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DEPARTMENT OF THE INTERIOR,
CENSUS OFFICE.

FRANCIS A. WALKER, Superintendent,
Appointed April 1, 1879; resigned November 3, 1881.

CHAS. W. SEATON, Superintendent,
Appointed November 4, 1881.

REPORT

ON THE

MANUFACTURES OF THE UNITED STATES

AT THE

TENTH CENSUS

(JUNE 1, 1880),

EMBRACING

GENERAL STATISTICS

AND MONOGRAPHS ON

POWER USED IN MANUFACTURES.
THE FACTORY SYSTEM.
INTERCHANGEABLE MECHANISM.
HARDWARE, CUTLERY, ETC.
IRON AND STEEL.
SILK MANUFACTURE.
COTTON MANUFACTURE.
WOOLEN MANUFACTURE.
CHEMICAL PRODUCTS AND SALT.
GLASS MANUFACTURE.

COMPILED AND PUBLISHED PURSUANT TO ACTS OF CONGRESS APPROVED MARCH 3, 1879, APRIL 20, 1880, AND AUGUST 7, 1882.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1883.

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DEPARTMENT OF THE INTERIOR,
CENSUS OFFICE,
Washington, D. C., October 1, 1883.

Hon. H. M. TELLER,
Secretary of the Interior.

SIR: I have the honor to transmit herewith the second volume of the final report upon the Tenth Census, viz, that comprising the general statistics of manufacturing industry, together with special reports on Power used in Manufactures, by Herman Hollerith; The Factory System, by Carroll D. Wright; Manufactures of Interchangeable Mechanism, by Charles H. Fitch; Hardware, Cutlery, and Edge-tools, by Charles H. Fitch; Iron and Steel Production, by James M. Swank; Silk Manufacture, by Wm. C. Wyckoff; Cotton Manufacture, by Edward Atkinson; Woolen Manufacture, by Geo. Wm. Bond; Chemical Products and Salt, by Wm. L. Rowland, and Glass Manufacture, by Jos. D. Weeks.

Especial acknowledgment is due to Frank R. Williams, who, as chief of the division of manufactures, has conducted, in a manner altogether admirable, the compilation of the general statistical tables.

I have the honor to be, very respectfully, your obedient servant,

C. W. SEATON,
Superintendent of Census.

REMARKS ON THE STATISTICS OF MANUFACTURES.

Inquiries respecting the manufacturing interests of the country were incorporated into the census as early as 1810.

The data collected for that census (1810) were so varied for the several states that no consolidated statement could be given for the United States; hence an exact copy has been made showing the methods adopted for each state, and is published, for its historical value, in an appendix to these remarks.

In 1820 the inquiries of the census embraced the following information:

Market value of the *articles* annually *manufactured.*
The *kind* of *raw materials employed.*
The *quantity* of *raw materials* annually *consumed.*
The cost of *raw materials* annually *consumed.*
Men employed.
Women employed.
Boys and *girls* employed.
Whole *quantity* and *kind* of *machinery.*
Quantity of *machinery* in *operation.*
Amount of *capital invested.*
Amount paid annually *for wages.*
Amount of *contingent expenses.*
General observations.

The industries separately returned at this census (1820) were, from the state of New York for example, as follows:

Ale and strong beer.
Axes, edged tools, machinery, etc.
Axes, hoes, scythes.
Ashes, pot.
Beef and pork.
Broadcloths, satinets, cassimeres, etc.
Beer.
Bricks.
Bar iron.
Bar iron, wagon tire, plowshares, molds, etc.
Boots and shoes.
Broad, narrow, plain cloths and cassimeres.
Beer, porter, and ale.
Bonnets, straw, etc.
Books, school, blank, and miscellaneous.
Brushes.
Black lead-pencils and crayons.
Blockmakers' work in general.
Brass andirons, shovels and tongs, castings, hinges, etc.
Brushes, bellows, etc.
Buhr millstones.
Brass and prince's metal, nails.
Brick and tile.
Clocks, wooden.
Cutlery.
Chairs.
Coopers' work.
Chairs and spinning-wheels.
Church and other bells, mathematical instruments, brass castings, etc.
Combs.
Cloth manufactured and cloth dressed for customers.
Cotton cloths.
Chairs, Windsor.
Copper and tin ware.
Clocks of brass.
Cotton cloth and yarn.
Cotton yarn, shirtings and sheetings, etc.
Cloths, woolen.
Combs, brass.
Chairs, fancy and Windsor.
Cloth made and cloth dressed, and wool carded.
Candles and soap.
Candles, spermaceti.
Chemical drugs.
Coaches, sleighs, gigs, etc.
Colors.
Cotton goods generally.
Cut glass.
Cordage, white and tarred.
Cordage of all sorts.
Casks for whale oil.
Cider spirits.
Cotton yarn, twist, filling, sewing, netting, and floss cotton.
Cardboards and handles.
Cabinet ware of all kinds.
Cider brandy.
Deer skins, dressed, mittens and gloves.
Earthenware.
Flour.
Furniture, cabinet.
Flour of gypsum.
Fulling, dressing, etc., of cloth.
Fulling and dressing cloths and flannels.

Fulling, etc., cloth and carding wool.
Flour and meal.
Fabrics, cotton and woolen.
Flour and ground plaster.
Floor-cloth.
Flannels, kerseymeres, cassimeres, etc.
Flour and linseed oil.
Flour barrels.
Gin and whisky.
Gloves and mittens.
Guns and gun-locks.
Guns.
Glass bottles and tumblers.
Gin and brandy.
Gunpowder.
Gummed silk.
Gummed, medicated elastic linen and cotton.
Gin.
Gun-barrels, scythes, etc.
Hats.
Hollow ware, molds, castings, etc.
Hats and bonnets.
Hollow ware, potash kettles, stoves, machinery, etc.
Hoops for cut nails.
Hogsheads, tierces, barrels, etc.
Harness, saddles, etc.
Horn combs.
Iron castings of every kind.
Iron railing and house work.
Iron and brass of all kinds.
Iron, bar and draft.
Iron, pig, and refined bar iron.
Leather, upper and sole, calf and sheepskins.
Leather, sole, harness, etc.
Lumber.
Lumber, as boards, scantling, etc.
Linen yarn and coarse cloths.
Lead of all descriptions, distill-worms, and pewter ware generally.
Lead, white and red, and whiting.
Locks, bolts, hinges, etc.
Morocco leather.
Machines, carding and spinning.
Morocco, shoes and boots.
Muskets, rifles, and fowling-pieces.
Machinery for cotton and woolen manufactures.
Machines, carding, picking, and spinning.
Machine and hand cards.
Marble, rough and manufactured.
Marble mantels, tombs, monuments, gravestones, table-tops, etc.
Marble chimney pieces, monuments, and busts.
Morocco, roans and binding.
Mustard.
Nails.
Nails of all kinds, and brads.
Nails, wrought and cut.
Nails and hoop-iron.
Nail-plates, rods, and cut nails.
Nails, axes, etc.
Needles and fish-hooks.
Nails and smiths' work.
Nails, cut.
Nails and brads, hooped and rolled iron, rolled steel.
Paper, cap, letter, super royal and demy, printing, and writing.
Plow plates, stoves, ironware, etc.
Potash.
Pearlash.
Plows.
Pot and pearl ash.
Pottery.
Potters' ware.
Printers' work, as newspapers, pamphlets, etc.
Paint, red and gray emery.
Plow irons, hoes, axes, etc.
Potters' brown earth-ware.
Paper, writing, printing, hanging, etc.
Plows and agricultural implements.
Prussian blue.
Patent painted floor-cloth.
Plated saddlery, coach and harness furniture.
Porter, ale, and beer.
Rope and twine.
Rum.
Rifles, pistols, and muskets.
Rolls, carded and cloth dressed.
Rolls, carded and cloth dyed, fulled, and dressed.
Shirting, brown.
Soap and candles.
Saddles, bridles, harness, trunks, etc.
Shovels and spades.
Spinning-wheels.
Salt.
Satinets, cassimeres, and other woolen cloths.
Scythes.
Sieves, etc.
Segars.
Sugar, maple.
Scythes, hoes, and axes.
Scythes, hoes, axes, and edge-tools.
Satinets and narrow cloths.
Shirtings, sheeting, ticking, diapers, stripes, etc.
Shirtings, sheetings, stripes, checks, etc., and yarn.
Stove-pipe, tinware, etc.
Slate, house.
Scythes and sleigh shoes.
Screens, sieves, safes, etc.
Satinets and broadcloths.
Silverware.
Smoke-jacks, plating-mills, rollers, locks, turning-lathes, spiral springs, etc.
Snuff and tobacco.
Soap, fancy.
Soap, transparent and perfumed.
Steam-engines, and castings of all descriptions.
Stills, worms, etc.
Stockings, pantaloons, and drawers.
Stone-cutting in general.
Stoneware.
Sugar, refined, etc.
Stone, lime.
Stoves, mounted, pipes and boilers.
Tinware.
Tinware and sheet-iron ware.
Tobacco, fine-cut, common smoking, and pig-tail.
Tinware of all kinds, stoves and pipes.
Tobacco, cut, chewing, etc.
Tobacco and snuff of all kinds.
Turpentine, spirits, varnish, pitch, etc.
Types, printing, and stereotype plates.
Tobacco, cut, and segars.
Whips, mounted and common.
Whisky.
Wagons, sleighs, etc.
Whisky, raw and rectified.
Window-glass.
Whisky and gin.
Window-glass, cylinder, crown.
Window-sash.
Woolen cloths, dressed.
Wool carded and cloth dressed.
Woolen cloths.
Woolen cloths and satinets.
Wool, carded and spun.
Woolen goods of all sorts.
Wagons, plows, etc.
Yarns, shirtings, sheeting, tickings, etc.
Yarn and wool, carded.

In 1830 there was no provision made by the census law for taking the industrial statistics. For 1840 the following summarized table for the United States is given:

Industries.	Number of establishments.	Capital.	Number of persons employed.	Value of products.
		Dollars.		*Dollars.*
Machinery	...	20 620, 869	13, 001	10, 980, 581
Hardware, cutlery, etc			5, 492	6, 451, 967
Cannon and small-arms*			1, 744	...
Precious metals			1, 556	4, 734, 960
Various metals			6, 667	9, 779, 442
Granite, marble, etc			3, 734	2, 412, 950
Bricks and lime			22, 807	9, 736, 945
Wool:				
Fulling-mills	2, 585	15, 765, 124	21, 342	20, 696, 999
Woolen manufactories	1, 420			
Cotton:				
Cotton manufactories	1, 240	51, 102, 359	72, 119	46, 350, 453
Number of spindles, 2, 284, 631	...			
Dyeing and printing establishments	129			
Silk†	...	274, 374	767	119, 814
Flax	...	208, 087	1, 628	322, 205
Mixed manufactures	...	4, 368, 991	15, 905	6, 545, 503
Tobacco	...	3, 437, 191	8, 384	5, 819, 568
Hats, caps, bonnets, etc.:				
Hats and caps	...	4, 485, 300	20, 176	8, 708, 342
Straw bonnets				1, 476, 505
Leather tanneries, saddleries, etc.:				
Tanneries ‡	8, 229	15, 650, 929	26, 018	33, 134, 403
All other manufactories of leather, saddleries, etc	17, 136	12, 881, 262		
Soap and candles §	...	2, 757, 273	5, 641	...
Distilled and fermented liquors:				
Distilleries ‖	10, 306	9, 147, 368	12, 223	...
Breweries ¶	406			
Powder mills **	137	875, 875	496	...
Drugs and medicines, paints and dyes:				
Medicinal drugs, paints and dyes	...	4, 507, 675	1, 848	4, 151, 899
Turpentine and varnish				660, 827
Glass, earthenware, etc.:				
Glass houses	81	2, 084, 100	3, 236	2, 890, 293
Glass-cutting establishments	34			
Potteries	659	551, 431	1, 612	1, 104, 825
Sugar refineries, chocolate, etc.:				
Sugar refineries	43	1, 769, 571	1. 355	3, 250, 700
Chocolate				79, 900
Confectionery				1, 143, 965
Paper	426	4, 745, 239	4, 726	5, 641, 495
All other manufactures of paper, playing-cards, etc	...	...	...	511, 597
Printing and binding:				
Printing offices ††	1, 552	5, 873, 815	11, 523	...
Binderies	447			
Cordage:				
Rope-walks	388	2, 465, 577	4, 464	4, 078, 306
Musical instruments	...	734, 370	908	923, 924
Carriages and wagons	...	5, 551, 632	21. 994	10, 897, 887
Mills:				
Flouring-mills ‡‡	4, 364	65, 858, 470	60, 788	76, 545, 246
Grist-mills	23, 661			
Oil-mills	843			
Saw-mills	31, 650			
Ships	...	...	...	7, 016, 094
Furniture	...	6, 989, 971	18, 003	7, 555, 405
Houses §§	...	...	85, 501	41, 917, 401
All other manufactures	...	25, 019. 726	...	34, 785, 353

---

* Number of cannon, 274; number of small-arms, 88,073.

† Pounds made, 15,745½.

‡ Sides of sole-leather tanned, 3,463,611; sides of upper leather tanned, 3,781,868.

§ Pounds of soap, 49,820,497; pounds of tallow candles, 17,904,507; pounds of spermaceti and wax candles, 2,936,951.

‖ Gallons produced, 41,402,627.

¶ Gallons produced, 23,267,730.

** Pounds of powder made, 8,977,348.

†† Number of daily newspapers, 138; number of weekly newspapers, 1,141; number of semi-and tri-weekly newspapers, 125; number of periodicals, 227.

‡‡ Barrels of flour made, 7,404,562.

§§ Number of brick and stone houses built, 8,429; number of wooden houses built, 45,684.

By the act of May 2, 1850, the scope of the industrial statistics of the census was greatly enlarged. The results as published in the reports of the Seventh Census (1850) are in the main comparable with those of subsequent enumerations, although the schedule of inquiries has been considerably enlarged and the classification of industries has naturally undergone some changes. Table I of the present volume gives the figures of 1850 in juxtaposition with those of 1860, 1870, and 1880, and the statistics of that year are freely used throughout the present report, which cannot be said of the figures of any former census year—1820 or 1840, for instance, which are hardly comparable in form with those of the last four censuses, while there is grave reason to doubt alike the completeness and the accuracy of the returns from which they were made up.

THE METHODS OF COLLECTING INDUSTRIAL STATISTICS.

From 1850 to 1870, both inclusive, the statistics of manufactures were collected by the assistant marshals, so called, the actual enumerators of population, who, in addition to the family schedule, carried around with them a schedule for the enumeration of "productive industries", according to the provisions of the law. The enumeration was, by the terms of the schedule, limited to establishments producing annually to the value of $500.

In the earlier censuses it was almost a necessity that the regular enumerators of population should also conduct the canvass of manufacturing industries on account of the sparseness of settlement and the wide diffusion of petty manufacturing and mechanical establishments. (*a*) It would have involved an intolerable expense to require one set of officers to traverse the vast spaces covered by the census for the purpose of obtaining the statistics of population, while another set of officers went over the same ground to obtain the statistics of manufactures. Even at the present time, notwithstanding the increase of productive industry, it would probably be deemed undesirable to attempt the industrial canvass of the entire country through a special body of officers, however great might be considered the advantages of an enumeration by experts and picked men. But while this is true, and likely long to remain true, sound judgment seems to require that the advantages of such an enumeration should be obtained wherever they can be had at a not inordinate cost, even though the imperfections of the older method of enumeration should still have to be endured in regard to other portions of the field. Congress recognized this principle when it provided by the eighteenth section of the act of March 3, 1879, that—

> Whenever he shall deem it expedient the Superintendent of Census may withdraw the schedules of manufacturing and social statistics from the enumerators of the several subdivisions, and may charge the collection of these statistics upon experts and special agents to be employed without respect to locality.(*b*)

This provision of law placed it in the power of the Census Office to secure all the advantages of expert enumeration in the case of cities and large manufacturing towns, and even in the case of a few highly important industries spread all over the country, which are by their nature specially adapted to such a canvass from a central point, while leaving the productive establishments found in the small villages or scattered throughout rural districts to be visited by the regular enumerators of population. Under this duplex system the statistics of the latter class of establishments are still obtained just as well, with no greater imperfection and at no greater cost than formerly; while in respect to the larger number of establishments, predominantly also of a much higher industrial importance, which are comprised within cities and compact settlements, the advantages of an enumeration by officers specially appointed on account of their familiarity with the facts and conditions of each industry are secured at no extravagant cost. Under the provisions of law recited special agents were appointed in 279 cities and towns of the United States. In the case of all but thirty-one cities, one special agent only was appointed for each. In the remaining cities assistant special agents were appointed according to the extent and difficulty of the service required.

The total number of persons so appointed, with the length of service and amount of compensation in each case, will be found stated on pages v–viii of Statistics of Manufactures. From this it appears that the aggregate number of days' service rendered in this capacity was 16,138¾, and the aggregate amount of compensation therefor was $68,825.

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[a] In illustration of this wide diffusion of petty productive establishments, it is interesting to observe that, while the settled area of 1840 was but a little over one-half that of 1880, and the value of its manufactured products perhaps not more than one-seventh or one-eighth, there were almost as many grist-mills at the former as at the latter date, and an even greater number of saw-mills.

The figures for the two censuses are as follows:

	1840.	1880.
Grist-mills	23, 661	24, 338
Saw-mills	31, 650	25, 708

This fact shows strikingly the tendency to the concentration of productive industry during the past forty years, due chiefly to the increased facilities for transportation.

[b] Such experts and special agents shall take the same oath as the enumerators of the several subdivisions, and shall have equal authority with such enumerators in respect to the subjects consigned to them, and they shall receive compensation at rates to be fixed by the Superintendent of Census, with the approval of the Secretary of the Interior: *Provided*, That the same shall in no case exceed six dollars a day and actual traveling expenses.—*Ibid.*

The total number of establishments returned by the special agents appointed for cities and manufacturing towns was 99,401. This statement does not, however, of itself alone convey an adequate idea of the importance of the enumeration so conducted; probably five-sixths, if not nine-tenths, of the great manufacturing establishments of the country were embraced in this canvass. Single establishments were enumerated by special agents whose product exceeded that of any one of two thousand of the counties of the United States, and in more than one instance exceeded the combined product of twenty populous counties in states not specially given to manufactures. The total value of product reported from the 100 principal cities and towns, whose statistics are separately published in Table VI, following, reaches $3,045,368,831, forming much more than one-half of the entire product of the country. It is in regard to the great manufacturing establishments of the country that the industrial statistics of the census have heretofore been chiefly defective. The ordinary enumerator of population might safely be trusted to make an account of the product of the country saw-mill or blacksmith shop, perhaps of the small factory running a few months in the year and employing a score of hands. Even if he did not perform his work very well, his errors would, in a degree, offset each other, and the results would not in any case be of very great consequence. But if the work of canvassing the monster establishments which characterize this industrial age, in which hundreds or thousands are employed, in which hundreds of thousands or millions of capital are invested, be committed to a person not selected carefully for this very purpose and not giving his sole attention thereto, with abundant time and special facilities afforded him for the discharge of the duty, errors will inevitably occur so great and so vital as greatly to diminish the value of the results. A very careful enumerator of population may be grossly ignorant of the primary facts of the cotton, woolen, or iron manufacture, and might, in recording the statistics of a single gigantic establishment, commit a blunder which would exceed the value of the whole manufacturing production of a half dozen agricultural counties.

Moreover, it is to be noted that the employment of experts and special agents allows the census to obtain with accuracy a vast amount and variety of information regarding the kinds and quantities of machinery, of materials, and of products, to seek which through unskilled enumerators would only be to invite errors.

Besides the special agents already spoken of as appointed to canvass the manufacturing interests of their respective towns and cities, experts and special agents were appointed under the eighteenth section of the act of 1879 to canvass certain industries throughout the country at large, and the functions of these officers were in most cases enlarged by virtue of that provision of the same section which authorizes the Superintendent of Census to employ experts and special agents to investigate in their economic relations the manufacturing, railroad, fishing, mining, and other industries of the country.

Under the authority conveyed in the two several provisions recited, the following-named persons were appointed special agents at large in the department of manufactures:

Edward Atkinson, cotton goods, Boston, Mass.

George William Bond, manufactures of wool, Boston, Mass.

Henry Hall, ship-building, New York, N. Y.

Professor S. F. Peckham, petroleum production, Providence, R. I.

William L. Rowland, chemical manufacturing industry, Philadelphia, Pa.

James M. Swank, manufactures of iron and steel, Philadelphia, Pa.

Joseph D. Weeks, wages, and the manufacture of coke and glass, Pittsburgh, Pa. Three assistants: Edward T. Peters, E. W. Crane, John Caruthers.

William C. Wyckoff, manufactures of silk, New York, N. Y. One assistant: P. T. Wood.

P. T. Wood, mixed textile industry, New Providence, N. J.

Professor William P. Trowbridge, "power and machinery used in manufactures," Columbia College, New York city. Assistants: Joseph W. Knight Neftel, Herman Hollerith, F. R. Hutton, Charles H. Fitch, Dwight Porter, George F. Swain, James L. Greenleaf, Walter G. Eliott.

The reports of Messrs. Wright, Wyckoff, Bond, Atkinson, Swank, and Rowland on the subjects assigned to them, of Mr. Weeks on glass, and partial reports by two of Professor Trowbridge's assistants, Messrs. Fitch and Hollerith, will be found in the present volume. These reports present the results of a vast amount of patient and intelligent investigation by highly competent experts into the facts and conditions of manufacturing industry.

The remaining reports of special agents appointed to canvass manufacturing industries throughout the country at large have been left, on account of their bulk, to appear in subsequent volumes.

INCREASE OF MANUFACTURING INDUSTRY, 1850–1880.

The growth of the United States in manufacturing industry is one of the most noteworthy features of the present industrial age. It is not easy to say which is the best test of that growth; but the application of any one of the several tests offered by the tables common (*a*) to the last four censuses shows our national progress in this direction to have been remarkable.

---

[a] With certain exceptions, which are not of sufficient importance to require to be noted for the purposes of the following discussion.

Let us first take the figures representing the gross value of product; these are as follows:

Year.	Gross value of products.	Gain per cent. in ten years.	Gain per cent. in twenty years.	Gain per cent. in thirty years.
1850	*$1, 019, 109, 616			
1860	1, 885, 861, 676	85. 05		
1870	4, 232, 325, 442	124. 42	315. 30	
1880	5, 369, 579, 191	26. 87	184. 73	426. 89

* This is the true total. The total published is $1,019,106,616.

It is noted in another place (see introductory notes on the statistics of manufactures) that in comparisons of 1870 with 1880, on the one hand, or with 1860 on the other, it should be borne in mind that the figures for 1870 are stated in a currency which was at a great discount in gold, the average premium on gold being for the twelve months, June 1, 1869, to May 31, 1870, 25.3 per cent., which is closely equivalent to a discount on currency of 20 per cent. If, then, we discount the reported values of 1870 by one-fifth, we shall have as our corrected table the following:

Year.	Corrected gross value of manufactured products.	Corrected gain per cent. in ten years.	Corrected gain per cent. in twenty years.	Corrected gain per cent. in thirty years.
1850	$1, 019, 109, 616			
1860	1, 885, 861, 676	85. 05		
1870	3, 385, 860, 354	79. 54	232. 24	
1880	5, 369, 579, 191	58. 59	184. 73	426. 89

Again, we may inquire what has been the increase in the net value of manufactured products reported in the four successive censuses taken for the purposes of this comparison; that is, the value of the products after deduction of the value of the materials consumed:

Year.	Net value of manufactured products.	Gain per cent. in ten years.	Gain per cent. in twenty years.	Gain per cent. in thirty years.
1850	*$463, 935, 296			
1860	854, 256, 584	84. 13		
1870	1, 743, 898, 200	104. 14	275. 89	
1880	1, 972, 755, 642	13. 12	130. 93	325. 22

* The true total of materials is $555,174,320. The one published is $555,123,822.

Discounting the figures for 1870 on account of the premium on gold, as we did with the figures reporting gross product, we should have the corrected table of the net values of manufactured products as follows:

Year.	Corrected net value of manufactured products.	Corrected gain per cent. in ten years.	Corrected gain per cent. in twenty years.	Corrected gain per cent. in thirty years.
1850	$463, 935, 296			
1860	854, 256, 584	84. 13		
1870	1, 395, 118, 560	63. 31	200. 71	
1880	1, 972, 755, 642	41. 40	130. 93	325. 22

Again, we may take the figures of capital reported as invested in manufacturing industries at the successive periods under consideration, as affording a certain measure of the growth of the country in industrial power, although there is too much reason to believe that the returns of capital have always been gravely defective, for reasons which will be adverted to hereafter. Assuming, however, that the liability to omission or defective statement remained of constant force from 1850 to 1880, we should have the following progressive results:

Year.	Capital invested in manufactures.	Gain per cent. in ten years.	Gain per cent. in twenty years.	Gain per cent. in thirty years.
1850	$533, 245, 351			
1860	1, 009, 855, 715	89. 38		
1870	2, 118, 208, 769	109. 75	297. 23	
1880	2, 790, 272, 606	31. 73	176. 30	423. 26

Discounting the reported values of 1870, as has been done in preceding cases, we should have the corrected table as follows:

Year.	Corrected amount of capital invested in manufactures.	Corrected gain per cent. in ten years.	Corrected gain per cent. in twenty years.	Corrected gain per cent. in thirty years.
1850	$533, 245, 351			
1860	1, 009, 855, 715	89. 38		
1870	1, 694, 567, 015	67. 80	217. 70	
1880	2, 790, 272, 606	64. 66	176. 30	423. 26

Again, we may take for comparison the amount of manufacturing wages paid in each of the years 1850, 1860, 1870, and 1880:

Year.	Amount of manufacturing wages paid.	Gain per cent. in ten years.	Gain per cent. in twenty years.	Gain per cent. in thirty years.
1850	*$236, 759, 464			
1860	378, 878, 966	60. 03		
1870	775, 584, 343	104. 71	227. 58	
1880	947, 953, 795	22. 22	150. 20	300. 39

* This is the true total. The one published is $236,755, 464.

Should we discount the amount of wages paid in 1870 for the same reason and to the same extent as was done in the case of the gross product and the net product of that year, we should have the corrected table as follows:

Year.	Corrected amount of manufacturing wages paid.	Corrected gain per cent. in ten years.	Corrected gain per cent. in twenty years.	Corrected gain per cent. in thirty years.
1850	$236, 759, 464			
1860	378, 878, 966	60. 03		
1870	620, 467, 474	63. 76	162. 06	
1880	947, 953, 795	52. 78	150. 20	300. 39

If, again, we were to take the number of hands employed as the test of the manufacturing power of the country on the several dates named, we should have the following table:

Year.	Number of hands employed.	Gain per cent. in ten years.	Gain per cent. in twenty years.	Gain per cent. in thirty years.
1850	* 958, 079			
1860	1, 311, 246	36. 86		
1870	2, 053, 996	56. 64	114. 39	
1880	2, 732, 595	33. 04	108. 40	185. 22

* This is the true total. The one published is 957,959.

In the above table we reach an element which requires no allowance to be made on account of the state of the currency in 1870. The tremendous leap made by our manufacturing industries between 1860 and 1870, under the stimulus of war demand and war prices, forms a very striking feature of this table. Let us now put some of these separate elements together into a table for prompt and easy comparison:

	Gross value of manufactured product.	Gross value of manufactured product, 1870, discounted by premium on gold.	Net value of manufactured product.	Net value of manufactured product, 1870, discounted by premium on gold.	Capital invested.	Capital invested, 1870, discounted by premium on gold.	Wages paid.	Wages paid, 1870, discounted by premium on gold.	Hands employed.
Per cent. gain 10 years, 1850–'60 *	85. 05	85. 05	84. 13	84. 13	89. 38	89. 38	60. 03	60. 03	36. 86
Per cent. gain 10 years, 1860–'70	124. 42	79. 54	104. 14	63. 31	109. 75	67. 80	104. 71	63. 76	56. 64
Per cent. gain 10 years, 1870–'80	26. 87	58. 59	13. 12	41. 40	31. 73	64. 66	22. 22	52. 78	33. 04
Per cent. gain 20 years, 1860–'80	184. 73	184. 73	130. 93	130. 93	176. 30	176. 30	150. 20	150. 20	108. 40
Per cent. gain 30 years, 1850–'80	426. 89	426. 89	325. 22	325. 22	423. 26	423. 26	300. 39	300. 39	185. 22

* The true total of 1850 is used in casting these percentages.

THE GEOGRAPHICAL DISTRIBUTION OF OUR MANUFACTURING INDUSTRIES.

The geographical distribution of manufactures throughout the United States appears by the following tables, as was to be expected, to be governed by very different forces from those which control the distribution of population or of agricultural industry. The following table exhibits the rank of each state in the several respects of population, number of farms, aggregate value of farms, aggregate value of farm products, number of manufacturing establishments, aggregate value of manufacturing capital, and aggregate value of manufactured products:

States.	Rank in population.	AGRICULTURAL RANK.			MANUFACTURING RANK.		
		In number of farms.	In aggregate value of farms.	In aggregate value of products.	In number of establishments.	In capital.	In value of products.
Alabama	17	15	28	16	29	30	32
Arkansas	25	19	30	21	33	37	36
California	24	28	11	15	13	13	12
Colorado	35	37	36	36	36	35	31
Connecticut	28	32	22	31	16	6	7
Delaware	37	35	34	35	35	24	28
Florida	34	33	37	34	37	36	37
Georgia	13	13	23	10	20	22	22
Illinois	4	1	3	1	4	5	4
Indiana	6	6	5	6	6	12	10
Iowa	10	7	6	4	11	18	19
Kansas	20	14	12	17	25	29	24
Kentucky	8	9	10	12	15	17	17
Louisiana	22	25	32	22	30	27	25
Maine	27	22	26	29	17	16	15
Maryland	23	26	18	26	12	14	13
Massachusetts	7	27	19	27	5	3	3
Michigan	9	12	7	8	7	8	9
Minnesota	26	21	15	19	21	19	16
Mississippi	18	18	27	13	31	34	35
Missouri	5	4	8	7	8	11	8
Nebraska	30	23	25	24	32	33	33
Nevada	38	38	38	38	38	38	38
New Hampshire	31	31	29	32	22	15	18
New Jersey	19	30	16	25	10	7	6
New York	1	3	2	2	1	1	1
North Carolina	15	11	20	18	19	26	29
Ohio	3	2	1	3	3	4	5
Oregon	36	34	33	33	34	32	34
Pennsylvania	2	5	4	5	2	2	2
Rhode Island	33	36	35	37	27	9	14
South Carolina	21	20	31	23	28	28	30
Tennessee	12	10	14	14	18	23	21
Texas	11	8	17	11	23	31	27
Vermont	32	29	24	28	24	21	23
Virginia	14	17	13	20	14	20	20
West Virginia	29	24	21	30	26	25	26
Wisconsin	16	16	9	9	9	10	11

In the following tables the general statistics of manufactures for 1850, 1860, 1870, and 1880 are shown, with the states arranged by geographical groups and group totals (see note at foot of page xvi):

Groups.	Year.	No. of establishments.	Capital invested.	Hands employed.	Wages paid.	Value of all materials used.	Value of product.
NORTH ATLANTIC GROUP.							
Maine	1850	3, 974	$14, 699, 152	28, 020	$7, 485, 588	$13, 553, 144	$24, 661, 057
Do	1860	3, 810	22, 044, 020	34, 619	8, 368, 691	21, 553, 066	38, 193, 254
Do	1870	5, 550	39, 796, 190	49, 180	14,282, 205	49, 379, 757	79, 497, 521
Do	1880	4, 481	49, 988, 171	52, 954	13, 623, 318	51, 120, 708	79, 829, 793
New Hampshire	1850	3, 211	18, 242, 114	27, 092	6, 123, 876	12, 745, 466	23, 164, 503
Do	1860	2, 592	23, 274, 094	32, 340	8, 110, 561	20, 539, 857	37, 586, 453
Do	1870	3, 342	36, 023, 743	40, 783	13, 823, 091	44, 577, 967	71, 038, 249
Do	1880	3, 181	51, 112, 263	48, 831	14, 814, 793	43, 552, 462	73, 978, 028
Vermont	1850	1, 849	5, 001, 377	8, 445	2, 202, 348	4, 172, 552	8, 570, 920
Do	1860	1, 883	9, 498, 617	10, 497	3, 004, 986	7, 608, 858	14, 637, 807
Do	1870	3, 270	20, 329, 637	18, 686	6, 264, 581	17, 007, 769	32, 184, 606
Do	1880	2, 874	23, 265, 224	17, 540	5, 164, 479	18, 330, 677	31, 354, 366
Massachusetts	1850	8, 852	88, 940, 292	177, 461	41, 954, 736	85, 856, 771	157, 743, 994
Do	1860	8, 176	132, 792, 327	217, 421	56, 960, 913	135, 053, 721	255, 545, 922
Do	1870	13, 212	231, 677, 862	279, 380	118, 051, 886	334, 413, 982	553, 912, 568
Do	1880	14, 352	303, 806, 185	352, 255	128, 315, 362	386, 972, 655	631, 135, 284
Rhode Island	1850	864	12, 935, 676	20, 967	5, 047, 080	13, 186, 703	22, 117, 688
Do	1860	1, 191	24, 278, 295	32,490	8, 760, 125	19, 858, 515	40, 711, 296
Do	1870	1, 850	66, 557, 322	49, 417	19, 354, 256	73, 154, 109	111, 418, 354
Do	1880	2, 205	75, 575, 943	62, 878	21, 355, 619	58, 108, 443	104, 163, 621

Groups.	Year.	No. of establishments.	Capital invested.	Hands employed.	Wages paid.	Value of all materials used.	Value of product.
NORTH ATLANTIC GROUP—continued.							
Connecticut	1850	3, 737	$25, 876, 648	50, 731	$12, 435, 984	$23, 608, 971	$47, 114, 585
Do	1860	3, 019	45, 590, 430	64, 469	19, 026, 196	40, 909, 090	81, 924, 555
Do	1870	5, 128	95, 281, 278	89, 523	38, 987, 187	86, 419, 579	161, 065, 474
Do	1880	4, 488	120, 480, 275	112, 915	43, 501, 518	102, 183, 341	185, 697, 211
New York	1850	23, 553	99, 904, 405	199, 349	49, 131, 000	134, 655, 674	237, 597, 249
Do	1860	22, 624	172, 895, 652	230, 112	65, 446, 759	214, 813, 061	378, 870, 939
Do	1870	36, 206	366, 994, 320	351, 800	142, 466, 758	452, 065, 452	785, 194, 651
Do	1880	42, 739	514, 246, 575	531, 533	198, 634, 029	679, 612, 545	1, 080, 696, 596
New Jersey	1850	4, 207	22, 293, 258	37, 830	9, 364, 740	22, 011, 871	39, 851, 256
Do	1860	4, 173	40, 521, 048	56, 027	16, 277, 337	41, 429, 100	76, 306, 104
Do	1870	6, 636	79, 606, 719	75, 552	32, 648, 409	103, 415, 245	169, 237, 732
Do	1880	7, 128	106, 226, 593	126, 038	46, 083, 045	165, 285, 779	254, 380, 236
Pennsylvania	1850	21, 605	94, 473, 810	146, 766	37, 163, 232	87, 206, 377	155, 044, 910
Do	1860	22, 363	190, 055, 904	222, 132	60, 369, 165	153, 477, 698	290, 121, 188
Do	1870	37, 200	406, 821, 845	319, 487	127, 976, 594	421, 197, 673	711, 894, 344
Do	1880	31, 232	474, 510, 993	387, 072	134, 055, 904	465, 020, 563	744, 818, 445
SOUTH ATLANTIC GROUP.							
Delaware	1850	531	2, 978, 945	3, 888	936, 924	2, 864, 607	4, 649, 296
Do	1860	615	5, 452, 887	6, 421	1, 905, 754	6, 028, 918	9, 892, 902
Do	1870	800	10, 839, 093	9, 710	3, 692, 195	10, 206, 397	16, 791, 382
Do	1880	746	15, 655, 822	12, 638	4, 267, 349	12, 828, 461	20, 514, 438
Maryland	1850	3, 725	14, 934, 450	30, 212	7, 403, 832	17, 690, 836	33, 043, 892
Do	1860	3, 083	23, 230, 608	28, 403	7, 190, 672	25, 494, 007	41, 735, 157
Do	1870	5, 812	36, 438, 729	44, 860	12, 682, 817	46, 897, 032	76, 593, 613
Do	1880	6, 787	58, 742, 384	74, 945	18, 904, 965	66, 937, 846	106, 780, 563
Virginia	1850	4, 740	18, 109, 143	29, 110	5, 434, 476	18, 101, 131	29, 602, 507
Do	1860	5, 385	26, 935, 560	36, 174	8, 544, 117	30, 840, 531	50, 652, 124
Do	1870	5, 933	18, 455, 400	26, 974	5, 343, 099	23, 832, 384	38, 364, 322
Do	1880	5, 710	26, 968, 990	40, 184	7, 425, 261	32, 883, 933	51, 780, 992
West Virginia	1850	....	....	....	....	....	....
Do	1860	....	....	....	....	....	....
Do	*1870	2, 444	11, 084, 520	11, 672	4, 322, 164	14, 503, 701	24, 102, 201
Do	1880	2, 375	13, 883, 390	14, 311	4, 313, 965	14, 027, 388	22, 867, 126
North Carolina	1850	2, 663	7, 456, 860	14, 601	2, 383, 456	4, 602, 501	9, 111, 050
Do	1860	3, 689	9, 693, 703	14, 217	2, 689, 441	10, 203, 228	16, 678, 698
Do	1870	3, 642	8, 140, 473	13, 622	2, 195, 711	12, 824, 693	19, 021, 327
Do	1880	3, 802	13, 045, 639	18, 109	2, 740, 768	13, 090, 937	20, 095, 037
South Carolina	1850	1, 430	6, 053, 265	7, 066	1, 127, 712	2, 787, 534	7, 045, 477
Do	1860	1, 230	6, 931, 756	6, 994	1, 380, 027	5, 198, 881	8, 615, 195
Do	1870	1, 584	5, 400, 418	8, 141	1, 543, 715	5, 855, 736	9, 858, 981
Do	1880	2, 078	11, 205, 894	15, 828	2, 836, 289	9, 885, 538	16, 738, 008
Georgia	1850	1, 522	5, 456, 483	8, 368	1, 709, 664	3, 404, 917	7, 082, 075
Do	1860	1, 890	10, 890, 875	11, 575	2, 925, 148	9, 986, 532	16, 925, 564
Do	1870	3, 836	13, 930, 125	17, 871	4, 844, 508	18, 583, 731	31, 196, 115
Do	1880	3, 593	20, 672, 410	24, 875	5, 266, 152	24, 143, 939	36, 440, 948
Florida	1850	103	547, 060	991	199, 452	220, 611	668, 335
Do	1860	185	1, 874, 125	2, 454	619, 840	874, 506	2, 447, 969
Do	1870	659	1, 679, 930	2, 749	989, 592	2, 330, 873	4, 685, 403
Do	1880	426	3, 210, 680	5, 504	1, 270, 875	3, 040, 119	5, 546, 448
NORTHERN CENTRAL GROUP.							
Ohio	1850	10, 622	29, 019, 538	51, 491	13, 467, 156	34, 678, 019	62, 602, 279
Do	1860	11, 123	57, 295, 303	75, 602	22, 302, 989	69, 800, 270	121, 601, 148
Do	1870	22, 773	141, 923, 964	137, 202	49, 066, 488	157, 131, 697	269, 713, 610
Do	1880	20, 699	188, 939, 614	183, 609	62, 103, 800	215, 334, 258	348, 298, 390
Indiana	1850	4, 392	7, 750, 402	14, 440	3, 728, 844	10, 369, 700	18, 725, 423
Do	1860	5, 323	18, 451, 121	21, 295	6, 318, 335	27, 142, 597	42, 803, 469
Do	1870	11, 847	52, 052, 425	58, 852	18, 366, 780	63, 135, 492	108, 617, 278
Do	1880	11, 198	65, 742, 962	69, 508	21, 960, 888	100, 262, 917	148, 006, 411

* West Virginia separated from Virginia, yet there is an increase in Virginia.

Groups.	Year.	No. of establishments.	Capital invested.	Hands employed.	Wages paid.	Value of all materials used.	Value of product.
NORTHERN CENTRAL GROUP—continued.							
Illinois	1850	3, 162	$6, 217, 765	11, 559	$3, 204, 336	$8, 959, 327	$16, 534, 272
Do	1860	4, 268	27, 548, 563	22, 968	7, 637, 921	35, 558, 782	57, 580, 886
Do	1870	12, 597	94, 368, 057	82, 979	31, 100, 244	127, 600, 077	205, 620, 672
Do	1880	14, 549	140, 652, 066	144, 727	57, 429, 085	289, 843, 907	414, 864, 673
Michigan	1850	2, 033	6, 563, 660	9, 344	2, 717, 124	6, 136, 328	11, 169, 002
Do	1860	3, 448	23, 808, 226	23, 190	6, 735, 047	17, 635, 611	32, 658, 356
Do	1870	9, 455	71, 712, 283	63, 694	21, 205, 355	68, 142, 515	118, 394, 676
Do	1880	8, 873	92, 930, 959	77, 591	25, 313, 682	92, 900, 269	150, 715, 025
Wisconsin	1850	1, 262	3, 382, 148	6, 089	1, 712, 496	5, 414, 931	9, 293, 068
Do	1860	3, 064	15, 831, 581	15, 414	4, 268, 708	17, 137, 334	27, 849, 467
Do	1870	7, 013	41, 981, 872	43, 910	13, 575, 642	45, 851, 266	77, 214, 326
Do	1880	7, 674	73, 821, 802	57, 109	18, 814, 917	85, 796, 178	128, 255, 480
Minnesota	1850	5	94, 000	63	18, 540	24, 300	58, 300
Do	1860	562	2, 388, 310	2, 123	712, 214	1, 904, 070	3, 373, 172
Do	1870	2, 270	11, 993, 729	11, 290	4, 052, 837	13, 842, 902	23, 110, 700
Do	1880	3, 493	31, 004, 811	21, 247	8, 613, 094	55, 660, 681	76, 065, 198
Iowa	1850	522	1, 292, 875	1, 707	473, 016	2, 356, 881	3, 551, 783
Do	1860	1, 939	7, 247, 130	6, 307	1, 922, 417	8, 612, 259	13, 971, 325
Do	1870	6, 566	22, 420, 183	25, 032	6, 893, 292	27, 682, 096	46, 534, 322
Do	1880	6, 921	33, 987, 886	28, 372	9, 725, 962	48, 704, 311	71, 045, 926
Missouri	1850	2, 923	8, 576, 607	15, 808	4, 692, 648	12, 798, 351	24, 324, 418
Do	1860	3, 157	20, 034, 220	19, 681	6, 669, 916	23, 849, 941	41, 782, 731
Do	1870	11, 871	80, 257, 244	65, 354	31, 055, 445	115, 533, 269	206, 213, 429
Do	1880	8, 592	72, 507, 844	63, 995	24, 309, 716	110, 798, 392	165, 386, 205
Nebraska	1850						
Do	1860	107	266, 575	336	105, 332	237, 215	607, 328
Do	1870	670	2, 169, 963	2, 665	1, 429, 913	2, 902, 074	5, 738, 512
Do	1880	1, 403	4, 881, 150	4, 793	1, 742, 311	8, 208, 478	12, 627, 336
Kansas	1850						
Do	1860	344	1, 084, 935	1, 735	880, 346	1, 444, 975	4, 357, 408
Do	1870	1, 477	4, 319, 060	6, 844	2, 377, 511	6, 112, 163	11, 775, 833
Do	1880	2, 803	11, 192, 315	12, 062	3, 995, 010	21, 453, 141	30, 843, 777
SOUTHERN CENTRAL GROUP.							
Kentucky	1850	3, 609	11, 810, 462	21, 476	5, 106, 048	12, 165, 075	21, 710, 212
Do	1860	3, 450	20, 256, 579	21, 258	6, 020, 082	22, 295, 759	37, 931, 240
Do	1870	5, 390	29, 277, 809	30, 636	9, 444, 524	29, 497, 535	54, 625, 809
Do	1880	5, 328	45, 813, 039	37, 391	11, 657, 844	47, 461, 890	75, 483, 377
Tennessee	1850	2, 887	6, 527, 729	12, 039	2, 247, 492	5, 166, 886	9, 725, 608
Do	1860	2, 572	14, 426, 261	12, 528	3, 370, 687	9, 416, 514	17, 987, 225
Do	1870	5, 317	15, 595, 295	19, 412	5, 390, 630	19, 657, 027	34, 362, 636
Do	1880	4, 326	20, 092, 845	22, 445	5, 254, 775	23, 834, 262	37, 074, 886
Alabama	1850	1, 026	3, 450, 606	4, 936	1, 105, 824	2, 224, 960	4, 528, 876
Do	1860	1, 459	9, 098, 181	7, 889	2, 132, 940	5, 489, 963	10, 588, 566
Do	1870	2, 188	5, 714, 032	8, 248	2, 227, 968	7, 592, 837	13, 040, 644
Do	1880	2, 070	9, 668, 008	10, 019	2, 500, 504	8, 545, 520	13, 565, 504
Mississippi	1850	947	1, 815, 820	3, 154	771, 528	1, 275, 771	2, 912, 068
Do	1860	976	4, 384, 492	4, 775	1, 618, 320	3, 146, 636	6, 590, 687
Do	1870	1, 731	4, 501, 714	5, 941	1, 547, 428	4, 364, 206	8, 154, 758
Do	1880	1, 479	4, 727, 600	5, 827	1, 192, 645	4, 667, 183	7, 518, 302
Louisiana	1850	1, 008	5, 032, 424	6, 217	2, 033, 928	2, 459, 508	6, 779, 417
Do	1860	1, 744	7, 151, 172	8, 789	3, 683, 679	6, 738, 486	15, 587, 473
Do	1870	2, 557	18, 313, 974	30, 071	4, 593, 470	12, 412, 023	24, 161, 905
Do	1880	1, 553	11, 462, 468	12, 167	4, 360, 371	14, 442, 506	24, 205, 183
Texas	1850	309	530, 290	1, 066	322, 368	394, 642	1, 168, 538
Do	1860	983	3, 272, 450	3, 449	1, 162, 756	3, 367, 372	6, 577, 202
Do	1870	2, 399	5, 284, 110	7, 927	1, 787, 835	6, 273, 193	11, 517, 302
Do	1880	2, 996	9, 245, 561	12, 159	3, 343, 087	12, 956, 269	20, 719, 928

Groups.	Year.	No. of establishments.	Capital invested.	Hands employed.	Wages paid.	Value of all materials used	Value of product.
SOUTHERN CENTRAL GROUP—continued.							
Arkansas	1850	261	305, 015	842	159, 876	215, 789	537, 908
Do	1860	518	1, 316, 610	1, 877	554, 240	1, 280, 503	2, 880, 578
Do	1870	1, 079	1, 782, 913	3, 206	673, 963	2, 536, 998	4, 029, 234
Do	1880	1, 202	2, 953, 130	4, 557	925, 358	4, 392, 080	6, 756, 159
WESTERN GROUP.							
Nevada	1850	....	....	....	....	....	....
Do	1860	....	....	....	....	....	....
Do	1870	330	5, 127, 790	2, 859	2, 498, 473	10, 315, 984	15, 870, 539
Do	1880	184	1, 323, 300	577	461, 807	1, 049, 794	2, 179, 626
Oregon	1850	52	843, 600	285	388, 620	809, 560	2, 236, 640
Do	1860	309	1, 337, 238	978	635, 256	1, 431, 952	2, 976, 761
Do	1870	969	4, 376, 849	2, 884	1, 120, 173	3, 419, 756	6, 877, 387
Do	1880	1, 080	6, 312, 056	3, 473	1, 667, 046	6, 954, 436	10, 931, 232
California	1850	1, 003	1, 006, 197	3, 964	3, 717, 180	1, 201, 154	2, 862, 522
Do	1860	8, 468	22, 043, 096	49, 226	28, 402, 287	27, 051, 674	68, 253, 228
Do	1870	3, 984	39, 728, 202	25, 392	13, 136, 722	35, 351, 193	66, 594, 556
Do	1880	5, 885	61, 243, 784	43, 693	21, 065, 905	72, 607, 709	116, 218, 973
Colorado	1850	....	....	....	....	....	....
Do	1860	....	....	....	....	....	....
Do	1870	256	2, 835, 605	876	528, 221	1, 593, 280	2, 852, 820
Do	1880	599	4, 311, 714	5, 074	2, 314, 427	8, 806, 762	14, 260, 159

RECAPITULATION BY GROUP TOTALS.

Group totals.	Number of establishments.	Capital invested.	Hands employed.	Wages paid.	Value of all materials used.	Value of product.
1850.						
The United States	122, 589	$532, 131, 076	955, 377	$235, 971, 124	$553, 320, 848	$1, 015, 879, 128
North Atlantic	71, 852	382, 366, 732	696, 661	170, 908, 584	396, 997, 529	715, 866, 162
South Atlantic	14, 714	55, 536, 206	94, 236	19, 195, 516	49, 672, 137	91, 202, 632
Northern Central	24, 921	62, 896, 995	110, 501	30, 014, 160	80, 737, 837	146, 348, 545
Southern Central	10, 047	29, 481, 346	49, 730	11, 747, 064	23, 902, 631	47, 362, 627
Western	1, 055	1, 849, 797	4, 249	4, 105, 800	2, 010, 714	15, 099, 162
1860.						
The United States	139, 722	1, 003, 201, 944	1, 305, 765	376, 713, 204	1, 027, 411, 482	1, 876, 893, 377
North Atlantic	69, 831	660, 950, 387	900, 107	246, 324, 733	655, 242, 966	1, 213, 897, 518
South Atlantic	16, 077	85, 009, 514	106, 238	25, 254, 999	88, 626, 603	146, 947, 609
Northern Central	33, 335	173, 955, 964	188, 651	57, 553, 225	203, 323, 054	346, 675, 290
Southern Central	11, 702	59, 905, 745	60, 565	18, 542, 704	51, 735, 233	98, 142, 971
Western	8, 777	23, 380, 334	50, 204	29, 037, 543	28, 483, 626	71, 229, 989
1870.						
The United States	249, 843	2, 104, 794, 677	2, 044, 681	771, 541, 682	2, 477, 613, 663	4, 211, 677, 791
North Atlantic	112, 394	1, 343, 088, 916	1, 273, 808	513, 854, 967	1, 581, 631, 533	2, 675, 443, 499
South Atlantic	24, 710	105, 968, 688	135, 599	35, 613, 801	135, 034, 547	220, 613, 344
Northern Central	86, 539	523, 198, 780	497, 822	179, 123, 507	627, 933, 551	1, 072, 933, 358
Southern Central	20, 661	80, 469, 847	105, 441	25, 665, 818	82, 333, 819	150, 492, 288
Western	5, 539	52, 068, 446	32, 011	17, 283, 589	50, 680, 213	92, 195, 302
1880.						
The United States	251, 104	2, 775, 412, 345	2, 718, 805	941, 325, 925	3, 381, 701, 277	5, 341, 838, 890
North Atlantic	112, 680	1, 719, 212, 222	1, 692, 016	605, 548, 067	1, 970, 182, 173	3, 186, 053, 580
South Atlantic	25, 517	163, 385, 209	206, 394	47, 025, 624	176, 838, 161	280, 763, 560
Northern Central	86, 205	715, 661, 409	663, 013	234, 008, 465	1, 028, 962, 532	1, 546, 108, 421
Southern Central	18, 954	103, 962, 651	104, 565	29, 234, 584	116, 299, 710	185, 323, 339
Western	7, 748	73, 190, 854	52, 817	25, 509, 185	89, 418, 701	143, 589, 990

The following table presents for 1880 the proportions in which the several geographical groups contribute to the aggregate number of establishments, amount of capital invested, number of hands employed, amount of wages paid, and the gross and net values of product:

Groups of states.	Number of establishments.	Amount of capital invested.	Hands employed.	Wages paid.	Gross product.	Net product (*i. e.*, deducting value of materials).
The United States	100.00	100.00	100.00	100.00	100.00	100.00
North Atlantic	44.87	61.94	62.23	64.33	59.64	62.03
South Atlantic	10.16	5.89	7.59	4.99	5.26	5.30
Northern Central	34.33	25.78	24.39	24.86	28.94	26.38
Southern Central	7.55	3.75	3.85	3.11	3.47	3.52
Western	3.09	2.64	1.94	2.71	2.69	2.77

The following table exhibits the ratio of increase in the population of each state from 1870 to 1880 in comparison with the ratio of increase in certain manufacturing respects:

States.	Population.	Increase per cent. in population, 1870 to 1880.	INCREASE PER CENT. IN CERTAIN MANUFACTURING RESPECTS, 1870–1880.					
			Number of establishments.		Capital invested.*		Aggregate value of gross products.	
			Increase.	Decrease. †	Increase.	Decrease. †	Increase.	Decrease. †
The United States	50,155,783	30.08	0.68		31.73		26.87	
Alabama	1,262,505	26.63		5.39	69.20		4.02	
Arkansas	802,525	65.65	11.40		65.64		45.95	
California	864,694	54.34	47.72		54.16		74.52	
Colorado	194,327	387.47	133.98		52.06		399.86	
Connecticut	622,700	15.86		12.48	26.45		15.29	
Delaware	146,608	17.27		6.75	44.44		22.17	
Florida	269,493	43.54		35.36	91.12		18.38	
Georgia	1,542,180	30.24		6.33	48.40		16.81	
Illinois	3,077,871	21.18	15.50		49.05		101.76	
Indiana	1,978,301	17.71		5.48	26.30		36.26	
Iowa	1,624,615	36.06	5.41		51.60		52.67	
Kansas	996,096	173.35	89.78		159.14		161.92	
Kentucky	1,648,690	24.81		1.15	56.48		38.18	
Louisiana	939,946	29.31		39.26		37.41	0.18	
Maine	648,936	3.51		19.26	25.61		0.42	
Maryland	934,943	19.73	16.78		61.21		39.41	
Massachusetts	1,783,085	22.35	8.63		31.13		13.94	
Michigan	1,636,937	38.24		6.16	29.59		27.30	
Minnesota	780,773	77.57	53.88		158.51		229.13	
Mississippi	1,131,597	36.68		14.56	5.02			7.80
Missouri	2,168,380	25.97		27.62		9.66		19.80
Nebraska	452,402	267.83	109.40		124.94		120.05	
Nevada	62,266	46.54		44.24		74.19		86.27
New Hampshire	346,991	9.01		4.82	41.88		4.14	
New Jersey	1,131,116	24.83	7.41		33.44		50.31	
New York	5,082,871	15.97	18.04		40.12		37.63	
North Carolina	1,399,750	30.65	4.39		60.26		5.64	
Ohio	3,198,062	19.99		9.11	33.13		29.14	
Oregon	174,768	92.22	11.46		44.21		58.94	
Pennsylvania	4,282,891	21.61		16.04	16.64		4.62	
Rhode Island	276,531	27.22	19.19		13.55		6.51	
South Carolina	995,577	41.09	31.19		107.50		69.77	
Tennessee	1,542,359	22.55		18.64	28.84		7.89	
Texas	1,591,749	94.45	24.89		74.97		79.90	
Vermont	332,286	0.52		12.11	14.44			2.58
Virginia	1,512,565	23.46		3.76	46.13		34.97	
West Virginia	618,457	39.92		2.82	25.25			5.12
Wisconsin	1,315,497	24.73	9.43		75.84		66.10	

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* It will be observed that in this comparison of 1870 with 1880 the reported capital and the values of the products of the former date are not discounted according to the premium on gold.

† The following industries, viz: Pig lead, gold and silver quartz (milled), sugar and molasses manufactured from sorghum and raw cane, which were included with the statistics of manufactures for 1870, have been relegated to their respective classes of mining and agriculture in 1880, and this fact should be borne in mind in making comparisons between 1880 and 1870 of states reporting for 1870 either industry named above.

INDIVIDUAL INDUSTRIES.

Table II of the general statistical tables following distributes the aggregate of our manufacturing industries under 332 titles; of these the following show each a total production of $30,000,000 or over:

Industry.	Number of establishments.	Number of hands employed.	Amount paid in wages.	Value of materials.	Value of product.
Total	194, 539	2, 005, 647	$688, 361, 961	$2, 654, 702, 809	$4, 101, 889, 676
Agricultural implements	1, 943	39, 580	15, 359, 610	31. 531, 170	68, 640, 486
Blacksmithing	28, 101	34, 526	11, 126, 001	14, 572, 363	43, 774, 271
Boots and shoes, including custom work and repairing	17, 972	133, 819	50, 995, 144	114, 966, 575	196, 920, 481
Bread and other bakery products	6, 396	22, 488	9, 411, 328	42, 612, 027	65, 824, 896
Brick and tile	5, 631	66, 355	13, 443, 532	9, 774, 834	32, 833, 587
Carpentering	9, 184	54, 138	24, 582, 077	51, 621, 120	94, 152, 139
Carriages and wagons	3, 841	45, 394	18, 988, 615	30, 597, 086	64, 951, 617
Clothing, men's	6, 166	160, 813	45, 940, 353	131, 363, 282	209, 548, 460
Clothing, women's	562	25, 192	6, 661, 005	19, 559, 227	32, 004, 794
Cooperage	3, 898	25, 973	8, 992, 603	18, 441, 064	33, 714, 770
Cotton goods	1, 005	185, 472	45, 614, 419	113, 765, 537	210, 950, 383
Drugs and chemicals	592	9, 545	4, 157, 163	24. 380, 566	38, 173, 658
Dyeing and finishing textiles	191	16, 698	6, 474, 364	13, 664, 295	32, 297, 420
Flouring- and grist-mill products	24, 338	58, 407	17, 422, 316	441, 545, 225	505, 185, 712
Foundery and machine-shop products	4, 958	145, 351	65, 982, 133	103, 345, 083	214, 378, 468
Furniture*	5, 227	59, 304	23, 695, 080	35, 860, 206	77, 845, 725
Iron and steel	1, 005	140, 978	55, 476, 785	191, 271, 150	296, 557, 685
Leather, curried	2, 319	11, 053	4, 845, 413	59, 306, 509	71, 351, 297
Leather, tanned	3, 105	23, 812	9, 204, 243	85, 949, 207	113, 348, 336
Liquors, distilled	844	6, 502	2, 663, 967	27, 744, 245	41, 063, 663
Liquors, malt	2, 191	26, 220	12, 198, 053	56, 836, 500	101, 058, 385
Lumber, planed	1, 203	15, 289	5, 890, 724	24, 477, 543	36, 803, 356
Lumber, sawed	25, 708	147, 956	31, 845, 974	146, 155, 385	233, 268, 729
Marble and stone work	2, 846	21, 471	10, 238, 885	12, 743, 345	31, 415, 150
Mixed textiles	470	43, 373	13, 316, 753	37, 227, 741	66, 221, 703
Paper	692	24, 422	8, 525, 355	33, 951, 297	55, 109, 914
Printing and publishing	3, 467	58, 478	30, 531, 657	32, 460, 395	90, 789, 341
Saddlery and harness	7, 999	21, 446	7, 997, 752	19, 968, 716	38, 081, 643
Sash, doors, and blinds	1, 288	21, 898	8, 540, 930	20, 790, 919	36, 621, 325
Ship-building	2, 188	21, 345	12, 713, 813	19, 736, 358	36, 800, 327
Silk and silk goods	382	31, 337	9, 146, 705	22, 467, 701	41, 033, 045
Slaughtering and meat-packing, not including retail butchering establishments.	872	27, 297	10, 508, 530	267, 738, 902	303, 562, 413
Sugar and molasses, refined	49	5, 857	2, 875, 032	144, 698, 499	155, 484, 915
Tinware, copperware, and sheet-iron ware	7, 595	26, 248	10, 722, 974	25, 232, 281	48, 096, 038
Tobacco, chewing, smoking, and snuff	477	32, 756	6, 419, 024	34, 397, 072	52, 793, 056
Tobacco, cigars and cigarettes	7, 145	53, 297	18, 464, 562	29, 577, 833	63, 979, 575
Woolen manufactures, all classes †	2, 689	161, 557	47, 389, 087	164, 371, 551	267, 252, 913

* Includes furniture, chairs. † Includes carpets, other than rag; felt goods; hosiery and knit goods; wool hats; woolen goods and worsted goods.

It will be seen that these thirty-seven (*a*) selected industries yield a total production of $4,101,889,676, or about 76.39 per cent. of the manufacturing aggregate of the United States. Twenty-one industries report each $15,000,000 to $30,000,000; 60, $5,000,000 to $15,000,000; 108, $1,000,000 to $5,000,000; 100, under $1,000,000.

Table III shows the respective contributions of the states and territories to the grand total of each industry, with the exception of 26 branches of manufacture, which are reserved to be subsequently given more at length, either in Table VII or in the detailed report of some special agent, and certain branches of manufacture which are omitted by reason of their appearing in less than eight states and territories. That the latter class should contain so many as 103 out of the 332 industries enumerated in Table II affords a striking exhibition of the irregular manner in which the industries recorded in the census are found distributed among the several states and territories. The study of that distribution is both interesting and instructive; but it needs to be borne in mind that the titles in the tables under consideration only characterize the principal productions of the establishments reported. Thus, while there may appear a certain number of establishments reported as manufacturing some highly special article, it does not follow that this article is only manufactured to that extent; other establishments of a more miscellaneous character may produce this article in connection with many others, and those establishments would be properly returned under some more general term to express the wide variety of their products. The making of shirts, for instance, is returned as a separate branch of industry in only 27 states and territories; but, in addition to the domestic manufacture of this article, there are doubtless in the other states and territories tailors, manufacturers of clothing, etc., who make shirts for the general market as a part of their business.

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[a] These thirty-seven industries embrace forty-three industries, according to the classification adopted in Table IV.

It is, of course, always to be borne in mind that these tables relate only to the product of distinct establishments. When we say that "bread and other bakery products" are reported in 45 states and territories, (*a*) we do not mean to say that bread is not also made in the remaining two states or territories in private families, hotels, restaurants, or boarding-houses, but only that it is not made in distinct establishments of productive industry, such as bakeries.

Some branches of manufacture are reported for every one of the 47 states and territories; such as blacksmithing, boot and shoe making, the manufacture of tinware, copperware, or sheet-iron ware, and saddlery and harness making. The making or repairing of carriages and the wheelwrighting trade appear in 46 states and territories. The making of bread and other bakery products and the manufacture of furniture are reported from 45 states and territories. Forty-four states and territories return founderies and machine-shops.

It is significant of the habits of the people that while the production of men's clothing in distinct establishments is reported in 43 states and territories, that of women's clothing is reported for only 25, domestic manufacture or custom dress-making taking the place of the shop or factory in supplying this demand in 22 states or territories. The other industries which are reported in as many as 43 states and territories are the manufacture of tobacco or cigars and the manufacture of confectionery. The distinct manufacture of brooms and brushes is reported from 36 states and territories, and that of mattresses and spring beds from 35.

The planing of lumber in distinct establishments (not that which is merely a branch of carpentering) is reported in 42 states and territories. The industry of printing and publishing is reported in an equal number, the working of stone or marble in 41, lock- and gun-smithing in 40. The manufacture of mineral and soda-water follows close upon lock- and gun-smithing, being represented in 38 states. The manufacture of malt liquors is pursued in 40 states or territories. The separate manufacture of coffins and undertakers' goods is reported from only 38. The manufacture of looking-glasses and picture frames appears in 32 states or territories; that of umbrellas and canes in but 19. One marked tendency of our agriculture at the present time is indicated by the return of fertilizers manufactured in 31 states or territories, while another notable feature is represented by the canning and preserving of fruits and vegetables, as a shop or factory industry, in not less than 25. The dressing of furs is reported in 22 states or territories; the making of paving materials in 14; of professional and scientific instruments in 18; of fire-proof safes and vaults in 14; of matches in 13; of corsets in 20; of fire-arms in 6; of scales and balances in 16; of sewing-machines and attachments in an equal number; of saws in 20; of lightning-rods in 10 (it is curious to note that the lightning-rod manufacture, as a separate branch of industry, is reported almost exclusively from the west, the states reported being Illinois, Indiana, Iowa, Kentucky, Maryland, Minnesota, Missouri, Ohio, Pennsylvania, and Wisconsin); of needles and pins in 8; of ink in 14; of refrigerators in 15.

So much for the wide territorial diffusion of common industries, many of them of a petty character. One branch of manufacture, which aggregates less than $2,000,000 worth of product, appears in 28 states or territories, including Maine, California, and Louisiana; another in 22 states aggregates considerably less than $1,000,000. Of the greater industries, some are widely spread; others intensely concentrated. The greatest of all is the flour- and grist-mill industry, aggregating a product of $505,185,712. Of this about one-half is produced by the six states of New York, Illinois, Pennsylvania, Minnesota, Ohio, and Missouri, while yet not less than 24 states produce above $4,000,000 each. This industry involves the consumption of 304,775,737 bushels of wheat and 234,907,220 bushels of other grain, with an aggregate value of all materials reaching $441,545,225.

The cities producing to the value of $4,000,000 annually are: In New York, New York city; in Minnesota, Minneapolis; in Missouri, Saint Louis; in Wisconsin, Milwaukee.

The next of the great industries is also connected with the supply of food, viz, slaughtering and meat-packing, which yields an aggregate product of $303,562,413. The concentration of this interest is startling, (*b*) the single state of Illinois contributing almost one-third of the whole, the single city of Chicago producing $85,324,371. Of the other states, New York follows at a long distance with $43,096,138; Massachusetts, with $22,951,782; New Jersey, with $20,719,640; Ohio, with $19,231,297; Indiana, with $15,209,204; Missouri, with $14,628,630.

Among the products of this industry, which is wholly exclusive of the ordinary retail butchering business, are reckoned 759,142,875 pounds of beef sold fresh, 192,134,665 pounds of beef salted or canned, 106,692,216 pounds of mutton sold fresh, 506,077,052 pounds of pork sold fresh, 859,045,987 pounds of pork salted, 1,122,742,816 pounds of bacon and hams, 501,471,698 pounds of lard.

The cities producing to the value of $3,000,000 each annually are: In Illinois, Chicago; in New York, New York city, Brooklyn, and Buffalo; in Massachusetts, Cambridge, Boston, and Somerville; in New Jersey, Jersey City; in Ohio, Cincinnati and Cleveland; in Indiana, Indianapolis; in Missouri, Saint Louis; in Pennsylvania, Philadelphia; in California, San Francisco; in Wisconsin, Milwaukee; in Connecticut, New Haven; in Kentucky, Louisville.

Ranking next in order of gross value of product comes the manufacture of iron and steel, with an aggregate of $296,557,685, of which Pennsylvania alone produces $145,576,268. Ohio is the next state as an iron producer, with

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[a] For the purposes of this discussion, the District of Columbia will be spoken of as a territory.

[b] For the influence of this industry in swelling the return of gross manufacturing for certain cities, see pages 424, 425 following.

$34,918,360, or less than one-fourth the product of Pennsylvania. New York, with $22,219,219; Illinois, with $20,545,289; New Jersey, with $10,341,896, and Massachusetts, with $10,288,921, are the only other states rising above ten millions. There are seven other states showing a product of between $10,000,000 and $4,000,000, and six showing between $4,000,000 and $1,000,000. The aggregate value assigned to the product of the iron and steel manufacture is distributed among the principal different classes of works as follows:

Blast-furnaces	$89,315,569
Bloomaries and forges	3,968,074
Iron rolling-mills	136,798,574
Bessemer and open-hearth steel works	55,805,210
Crucible and miscellaneous steel works	10,670,258
Total	296,557,685

Among the products of blast-furnaces are: Anthracite pig-iron, 1,112,735 tons; bituminous coal and coke pig-iron, 1,515,107 tons; mixed anthracite and coke pig-iron, 713,932 tons; cold-blast charcoal pig-iron, 79,613 tons; hot-blast charcoal pig-iron, 355,405 tons.

Among the products of iron rolling-mills are 663,211 tons of bar-iron, 145,626 tons of rod-iron, 96,810 tons of structural iron, 128,321 tons of skelp, 2,630 tons of rolled-iron car axles, 21,884 tons of hammered-iron car-axles, 466,917 tons of iron rails, 64,469 tons of muck bar, 94,992 tons of sheet-iron, 89,560 tons of boiler-plate iron, and 94,749 tons of other plate-iron, exclusive of nail-plate; 96,843 tons of hoop-iron, 48,345 tons of other rolled iron, and 3,703 tons of other hammered iron, 252,830 tons of cut nails, and 82,358 tons of other finished products.

Among the products of Bessemer and open-hearth steel works are 741,475 tons of Bessemer steel rails, valued at $37,408,625.

The chief seats of the blast-furnace industry are: In Pennsylvania, Allegheny county, Lehigh county, Berks county; in Ohio, Mahoning county, Lawrence county, Cuyahoga county; in New York, Essex county, Duchess county.

The chief seats of the Bessemer industry are: In Pennsylvania, Pittsburgh and Philadelphia; in Illinois, Chicago; in Ohio, Cleveland; in Massachusetts, Boston.

The elaborate report of Mr. James M. Swank on the iron and steel industry, which will be found in the present volume, forms a magazine of useful information, much of it wholly new, and the result of investigations conducted by Mr. Swank as a special agent of this office.

The saw-mill industry of the United States appears, as has been said, in every state and every territory. The aggregate product is reported at $233,268,729. To this the single state of Michigan contributes $52,449,928, or nearly 22½ per cent. The great lumber counties of this state are: Muskegon, $7,686,013; Bay, $5,832,307; Saginaw, $4,758,439; and Montcalm, $4,046,649.

The lumber industry of Pennsylvania, with a product of $22,457,359, having its headquarters at Williamsport, (*a*) comes next on the list. Wisconsin shows a product of $17,952,347, New York of $14,356,910, Indiana of $14,260,830, and Ohio of $13,864,460.

Among the products of this industry are 18,091,356,000 feet of lumber (board measure), 1,761,788,000 laths, 5,555,046,000 shingles, 1,248,226,000 staves, and 146,523,000 sets of headings.

The report of Professor Charles S. Sargent, the special agent appointed to investigate the forest wealth of the United States, deals with the question of lumber supply and the relations of tree-covering to the agricultural interests. Professor Sargent's report, on account of its bulk, forms the material of a separate volume.

The next largest item on the list is designated "Foundery and machine-shop products", with an aggregate value of $214,378,468. New York leads with $44,714,915; Pennsylvania follows with $35,029,673; Massachusetts shows a product of $23,935,604; Ohio, of $18,242,325; Illinois, of $13,515,791.

The cities producing to the value of $3,000,000 and upward in the foundery and machine-shop industry are: In New York, New York city, Brooklyn, Buffalo, and Troy; in Pennsylvania, Philadelphia and Pittsburgh; in Massachusetts, Boston and Worcester; in Ohio, Cincinnati and Cleveland; in Illinois, Chicago, etc.

Cotton goods are reported as produced to the aggregate value of $210,950,383, silk and silk goods to the value of $41,033,045, woolen goods to the value of $160,606,721, worsted goods to the value of $33,549,942, and mixed textiles to the value of $66,221,703; making the total value of all textile manufactures, exclusive of hosiery and knit goods, felt goods, and carpets, $512,361,794.

Mr. Edward Atkinson, the special agent for investigating the facts and conditions of the cotton manufacture, divides the total product of $210,950,383 into two parts, the larger one, $192,090,110, expressing the value of specific manufactures of cotton—cotton goods, in the ordinary sense of the term—the other, $18,860,273, expressing the value of certain products not so fully recognized as cotton goods in ordinary speech, the products of mills which work raw cotton, waste, or cotton yarn into hose webbing, tapes, fancy fabrics, etc.

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a Lycoming county, in which Williamsport is situated, reports a product of $3,907,069.

The cotton manufacture is almost monopolized by New England, Massachusetts alone producing to the value of $74,780,835. (*a*) The other New England states produce in the aggregate about as much more, viz: Rhode Island, $24,609,461; New Hampshire, $18,226,573; Connecticut, $17,050,126; Maine, $13,319,363; Vermont, $915,864. New England is thus seen to produce 70.59 per cent. of all the cotton goods made in the country.

The other states producing in excess of $2,000,000 each are Georgia, $6,513,490; Maryland, $4,688,714; New Jersey, $5,039,519; New York, $9,723,527; North Carolina, $2,554,482; Pennsylvania, $21,640,397; South Carolina, $2,895,769.

The aggregate weight of the specific cotton products of the country is given as 607,264,241 pounds, (*b*) comprised in which are broad goods to the extent of 2,273,278,025 yards. (*b*)

The cities producing to the value of $3,000,000 each and upward annually in the cotton manufacture are: In Massachusetts, Lowell, Fall River, Lawrence, New Bedford, and Holyoke; in New Hampshire, Manchester; in Pennsylvania, Philadelphia.

The silk manufacture is even more highly localized than the cotton manufacture. A large amount of valuable information regarding the history and present condition of this industry will be found in Mr. Wyckoff's report, in the present volume.

New Jersey leads in silk production with a total of $17,122,230; New York comes next with $10,170,140; Connecticut stands third with $5,881,000; while Massachusetts and Pennsylvania have respectively $3,764,260 and $3,491,840.

Among the products of the silk manufacture are 10,856,284 yards of broad goods and handkerchiefs, 30,129,951 yards of ribbons and laces, 821,528 pounds of sewing silk and twist, 710,149 pounds of trimmings and small goods.

The cities producing annually to the value of $1,000,000 and upward in this industry are: In New York, New York city; in Pennsylvania, Philadelphia; in Connecticut, Hartford.

The tables relating to the woolen manufacture, which will be found in this volume, present a great amount of highly detailed and technical information regarding this important branch of the national industry. Four states are found producing above $15,000,000 each, viz: Massachusetts, $45,099,203; Pennsylvania, $32,341,291; Connecticut, $16,892,284; Rhode Island, $15,410,450. New York produces to the value of $9,874,973; New Hampshire, $8,113,839; Maine, $6,686,073; New Jersey, $4,984,007; Vermont, $3,217,807.

The variety of products in the woolen manufacture is too great to justify mention here. The products will be found enumerated and classified in the extended tables following (Table VII).

The cities producing annually each $3,000,000 and upward in this industry are: In Massachusetts, Lawrence and Lowell; in Pennsylvania, Philadelphia; in Rhode Island, Providence; in New York, New York city; in New Hampshire, Manchester.

The mixed textile industry is pursued chiefly in Pennsylvania ($20,882,764), New York ($13,376,380), and Massachusetts ($13,043,829), these three states showing more than two-thirds the entire product.

The manufacture of clothing appears, as would have been anticipated, among the chief forms of the national industry. Notwithstanding that the figures exclude the domestic production of clothes, and also the work of the dressmaker, the product reaches the enormous aggregate of $209,548,460 worth of men's clothing and $32,004,794 worth of women's clothing; in all, $241,553,254. Only five states produce largely in this department. New York stands at the head, with $81,133,611 worth of men's and $20,314,307 worth of women's clothing; in all, $101,447,918 Pennsylvania comes next, with $26,799,697 worth of men's and women's clothing; Ohio, with $21,289,052; Illinois, with $20,942,839; Massachusetts, with $19,922,700. The cities manufacturing annually each to the value of $4,000,000 and upward are chiefly large commercial cities. They are as follows: In New York, New York city and Rochester; in Pennsylvania, Philadelphia; in Ohio, Cincinnati; in Illinois, Chicago; in Massachusetts, Boston; in Maryland, Baltimore; in California, San Francisco.

The manufacture of boots and shoes is one of the most important at once of those industries which are prosecuted in large factories, and of those which are carried on in a vast number of petty shops. The boot and shoe factories reported number 1,959, employing 111,152 men, women, and children, and producing to the value of $166,050,354. The materials consumed include 6,831,661 sides of sole-leather, 21,147,656 sides of upper leather, and 32,960,614 pounds of other leather.

The products are 30,590,896 pairs of boots and 94,887,615 pairs of shoes.

The single state of Massachusetts reports 982 of the 1,959 factories in this industry, and $95,900,510 of the $166,050,354 total product. New York comes next, with $18,979,259, and the following states produce in excess of

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a These figures embrace both classes of cotton manufactures.

b In the consideration of the footings of the aggregate yards and pounds of cotton fabrics, whether considered by counties or by states, it must be remembered that while all specific cotton fabrics may be rated by the pound, it by no means follows that there will in all cases be a statement of yards to correspond to that number of pounds, for the reason that very large quantities of yarn and thread are made which are sold by the pound, and never bought or considered by the unit of the yard. Hence the footing of pounds may be considered as the resultant of the use of the given quantity of cotton; the footing of yards merely of that part of the cotton manufacture which is woven and sold by the measure of the yard.

$5,000,000 each: Pennsylvania, $9,590,002; New Hampshire, $7,230,804; Maine, $5,823,541. California, Connecticut, Illinois, Maryland, New Jersey, and Ohio each produce between $2,000,000 and $5,000,000 worth of boots and shoes in factories.

The cities producing annually to the value of $3,000,000 or upward are: In Massachusetts, Haverhill, Lynn, Brockton, Marlborough, Worcester, and Weymouth; in New York, New York city and Rochester; in Pennsylvania, Philadelphia; in California, San Francisco; in Ohio, Cincinnati.

Aside from the factory industry, the manufacture of boots and shoes is large and widely spread. Deducting the factories, there remain 16,013 establishments, employing 22,667 hands, and producing to the value of $30,870,127.

The leather-tanning industry in the United States includes the preparation of 11,773,171 hides and 19,936,658 skins, the number of hands employed being 23,812, and the value of the product being $113,348,336. Of this Pennsylvania produces $27,042,068, New York $23,652,366, and Massachusetts $13,556,721. Nine other states produce in excess of $2,000,000 worth, viz: Maine, $7,100,967; New Jersey, $6,748,094; Illinois, $5,402,070; Ohio, $4,357,273; Wisconsin, $4,324,433; California, $3,738,723; Kentucky, $2,511,960; New Hampshire, $2,315,616; Michigan, $2,029,653. The cities producing in this industry annually to the value of $1,000,000 or over are: In Pennsylvania, Allegheny; in New York, Buffalo and New York city; in Massachusetts, Salem and Lynn; in New Jersey, Newark; in Illinois, Chicago; in Ohio, Cincinnati; in Wisconsin, Milwaukee; in California, San Francisco; in Kentucky, Louisville.

In striking contrast to most of the industries named, in the matter of geographical distribution, are some of the common trades, which may be called neighborhood trades. In illustration of the wide diffusion of these industries, we present the following table, which gives the value of the carpentering and blacksmithing reported for each state, together with the product per head of population:

State.	CARPENTERING.		BLACKSMITHING.		State.	CARPENTERING.		BLACKSMITHING.	
	Aggregate product.	Product per capita.	Aggregate product.	Product per capita.		Aggregate product.	Product per capita.	Aggregate product.	Product per capita.
Alabama	$337, 450	$0 27	$224, 611	$0 18	Mississippi	$170, 316	$0 15	$166, 291	$0 15
Arkansas	199, 625	25	210, 195	26	Missouri	5, 027, 011	2 32	2, 122, 068	98
California	3, 533, 131	4 09	1, 908, 969	2 21	Nebraska	968, 402	2 14	393, 509	87
Colorado	1, 056, 400	5 44	287, 085	1 48	Nevada	13, 600	22	200, 595	3 22
Connecticut	3, 101, 452	4 98	730 114	1 17	New Hampshire	855, 372	2 47	474, 123	1 37
Delaware	313, 255	2 14	148, 663	1 01	New Jersey	3, 995, 361	3 53	1, 207, 951	1 07
Florida	88, 400	33	56, 085	21	New York	19, 410, 276	3 82	6, 253, 634	1 23
Georgia	814, 049	53	472, 945	31	North Carolina	221, 970	16	192, 507	14
Illinois	5, 908, 100	1 92	3, 020, 521	98	Ohio	4, 815, 589	1 51	3, 038, 310	95
Indiana	2, 006, 094	1 01	1, 949 362	98	Oregon	341, 339	1 95	311, 450	1 79
Iowa	2, 280, 490	1 40	1, 551, 837	96	Pennsylvania	8, 125, 571	1 90	4, 324, 460	1 01
Kansas	1, 799, 648	1 81	816, 156	82	Rhode Island	2, 336, 517	8 45	405, 727	1 47
Kentucky	1, 525, 994	93	1, 104, 527	67	South Carolina	326, 590	33	192, 371	19
Louisiana	456, 500	49	334, 888	36	Tennessee	642, 770	42	698, 469	45
Maine	400, 020	62	665, 237	1 03	Texas	661, 370	41	727, 079	46
Maryland	3, 626, 189	3 88	942, 077	1 01	Vermont	158, 486	48	522, 575	1 57
Massachusetts	10, 973, 471	6 15	2, 501, 006	1 40	Virginia	850, 444	56	602, 627	40
Michigan	1, 747, 738	1 07	1, 539, 195	94	West Virginia	210, 450	34	257, 095	42
Minnesota	1, 722, 877	2 21	765, 807	98	Wisconsin	1, 721, 507	1 31	1, 581, 417	1 20

Certain industries, not of the highest yet of very considerable importance as to aggregate value of product, are noticeable for their rapid extension at the west. These are furniture, with a product of $77,845,725; agricultural implements, $68,640,486; carriages and wagons, $64,951,617; distilled liquors, $41,063,663. In furniture, while the chief manufacturing states, New York ($16,615,017) and Massachusetts ($9,332,455), are at the east, a number of western states have attained great success. Illinois comes next, with $8,042,210; Ohio produces to the value of $7,686,929; Indiana, $4,542,337; Michigan, $3,793,968; Missouri, $2,830,375; California, $1,857,010; Iowa, $1,293,504; Wisconsin, $2,177,173. The only eastern states of consequence in this branch of manufacture, besides New York and Massachusetts, are Maryland, $1,943,143, and Pennsylvania, $8,025,239. The cities annually producing above $1,000,000 each in furniture are: In New York, New York city and Brooklyn; in Illinois, Chicago; in Massachusetts, Boston; in Pennsylvania, Philadelphia; in Ohio, Cincinnati; in Michigan, Grand Rapids; in Missouri, Saint Louis; in California, San Francisco; in Maryland, Baltimore.

The manufacture of agricultural implements is still more strictly a western industry. The first state on the list is Ohio, with a product of $15,479,825; Illinois follows, with $13,498,575; New York, which is first in so many branches of production, is here third, with $10,707,766; Indiana is fourth, with $4,460,408. Of the eight other states which produce to the value of between $1,000,000 and $4,000,000, six, viz, Iowa, Kentucky, Michigan, Minnesota, Missouri, and Wisconsin, lie west of the Alleghanies. The cities producing each annually $1,000,000 worth or over are: In Ohio, Springfield and Dayton; in Illinois, Chicago; in New York, Auburn; in Kentucky, Louisville.

In the manufacture of carriages and wagons Ohio leads, with a product of $10,043,404; New York follows, with $8,888,479; Illinois shows $5,003,053; Pennsylvania has $4,760,723; Wisconsin, $4,350,454; Massachusetts, $4,048,141; Indiana, $3,998,520; Michigan, $2,741,143; Connecticut, $2,605,591; Missouri, $2,483,738; Iowa, $2,212,197. None of the other states report as much as $2,000,000 worth of product. The cities producing in this industry an annual value of $1,000,000 or over are: In Ohio, Cincinnati and Columbus; in New York, New York city; in Illinois, Chicago; in Pennsylvania, Philadelphia; in Connecticut, New Haven; in Missouri, Saint Louis.

In the distillation of spirits the great grain-growing states of the west have an unquestioned supremacy. Illinois produces to the value of $14,600,760; Kentucky, $8,281,018; Ohio, $6,692,736; Indiana, $2,997,063. No other state produces as much as $2,000,000 worth.

In the manufacture of malt liquors, on the other hand, the chief producing states are found at the east. New York leads, with $35,392,677; Pennsylvania follows, with $10,124,348; a western state, Ohio, is third, with $9,125,014; and another, Wisconsin, fourth, with $6,312,173. Illinois shows $5,798,109; Massachusetts, $5,112,227; Missouri, $5,048,077; New Jersey, $4,532,733; California, $3,862,431. Seven other states produce to the value of between $1,000,000 and $3,000,000 each.

THE MANUFACTURING CENTERS OF THE UNITED STATES.

The growth of cities in the United States has formed a marked feature of our social and industrial history. The following table shows the number of cities of 8,000 inhabitants and over at each census, beginning in 1790, and the aggregate urban population of the country in comparison with the total population at corresponding periods:

Date.	Population of United States.	Number of cities.	Population of cities.	Inhabitants of cities in each 100 of the total population.
1790	3, 929, 214	6	131, 472	3. 3
1800	5, 308, 483	6	210, 873	3. 9
1810	7, 239, 881	11	356, 920	4. 9
1820	9, 633, 822	13	475, 135	4. 9
1830	12, 866, 020	26	864, 509	6. 7
1840	17, 069, 453	44	1, 453, 994	8. 5
1850	23, 191, 876	85	2, 897, 586	12. 5
1860	31, 443, 321	141	5, 072, 256	16. 1
1870	38, 558, 371	226	8, 071, 875	20. 9
1880	50, 155, 783	286	11, 318, 547	22. 5

From this table it appears that, speaking roundly, in 1790 one-thirtieth of the population of the country was found in cities; in 1800, one twenty-fifth; in 1810, and again in 1820, one-twentieth; in 1830, one-fifteenth; in 1840, one-twelfth; in 1850, one-eighth; in 1860, one-sixth; in 1870, one-fifth; and in 1880, two-ninths.

It would be difficult to say in what proportion the growth of the cities of the country, as a body, has been due to commercial, and in what proportion to industrial forces, even had we official statistics covering our internal traffic, which we have not; but I conceive that no one will hesitate to assent to the proposition that the growth of the cities of the United States since 1850 has been due in far greater measure to their development as manufacturing centers than to their increased business as centers for the distribution of commercial products.

In the present volume are presented (Table VI) the manufacturing statistics of 100 cities. On pages 379, 380 will be found the summary statement of the extent of their respective industries, together with their rank, both in population and in aggregate value of manufactured products.

These cities are distributed by states and sections as follows:

Group.	Number of cities in Table VI.	Aggregate population.	Number of establishments.	Capital.	Number of hands employed.	Total amount of wages.	Value of materials.	Value of product.
NORTH ATLANTIC.								
Total	48	5, 193, 583	46, 274	$925, 752, 263	955, 506	$372, 083, 372	$1, 197, 692, 073	$1, 921, 454, 498
Maine	1	33, 810	302	4, 243, 225	7, 129	1, 541, 997	6, 813, 962	9, 832, 931
New Hampshire	1	32, 630	121	15, 149, 153	10, 838	3, 370, 404	7, 901, 066	14, 136, 305
Massachusetts	14	837, 251	7, 332	172, 685, 313	184, 039	69, 720, 371	216, 745, 677	352, 805, 514
Rhode Island	1	104, 857	1, 205	27, 177, 006	22, 891	9, 464, 110	22, 794, 227	42, 597, 512
Connecticut	3	132, 540	1, 025	29, 134, 648	28, 964	11, 952, 350	25, 769, 562	45, 935, 637
New York	12	2, 334, 461	21, 553	338, 520, 998	371, 322	152, 650, 523	514, 816, 358	813, 992, 251
New Jersey	7	439, 058	3, 244	64, 931, 907	78, 827	31, 587, 056	124, 241, 869	184, 466, 590
Pennsylvania	9	1, 278, 976	11, 492	273, 910, 013	251, 496	91, 796, 561	278, 609, 352	457, 687, 758
SOUTH ATLANTIC.								
Total	11	800, 036	6, 527	76, 321, 054	104, 479	30, 760, 687	92, 054, 042	153, 783, 585
Delaware	1	42, 478	258	10, 744, 389	7, 852	3, 174, 821	7, 884, 847	13, 205, 370
Maryland	1	332, 313	3, 683	38, 586, 773	56, 338	15, 117, 489	47, 974, 297	78, 417, 304
District of Columbia	1	147, 293	971	5, 552, 526	7, 146	3, 924, 612	5, 365, 400	11, 882, 316
Virginia	3	107, 222	818	9, 210, 077	18, 995	3, 926, 733	16, 292, 654	26, 889, 108
West Virginia	1	30, 737	227	4, 868, 288	5, 512	2, 192, 255	5, 203, 931	9, 259, 844
South Carolina	1	49, 984	194	1, 718, 300	2, 146	639, 030	1, 468, 375	2, 732, 590
Georgia	3	90, 009	376	5, 640, 701	6, 490	1, 785, 747	7, 864, 538	11, 397, 053
NORTH CENTRAL.								
Total	27	2, 221, 931	18, 761	312, 843, 405	316, 134	126, 275, 438	528, 194, 869	792, 596, 087
Ohio	6	576, 477	5, 752	94, 197, 062	98, 464	36, 209, 256	116, 881, 136	194, 557, 894
Indiana	4	157, 258	1, 339	19, 702, 166	19, 780	7, 709, 265	34, 922, 466	50, 547, 173
Illinois	4	579, 455	4, 249	78, 785, 567	88, 505	38, 089, 376	197, 012, 245	275, 478, 242
Michigan	3	169, 049	1, 354	24, 694, 277	23, 520	9, 004, 020	25, 959, 211	43, 120, 044
Wisconsin	1	115, 587	844	18, 766, 914	20, 886	6, 946, 105	28, 975, 872	43, 473, 812
Minnesota	2	88, 360	994	12, 741, 441	10, 574	4, 836, 593	29, 993, 690	40, 259, 839
Iowa	3	66, 493	689	7, 716, 338	6, 086	2, 692, 898	9, 608, 910	15, 018, 576
Missouri	3	438, 734	3, 386	54, 403, 840	46, 631	20, 061, 007	82, 313, 863	125, 859, 641
Nebraska	1	30, 518	154	1, 835, 800	1, 688	726, 918	2, 527, 476	4, 280, 866
SOUTHERN CENTRAL.								
Total	9	538, 873	3, 036	43, 128, 635	40, 433	14, 355, 230	48, 616, 216	81, 457, 480
Kentucky	3	173, 911	1, 383	26, 649, 869	22, 121	7, 580, 027	27, 669, 773	45, 284, 728
Tennessee	2	76, 942	406	6, 206, 355	7, 059	2, 158, 437	7, 731, 868	13, 010, 700
Alabama	1	29, 132	91	525, 708	704	261, 643	830, 961	1, 335, 579
Louisiana	1	216, 090	915	8, 565, 303	9, 504	3, 717, 557	10, 771, 892	18, 808, 096
Texas	2	42, 798	241	1, 181, 400	1, 045	637, 566	1, 611, 722	3, 018, 377
WESTERN.								
Total	5	346, 331	3, 628	41, 574, 261	34, 625	18, 236, 118	59, 430, 607	96, 077, 181
Colorado	1	35, 629	259	2, 301, 850	2, 944	1, 574, 438	5, 715, 215	9, 367, 749
California	3	289, 934	3, 203	38, 411, 996	30, 753	16, 236, 143	52, 902, 656	85, 099, 299
Utah	1	20, 768	166	860, 415	928	425, 537	812, 736	1, 610, 132

RELATION OF NET PRODUCT TO GROSS PRODUCT.

Heretofore, in comparing one state with another, or one section with another, while speaking of individual industries, like the cotton manufacture, the saw-mill industry, etc., we have compared the gross product of one with that of another without any qualification, inasmuch as the relation of gross product to net product, to wages, etc., might be assumed to approach uniformity within the same industry. But in comparing one city with another, as to the aggregate of their respective industries, gross product can no longer safely be used to indicate the relative importance of the two as manufacturing centers. One of these cities may have the greater gross production, yet, inasmuch as this may be made up chiefly of the products of industries which consume an exceptionally large proportion of materials, the net product, the number of hands employed, the amount of wages paid, may all be smaller than in the other. On pages 424, 425 will be found some striking examples of the manner and the degree in which the gross product of cities may be raised by the occurrence of such industries as meat-packing, sugar refining, and the like, where the value of the ultimate product is made up of the value of the original materials to the extent of 80, 85, or 90 per cent., or even more. For the convenience of our readers we present the 100 cities of our list in order of their rank successively, according to (1) the gross value of product, (2) the net value of product, (3) the number of hands employed, and (4) the amount of wages paid.

No.	Name of city.	Gross product.	Name of city.	Net product.	Name of city.	Hands employed.	Name of city.	Wages paid.
		Dollars.		*Dollars.*		*Number.*		*Dollars.*
1	New York, N. Y	472, 926, 437	New York, N. Y	184, 484, 746	New York, N. Y	227, 352	New York, N. Y	97, 030, 021
2	Philadelphia, Pa	324, 342, 935	Philadelphia, Pa	125, 187, 458	Philadelphia, Pa	185, 527	Philadelphia, Pa	64, 265, 966
3	Chicago, Ill	249, 022, 948	Chicago, Ill	69, 813, 338	Chicago, Ill	79, 414	Chicago, Ill	34, 653, 462
4	Brooklyn, N. Y	177, 223, 142	Boston, Mass	48, 843, 833	Boston, Mass	59, 213	Boston, Mass	24, 924, 009
5	Boston, Mass	130, 531, 993	Brooklyn, N. Y	48, 138, 051	Baltimore, Md	56, 338	Brooklyn, N. Y	22, 487, 457
6	Saint Louis, Mo	114, 333, 375	Cincinnati, Ohio	42, 882, 455	Cincinnati, Ohio	54, 517	Cincinnati, Ohio	19, 553, 629
7	Cincinnati, Ohio	105, 259, 165	Saint Louis, Mo	38, 953, 508	Brooklyn, N. Y	47, 587	Saint Louis, Mo	17, 743, 532
8	Baltimore, Md	78, 417, 304	Pittsburgh, Pa	33, 805, 256	Saint Louis, Mo	41, 825	Pittsburgh, Pa	17, 168, 989
9	San Francisco, Cal	77, 824, 299	Baltimore, Md	30, 443, 007	Pittsburgh, Pa	36, 930	Baltimore, Md	15, 117, 489
10	Pittsburgh, Pa	75, 915, 033	San Francisco, Cal	29, 846, 227	Newark, N. J	30, 046	San Francisco, Cal	14, 928, 534
11	Newark, N. J	69, 252, 705	Newark, N. J	24, 648, 370	San Francisco, Cal	28, 442	Newark, N. J	13, 171, 339
12	Jersey City, N. J	60, 473, 905	Providence, R. 1	19, 803, 285	Providence, R. I	22, 891	Providence, R. I	9, 464, 110
13	Cleveland, Ohio	48, 604, 050	Lowell, Mass	17, 620, 715	Troy, N. Y	22, 434	Cleveland, Ohio	8, 502, 935
14	Milwaukee, Wis	43, 473, 812	Cleveland, Ohio	16, 974, 313	Cleveland, Ohio	21, 724	Buffalo, N. Y	7, 442, 109
15	Buffalo, N. Y	42, 937, 701	Buffalo, N. Y	15, 385, 615	Milwaukee, Wis	20, 886	Paterson, N. J	6, 992, 487
16	Providence, R. I	42, 597, 512	Milwaukee, Wis	14, 497, 940	Lowell, Mass	20, 039	Milwaukee, Wis	6, 946, 105
17	Louisville, Ky	35, 423, 203	Louisville, Ky	14, 216, 093	Paterson, N. J	19, 799	Worcester, Mass	6, 910, 817
18	Lowell, Mass	33, 935, 777	Troy, N. Y	13, 053, 879	Buffalo, N. Y	18, 021	Troy, N. Y	6, 745, 874
19	Detroit, Mich	30, 181, 416	Detroit, Mich	12, 030, 421	Louisville, Ky	17, 448	Detroit, Mich	6, 306, 460
20	Minneapolis, Minn	29, 973, 476	Paterson, N. J	11, 879, 517	Fall River, Mass	17, 085	Lowell, Mass	5, 996, 591
21	Indianapolis, Ind	27, 453, 089	Lawrence, Mass	11, 196, 104	Lawrence, Mass	16, 719	Louisville, Ky	5, 835, 545
22	Worcester, Mass	27, 292, 793	Jersey City, N. J	10, 734, 920	Worcester, Mass	16, 559	Lynn, Mass	5, 833, 849
23	Lynn, Mass	26, 828, 023	Worcester, Mass	10, 710, 043	Detroit, Mich	16, 110	New Haven, Conn	5, 761, 374
24	Cambridge, Mass	26, 665, 688	Rochester, N. Y	10, 031, 451	New Haven, Conn	15, 156	Lawrence, Mass	5, 544, 513
25	Paterson, N. J	26, 503, 350	New Haven, Conn	9, 558, 062	Rochester, N. Y	14, 607	Rochester, N. Y	5, 217, 713
26	Troy, N. Y	26, 497, 163	Lynn, Mass	9, 394, 568	Richmond, Va	14, 047	Fall River, Mass	4, 659, 077
27	Rochester, N. Y	26, 478, 266	Albany, N. Y	9, 241, 647	Lynn, Mass	12, 420	Jersey City, N. J	4, 622, 655
28	Lawrence, Mass	25, 058, 246	Richmond, Va	8, 648, 594	Albany, N. Y	11, 785	Albany, N. Y	4, 566, 424
29	New Haven, Conn	24, 040, 225	Fall River, Mass	8, 361, 392	Jersey City, N. J	11, 138	Washington, D. C	3, 924, 612
30	Albany, N. Y	21, 751, 069	Indianapolis, Ind	8, 254, 987	Syracuse, N. Y	10, 966	Indianapolis, Ind	3, 917, 114
31	Richmond, Va	20, 790, 106	New Orleans, La	8, 036, 204	Manchester, N. H	10, 838	New Orleans, La	3, 717, 557
32	Fall River, Mass	18, 913, 584	Washington, D. C	6, 516, 916	Indianapolis, Ind	10, 000	Cambridge, Mass	3, 416, 470
33	New Orleans, La	18, 808, 096	Cambridge, Mass	6, 504, 339	New Orleans, La	9, 504	Manchester, N. H	3, 370, 404
34	Syracuse, N. Y	14, 695, 674	Manchester, N. H	6, 235, 239	Holyoke, Mass	9, 011	Bridgeport, Conn	3, 342, 935
35	Peoria, Ill	14, 228, 134	Syracuse, N. Y	6. 151, 238	Trenton, N. J	8, 902	Wilmington, Del	3, 174, 821
36	Manchester, N. H	14, 130, 305	Holyoke, Mass	5, 927, 754	Wilmington, Del	7, 852	Trenton, N. J	3, 150, 119
37	Allegheny, Pa	13, 731, 792	Minneapolis, Minn	5, 698, 853	Cambridge, Mass	7, 543	Syracuse, N. Y	3, 042, 135
38	Holyoke, Mass	13, 667, 327	Bridgeport, Conn	5, 638, 273	Bridgeport, Conn	7, 508	Richmond, Va	3, 006, 456
39	Reading, Pa	13, 251, 095	Dayton, Ohio	5, 551, 258	Springfield, Mass	7, 360	Springfield, Mass	2, 906, 130
40	Wilmington, Del	13, 205, 370	Wilmington, Del	5, 320, 523	Washington, D. C	7, 146	Hartford, Conn	2, 848, 041
41	Springfield, Mass	12, 891, 826	Trenton, N. J	5, 291, 363	Portland, Me	7, 129	Holyoke, Mass	2, 743, 142
42	Trenton, N. J	12, 712, 762	Springfield, Mass	5, 165, 707	Toledo, Ohio	6, 738	Allegheny, Pa	2, 652, 774
43	Dayton, Ohio	11, 985, 483	Hartford, Conn	4, 969, 740	Utica, N. Y	6, 710	Minneapolis, Minn	2, 583, 253
44	Washington, D. C	11, 882, 316	Allegheny, Pa	4, 913, 639	Reading, Pa	6, 695	Dayton, Ohio	2, 293, 630
45	Hartford, Conn	11, 437, 200	Reading, Pa	4, 854, 185	Allegheny, Pa	6, 471	Toledo, Ohio	2, 260, 456

No.	Name of city.	Gross product.	Name of city.	Net product.	Name of city.	Hands employed.	Name of city.	Wages paid.
		Dollars.		*Dollars.*		*Number.*		*Dollars.*
46	Toledo, Ohio	10, 600, 074	Peoria, Ill	4, 671, 658	Hartford, Conn	6, 300	Saint Paul, Minn	2, 254, 340
47	Bridgeport, Conn	10, 458, 212	Saint Paul, Minn	4, 567, 296	Dayton, Ohio	6, 025	Reading, Pa	2, 240, 290
48	Saint Paul, Minn	10, 286, 363	Toledo, Ohio	4, 244, 675	New Bedford, Mass	5, 812	Wheeling, W. Va	2, 192, 255
49	Salem, Mass	9, 926, 564	Columbus, Ohio	4, 112, 183	Wheeling, W. Va	5, 512	Taunton, Mass	2, 083, 185
50	New Bedford, Mass	9, 835, 955	Wheeling, W. Va	4, 055, 913	Columbus, Ohio	5, 490	New Bedford, Mass	2, 058, 751
51	Portland, Me	9, 832, 931	New Bedford, Mass	3, 928, 081	Minneapolis, Minn	5, 344	Columbus, Ohio	1, 961, 394
52	Columbus, Ohio	9, 646, 679	Elizabeth, N. J	3, 912, 176	Saint Paul, Minn	5, 230	Utica, N. Y	1, 917, 657
53	Denver, Colo	9, 367, 749	Springfield, Ohio	3, 911, 874	Grand Rapids, Mich	5, 172	Grand Rapids, Mich	1, 895, 072
54	Wheeling, W. Va	9, 259, 844	Utica, N. Y	3, 692, 708	Taunton, Mass	5, 154	Elizabeth, N. J	1, 740, 456
55	Terre Haute, Ind	9, 185, 246	Auburn, N. Y	3, 666, 663	Nashville, Tenn	4, 791	Auburn, N. Y	1, 658, 826
56	Utica, N. Y	8, 873, 306	Denver, Colo	3, 652, 534	Auburn, N. Y	4, 518	Springfield, Ohio	1, 637, 212
57	Nashville, Tenn	8, 597, 278	Grand Rapids, Mich	3, 448, 344	Camden, N. J	4, 370	Camden, N. J	1, 626, 306
58	Scranton, Pa	8, 561, 850	Taunton, Mass	3, 346, 502	Lancaster, Pa	4, 252	Denver, Colo	1, 574, 438
59	Springfield, Ohio	8, 462, 443	Camden, N. J	3, 295, 995	Petersburg, Va	4, 196	Portland, Me	1, 541, 997
60	Quincy, Ill	8, 103, 277	Nashville, Tenn	3, 284, 751	Salem, Mass	4, 181	Erie, Pa	1, 518, 085
61	Evansville, Ind	8, 091, 914	Evansville, Ind	3, 119, 224	Peoria, Ill	4, 067	Peoria, Ill	1, 507, 666
62	Auburn, N. Y	7, 719, 409	Portland, Me	3, 018, 969	Springfield, Ohio	3, 970	Kansas City, Mo	1, 420, 713
63	Erie, Pa	7, 683, 356	Quincy, Ill	3, 013, 397	Elizabeth, N. J	3, 849	Terre Haute, Ind	1, 406, 352
64	Harrisburg, Pa	7, 663, 416	Erie, Pa	2, 804, 037	Erie, Pa	3, 767	Salem, Mass	1, 401, 592
65	Camden, N. J	7, 644, 705	Harrisburg, Pa	2, 698, 140	Atlanta, Ga	3, 680	Evansville, Ind	1, 365, 066
66	Taunton, Mass	7, 618, 953	Salem, Mass	2, 662, 117	Evansville, Ind	3, 669	Dubuque, Iowa	1, 339, 730
67	Grand Rapids, Mich	7, 405, 007	Kansas City, Mo	2, 658, 765	Harrisburg, Pa	3, 660	Scranton, Pa	1, 313, 287
68	Elizabeth, N. J	6, 828, 027	Dubuque, Iowa	2, 491, 043	Scranton, Pa	3, 549	Nashville, Tenn	1, 312, 765
69	Kansas City, Mo	6, 328, 681	Lancaster, Pa	2, 462, 625	Terre Haute, Ind	3, 376	Quincy, Ill	1, 271, 995
70	Dubuque, Iowa	6, 328, 889	Terre Haute, Ind	2, 441, 527	Quincy, Ill	3, 326	Harrisburg, Pa	1, 236, 522
71	Covington, Ky	5, 864, 530	Memphis, Tenn	1, 994, 081	Dubuque, Iowa	3, 003	Lancaster, Pa	1, 177, 249
72	Somerville, Mass	5, 852, 535	Oswego, N. Y	1, 973, 099	Denver, Colo	2, 944	Covington, Ky	1, 033, 463
73	Fort Wayne, Ind	5, 816, 924	Saint Joseph, Mo	1, 933, 505	Covington, Ky	2, 925	Elmira, N. Y	1, 024, 161
74	Oswego, N. Y	5, 619, 944	Covington, Ky	1, 928, 803	Fort Wayne, Ind	2, 735	Fort Wayne, Ind	1, 020, 793
75	Bay City, Mich	5, 533, 621	Scranton, Pa	1, 890, 371	Elmira, N. Y	2, 728	Saint Joseph, Mo	896, 762
76	Lancaster, Pa	5, 404, 937	Fort Wayne, Ind	1, 808, 969	Kansas City, Mo	2, 548	Atlanta, Ga	889, 282
77	Saint Joseph, Mo	5, 143, 585	Omaha, Nebr	1, 753, 390	Poughkeepsie, N. Y	2, 482	Memphis, Tenn	845, 672
78	Elmira, N. Y	4, 877, 300	Elmira, N. Y	1, 745, 185	Memphis, Tenn	2, 268	Bay City, Mich	802, 488
79	Atlanta, Ga	4, 861, 727	Atlanta, Ga	1, 702, 460	Saint Joseph, Mo	2, 258	Poughkeepsie, N. Y	761, 711
80	Petersburg, Va	4, 643, 015	Bay City, Mich	1, 682, 068	Bay City, Mich	2, 238	Oakland, Cal	759, 917
81	Davenport, Iowa	4, 468, 978	Poughkeepsie, N. Y	1, 611, 611	Charleston, S. C	2, 146	Oswego, N. Y	756, 435
82	Memphis, Tenn	4, 413, 422	Davenport, Iowa	1, 508, 310	Oswego, N. Y	2, 132	Omaha, Nebr	726, 918
83	Poughkeepsie, N. Y	4, 392, 900	Newport, Ky	1, 470, 059	Newport, Ky	1, 748	Newport, Ky	711, 019
84	Omaha, Nebr	4, 280, 866	Des Moines, Iowa	1, 410, 313	Davenport, Iowa	1, 705	Davenport, Iowa	685, 469
85	Des Moines, Iowa	4, 220, 709	Petersburg, Va	1, 352, 899	Springfield, Ill	1, 698	Chelsea, Mass	677, 737
86	Springfield, Ill	4, 123, 883	Charleston, S. C	1, 264, 215	Omaha, Nebr	1, 688	Des Moines, Iowa	667, 699
87	Sacramento, Cal	4, 093, 934	Somerville, Mass	1, 244, 343	Augusta, Ga	1, 680	Springfield, Ill	656, 253
88	Newport, Ky	3, 996, 995	Sacramento, Cal	1, 182, 045	Chelsea, Mass	1, 647	Charleston, S. C	639, 030
89	Chelsea, Mass	3, 846, 250	Oakland, Cal	1, 168, 371	Oakland, Cal	1, 387	Petersburg, Va	602, 749
90	Savannah, Ga	3, 396, 297	Chelsea, Mass	1, 154, 339	Des Moines, Iowa	1, 378	Somerville, Mass	564, 508
91	Oakland, Cal	3, 181, 066	Galveston, Tex	1, 092, 719	Somerville, Mass	1, 296	Sacramento, Cal	547, 692
92	Augusta, Ga	3, 139, 029	Springfield, Ill	967, 604	Savannah, Ga	1, 130	Galveston, Tex	499, 785
93	Charleston, S. C	2, 732, 590	Savannah, Ga	938, 691	Salt Lake City, Utah	928	Augusta, Ga	448, 825
94	Galveston, Tex	2, 375, 965	Augusta, Ga	891, 364	Sacramento, Cal	924	Savannah, Ga	447, 640
95	Salt Lake City, Utah	1, 610, 133	Salt Lake City, Utah	797, 397	Norfolk, Va	752	Salt Lake City, Utah	425, 537
96	Norfolk, Va	1, 455, 987	Norfolk, Va	594, 961	Hoboken, N. J	723	Norfolk, Va	317, 528
97	Mobile, Ala	1, 335, 579	Mobile, Ala	504, 618	Mobile, Ala	704	Hoboken, N. J	283, 694
98	Wilkesbarre, Pa	1, 133, 344	Wilkesbarre, Pa	472, 695	Galveston, Tex	684	Mobile, Ala	261, 643
99	Hoboken, N. J	1, 051, 136	Hoboken, N. J	462, 380	Wilkesbarre, Pa	645	Wilkesbarre, Pa	223, 399
100	San Antonio, Tex	642, 412	San Antonio, Tex	313, 936	San Antonio, Tex	361	San Antonio, Tex	137, 781

In the following table we place against the title of each industry whose aggregate production in the United States reaches $30,000,000 the names of the seven cities in which that production is carried to the highest point:

RANK OF THE SEVEN LEADING CITIES IN EACH INDUSTRY SPECIFIED.

Industry.	First place.	Second place.	Third place.	Fourth place.	Fifth place.	Sixth place.	Seventh place.	Lowest amount taken.*
Agricultural implements	Springfield, Ohio	Chicago	Auburn	Louisville	Dayton	Saint Louis	Philadelphia	$739, 808
Blacksmithing	New York	Philadelphia	Boston	Brooklyn	Saint Louis	Chicago	Cincinnati	437, 019
Boots and shoes, including custom work.	Lynn	Philadelphia	New York	Worcester	San Francisco	Cincinnati	Rochester	3, 636, 985
Bread and other bakery products.	New York	Philadelphia	Brooklyn	Chicago	Saint Louis	Baltimore	San Francisco	2, 070, 884
Brick and tile	Philadelphia	Chicago	Saint Louis	Baltimore	Pittsburgh	Kansas City	Washington	314, 298
Carpentering	New York	Philadelphia	Brooklyn	Boston	Baltimore	San Francisco	Saint Louis	3, 005, 411
Carriages and wagons	Cincinnati	New York	Philadelphia	Chicago	New Haven	Saint Louis	Columbus	1, 008, 179
Clothing, men's	New York	Philadelphia	Chicago	Boston	Cincinnati	Baltimore	Rochester	4, 342, 000
Clothing, women's	New York	Philadelphia	Boston	Chicago	San Francisco	Cincinnati	Brooklyn	711, 249
Cooperage	Brooklyn	Saint Louis	Pittsburgh	Chicago	Indianapolis	Philadelphia	New York	895, 571
Cotton goods	Lowell	Fall River	Philadelphia	Manchester	Lawrence	New Bedford	Holyoke	3, 088, 851
Drugs and chemicals	Philadelphia	Brooklyn	New York	Jersey City	Newark	Saint Louis	Chicago	959, 850
Dyeing and finishing textiles	Philadelphia	Lawrence	Providence	Lowell	Paterson	Manchester	New York	690, 236
Flouring- and grist-mill products.	Minneapolis	Saint Louis	New York	Milwaukee	Terre Haute	Brooklyn	Rochester	2, 550, 815
Foundery and machine-shop products.	New York	Philadelphia	Chicago	Brooklyn	Boston	Saint Louis	Cincinnati	5, 723, 508
Furniture	New York	Chicago	Philadelphia	Cincinnati	Boston	Saint Louis	Grand Rapids	1, 831, 172
Iron and steel	Pittsburgh	Chicago	Cleveland	Troy	Scranton	Milwaukee	Wheeling	4, 306, 567
Leather, curried	Newark	Salem	Boston	Lynn	Milwaukee	Chicago	Cincinnati	1, 700, 426
Leather, tanned	Newark	Chicago	Salem	Milwaukee	Cincinnati	San Francisco	Louisville	1, 855, 590
Liquors, distilled	Peoria	Cincinnati	Chicago	Louisville	Terre Haute	Covington	Boston	596, 500
Liquors, malt	New York	Philadelphia	Brooklyn	Cincinnati	Saint Louis	Boston	Milwaukee	4, 034, 319
Lumber, planed	Chicago	New York	Brooklyn	Denver	Buffalo	Pittsburgh	Saint Louis	756, 936
Lumber, sawed †	Bay City	Muskegon	Minneapolis	Saginaw	Cincinnati	Evansville	Davenport	828, 080
Marble and stone work	New York	Philadelphia	Boston	Brooklyn	Chicago	Baltimore	Cincinnati	836, 863
Mixed textiles	Philadelphia	New York	Lawrence	Paterson	Boston	Louisville	Worcester	630, 700
Paper	Holyoke	Philadelphia	Lawrence	Wilmington	Louisville	Troy	Dayton	476, 104
Printing and publishing	New York	Philadelphia	Chicago	Boston	Cincinnati	Saint Louis	San Francisco	2, 987, 576
Saddlery and harness	Saint Louis	Newark	Cincinnati	New York	Louisville	Baltimore	Chicago	746, 247
Sash, doors, and blinds	Chicago	Saint Louis	New York	Cleveland	Philadelphia	San Francisco	Brooklyn	738, 722
Ship-building ‡	Philadelphia	New York	Brooklyn	Wilmington	Boston	Baltimore	San Francisco	1, 087, 843
Silk and silk goods	Paterson	New York	Philadelphia	Hartford, Conn	Brooklyn, N.Y.	Holyoke	Newark	468, 250
Slaughtering and meat-packing, not including retail butchering establishments.	Chicago	New York	Jersey City	Cincinnati	Indianapolis	Saint Louis	Brooklyn	8, 010, 492
Sugar and molasses, refined	Brooklyn	Philadelphia	Jersey City	Boston	New York	Cambridge	San Francisco	5, 932, 000
Tinware, copperware, and sheet-iron ware.	Baltimore	New York	Philadelphia	Chicago	Saint Louis	Boston	San Francisco	949, 499
Tobacco, chewing, smoking, and snuff.	Richmond	Saint Louis	Jersey City	New York	Petersburg	Louisville	Brooklyn	2, 302, 703
Tobacco, cigars and cigarettes	New York	San Francisco	Cincinnati	Philadelphia	Chicago	Baltimore	Detroit	1, 196, 870
Woolen manufactures (all classes) §	Philadelphia	Lawrence	Providence	Lowell	New York	Manchester	Boston	2, 069 488

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* The figures in this column represent the amount of production, for each industry enumerated, which takes place in the city occupying the seventh rank in that respect, *e. g.*, Philadelphia, which is seventh in the manufacture of agricultural implements, produces them to the value of $739,808.

† Manistee, Mich., produces lumber, sawed, to the value of $3,044,500. Menominee, Mich., produces lumber, sawed, to the value of $1,294,834.

‡ Chester, Pa., is also an important center, building to the value of $1,806,799. Bath, Me., is also a leading center for wooden ship-building.

§ Includes carpets, felt goods, hosiery and knit goods. wool hats, woolen goods, and worsted goods.

In the following table we give for each of the thirty cities having the largest gross manufacturing product the six leading industries therein pursued:

RANK OF THE SIX LEADING INDUSTRIES IN THE CITIES SPECIFIED.

No.	Names of 30 leading cities.	1.	2.	3.	4.	5.	6.	Lowest amount taken.*
1	New York, N. Y	Clothing, men's	Slaughtering	Printing and publishing.	Liquors, malt	Clothing, women's	Tobacco, cigars, and cigarettes.	$18, 347, 108
2	Philadelphia, Pa	Sugar and molasses	Woolen goods	Clothing, men's	Mixed textiles	Cotton goods	Carpets	14, 263, 510
3	Chicago, Ill	Slaughtering	Clothing, men's	Iron and steel	Foundery	Furniture	Printing and publishing.	5, 959, 295
4	Brooklyn, N. Y	Sugar and molasses	Slaughtering, etc	Foundery, etc	Bread, etc	Paints	Carpentering	5, 124, 407
5	Boston, Mass	do	Clothing, men's	Slaughtering, etc	Foundery, etc	Printing, etc	Liquors, malt	4, 426, 264
6	Saint Louis, Mo	Flour and grist	Slaughtering	Foundery, etc	Tobacco, chewing	Liquors, malt	Sugar and molasses	4, 475, 740
7	Cincinnati, Ohio	Clothing, men's	do	do	Liquors, distilled	Carriages and wagons.	Liquors, malt	4, 580, 579
8	Baltimore, Md	do	Fruits, vegetables, etc.	Fertilizers	Foundery, etc	Boots and shoes	Tinware, etc	3, 371, 081
9	San Francisco, Cal	Slaughtering	Sugar and molasses	Boots and shoes	do	Clothing, men's	Tobacco, cigars	3, 720, 813
10	Pittsburgh, Pa	Iron and steel	Foundery, etc	Glass	Clothing, men's	Iron pipe, wrought	Slaughtering	1, 451, 816
11	Newark, N. J	Smelting and refining.	Leather, curried	Leather, tanned	Jewelry	Liquors, malt	Hats and caps	2, 596, 578
12	Jersey City, N. J	Sugar and molasses	Slaughtering	Tobacco, chewing	Drugs and chemicals.	Iron and steel	Soap and candles	1, 310, 000
13	Cleveland, Ohio	Iron and steel	do	Foundery	Clothing, men's	Wire	Liquors, malt	1, 249, 502
14	Milwaukee, Wis	Slaughtering	Iron and steel	Flour, etc	Liquors, malt	Clothing, men's	Foundery, etc	2, 252, 784
15	Buffalo, N. Y	Foundery, etc	Slaughtering	Glucose	Clothing, men's	Flour, etc	Malt	2, 002, 893
16	Providence, R. I	Jewelry	Foundery, etc	Woolen goods	Worsted goods	Dyeing and finishing.	Cotton goods	2, 250, 273
17	Louisville, Ky	Slaughtering	do	Tobacco, chewing	Leather, tanned	Liquors, distilled	Clothing, men's	1, 308, 718
18	Lowell, Mass	Cotton goods	Woolen goods	Foundery, etc	Dyeing and finishing.	Worsted goods	Carpentering	627, 450
19	Detroit, Mich	Iron and steel	Clothing, men's	do	Slaughtering	Flour, etc	Cars, railr'd, street, and repairing.	1, 448, 756
20	Minneapolis, Minn	Flour, etc	Lumber, sawed	do	Sash, doors, etc	Cooperage	Clothing, men's	386, 700
21	Indianapolis, Ind	Slaughtering	Foundery, etc	Flour, etc	Cooperage	Fertilizers	Furniture	917, 600
22	Worcester, Mass	Boots and shoes	Wire	Foundery, etc	Iron and steel	Slaughtering	Woolen goods	982, 175
23	Lynn, Mass	do	Boots and shoes, cut stock.	Leather, curried	Leather, tanned	Carpentering	Boot and shoe findings.	209, 700
24	Cambridge, Mass	Slaughtering	Sugar and molasses	Soap and candles	Printing and publishing.	Musical instruments, organs.	Leather, curried	753, 000
25	Paterson, N. J	Silk and silk goods	Foundery, etc	Thread, linen	Mixed textiles	Cotton goods	Dyeing and finishing.	918, 583
26	Troy, N. Y	Iron and steel	do	Shirts	Furnishing goods, men's.	Liquors, malt	Clothing, men's	685, 436
27	Rochester, N. Y	Clothing, men's	Boots and shoes	Flour, grist-mill	Liquors, malt	Foundery, etc	Tobacco, chewing, etc.	1, 200, 747
28	Lawrence, Mass	Worsted goods	Cotton goods	Woolen goods	Mixed textiles	Dyeing and finishing.	Paper	972, 050
29	New Haven, Conn	Slaughtering	Corsets	Boots and shoes, rubber.	Hardware	Carriages and wagons.	Clothing, men's	1, 122, 080
30	Albany, N. Y	Foundery and machinery, etc.	Liquors, malt	Boots and shoes	Malt	Bread, etc	do	917, 646

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* The figures in this column represent the amount of production in each city, in succession, within that branch of manufacture which stands sixth on the list of the industries of that city; *e. g.*, the manufacture of tobacco, cigars, and cigarettes, which is sixth in order of importance of the industries of New York city, is there carried on to the extent of $18,347,108. Philadelphia's sixth industry—the carpet manufacture—yields a product of $14,263,510. On the other hand, the sixth industry of Chicago—printing and publishing—yields but $5,959,295. The sixth industry of Rochester yields $1,200,747, though the sixth industry of Lynn (which surpasses Rochester in aggregate manufacturing product) is only $209,700.

COMPARISON OF THE TABLES OF OCCUPATIONS WITH THE STATISTICS OF MANUFACTURES.

The facts relating to the occupations of the individual members of the community are obtained from the population or family schedule. Here is required to be recorded the habitual occupation or means of livelihood of each person enumerated in the census.

It might at first be thought that the totals obtained through the compilation of these individual returns, so far as they relate to the manufacturing and mechanical classes of the population, should conform closely to those obtained through the compilation of the returns of manufacturers as to the number of hands employed, or else that one or the other set of tables must be in error. This, however, does not follow as a matter of course.

The following paragraphs from the remarks which preface the statistics of occupation in the population volume will explain the causes of such discrepancies: (*a*)

THE COMPLETENESS OF THESE TABLES.—Comparison of the numbers reported in the tables of Occupations with the numbers found under corresponding titles in the tables of Manufactures will discover discrepancies of very important extent which require to be here accounted for, not only in justification of these tables, but for the additional light which such an investigation throws upon the industrial conditions of the country.

Not only do important discrepancies exist, but they are found to be of two kinds, of diametrically opposite direction. In one class of cases the numbers reported in the tables of Occupations appear to be too large; in the other, too small.

First, however, it needs to be stated just what constitutes a discrepancy. A failure in the numbers reported in the one place and in the other to balance exactly is not a discrepancy; on the contrary, this is to be expected; and if the numbers are found to be in excess in the proper set of tables, and to be in excess to only the proper extent, this furnishes a statistical proof of high character. The tables in which the numbers should thus be *generally* found in excess are the Occupation tables. The reason for the excess being found in these tables and not in the others is that the schedule of manufactures gives an *average* return of the number of "hands employed", while the statistics of occupations are taken from a count of individuals upon the population schedule, and present, therefore, a *maximum* return, embracing, as they do, artisans of every class out of employment, temporarily disabled, or for some other reason not included in the actual return of any establishment.

The degree to which such excess should extend will depend, within certain limits, upon the nature of the special occupation, as well as upon the general condition of manufacturing industry throughout the country at the time.

First. Those cases where the numbers in the tables of Occupations do not exceed those in the tables of Manufactures, but even fall below them. Instances of this kind are principally confined to the returns of factory operatives.

A portion of these omissions, undoubtedly, may be accounted for by the large number returned under the head of "Mill and factory operatives not specified", as well as by the number of "Employés of manufacturing establishments not specified"; but in the main the explanation of the discrepancies is found in the fact that women and children employed in factories are omitted in large numbers from the Occupation tables.

Thus omissions may take place either through the failure of the enumerators to ask questions relating to occupation concerning such persons, assuming that they have no avocation outside their homes, or from the indisposition of the persons themselves or the heads of their families to speak of them as in employment. Especially in the case of children, who are part of the time in school and part of the time in the mill, would the mother or father be likely to give a preference to the former over the latter mode of statement, particularly when, as in tens of thousands of cases the country over, the child comes within the period of life respecting which there is *a legal requirement* of school attendance.

When we come, however, to occupations pursued mainly by adults, and, indeed, almost exclusively by adult males, like the trades of carpenter, blacksmith, mason, or printer, or the professions of lawyer, physician, or clergyman, the force of this cause is no longer felt.

Second. Those instances where the numbers appearing in the tables of Occupations exceed those in the tables of Manufactures by more than the probable or possible difference between a maximum and an average return. Unlike the class first noted, these discrepancies affect mainly the statistics of those occupations which are pursued singly, or by twos and threes, out of large mills and factories, and even in a considerable degree out of shops. Discrepancies of this character in no degree discredit the statistics of occupations. They arise from the fact that the return of "productive industry" is not, as indeed it is not expected to be, a complete return of the mechanical production of the country.

The census attempts the enumeration of mechanical industry only as it is carried on in shops, and thus fails to embrace that large body of individual labor which is not attached to distinct "establishments of productive industry". Moreover, the census law establishes a minimum (namely, the value of $500 annually), below which the production of shops shall not be returned.

Thus the trades of blacksmith, carpenter, mason, painter, and, in a somewhat smaller degree, of plumber, locksmith, and harness-maker, are largely pursued by persons working singly, and not occupying, for the purpose of their respective trades, what would be popularly recognized as "an establishment of productive industry", perhaps having only a chest of tools in some room of the house, and perhaps also engaged in their trades for only one season of the year and producing to less than the value of $500. The census has never obtained a full report of the production of these trades so far as they are pursued out of shops and factories.

Again, in making such comparisons between the tables of Occupations and those of Manufactures, great care must be taken to ascertain whether the titles taken for the purpose really correspond. In some cases, where the apparent correspondence is greatest, the quantities are, in fact, not commensurable. An example may be found in the brick and tile manufacture. It would, at first, seem that the "hands employed" should answer to the "brick- and tile-makers" in the tables of Occupations; but, on the contrary, a considerable portion of the hands employed in large brick-yards, not infrequently exceeding indeed the number of craftsmen, are classed and known as common laborers, and are so returned in the census.

In the same way a factory producing fine furniture may report 100 hands employed, but of these only 80 may be cabinet-makers in the usual, and indeed proper, sense of that term, while the others may be simply unskilled laborers, or painters, varnishers, and locksmiths. In a currier's shop not all the hands are necessarily curriers in the craftsman's sense of that term. All textile factories employ persons who are not "operatives"—yard hands, watchmen, millwrights, or mechanics, and simple laborers, it may be, in considerable numbers.

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[a] See pages 703–909, volume on Population, Tenth Census; also, pages 1343–1399, Compendium of the Tenth Census.

There are, in addition, certain industries respecting which peculiar difficulties arise, from the distinct nature of the several avocations pursued under one roof in the same establishment. Thus, it might be supposed that the manufacture of "agricultural implements" is sufficiently distinct to secure a reasonably close comparison between the number of "hands employed" and the number of "agricultural implement makers" borne on the tables of Occupations. But this is not so. A large establishment producing agricultural implements is really divided into a number of shops or factories, where perfectly distinct trades are carried on. There is the foundery, where the iron parts of the machine are cast, and the men working herein will report their occupation as that of founderymen. There are carpenter shops, where the wooden parts are made and shaped by carpenters, who call themselves by this term, and no other. There are also machine shops, paint shops, etc., where the artisans employed know themselves as machinists or mechanics, or as painters and varnishers, and not as makers of agricultural implements. As a result of the peculiarities of this branch of industry, the "hands employed" in the statistics of Manufactures will exceed many times over the number of persons reporting themselves as "agricultural implement makers". An examination of the schedules from those towns where this industry is pursued will reveal the operation of this cause.

On the other hand, the very success with which specific statements of occupation are, in most cases, obtained serves to deplete some general title so far that the figures, if not interpreted in view of the specific titles, would be simply grotesque. Thus, the census reports but 7,858 "mechanics". As a matter of fact, there are many hundreds of thousands of mechanics in the United States, but all save the residue mentioned have been reported in connection with individual mechanical trades. The small number of "mechanics", therefore, instead of showing a failure of the enumeration in this respect, shows a rather striking degree of success in securing specific descriptions of the avocations of the people.

There is also to be noted the probable transfer of a considerable number of "laborers", who are mainly engaged in agriculture, to the class performing "personal and professional services" through the failure of the schedules to indicate their avocations more precisely. In much the same way, doubtless, no small number of "messengers", "laborers," "watchmen," and "clerks", who are really employed in those capacities in connection with manufacturing establishments, at least through portions of the year, have been transferred to other classes through the lack of more precise information regarding the field of their work.

INCOMPLETE SUBDIVISION OF EMPLOYMENTS.—In addition to the apparent deficiencies or discrepancies which have been noted, one general remark will suffice in explanation of many of the entries in the tables in respect to the accuracy of which question may naturally arise.

It must be borne in mind that the number of persons who are reported under a certain specified occupation does not necessarily embrace all the persons who perform the duties usually associated with that title, but only those who discharge such duties to the exclusion of other gainful occupations, or, at least, as their principal or sole professed means of support.

The organization of labor and the subdivision of industry vary, in respect to completeness and minuteness, with each successive community. As communities advance in industrial character functions become separated and distinct occupations become recognized, and this country, from its peculiar conditions, presents almost every degree between the two extremes of industrial development in this particular. It is common to find on the returns from the present territories, and even some of the present states of the Union, such entries as these: "Carpenter and miner," "Blacksmith and carpenter," "Blacksmith and miner," and in many of the communities of the land it is difficult to draw distinctions much finer than those between the agricultural, the mining, the mechanical, and the commercial pursuit or profession. Indeed, even this is not always practicable, since it is a matter of notoriety that in many of the states of the Union, and those not among the newest, the occupations of carpenter and farmer, or blacksmith and farmer, or farmer and fisherman, are frequently united in one person. In larger and more prosperous communities a clear separation between such occupations takes place; yet the carpenter, for instance, in nine out of ten counties in the United States performs half a dozen functions which in cities are recognized as belonging to distinct trades, such as carpenter, cabinet maker, stair builder, sash and blind maker, etc.

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ANOMALOUS ENTRIES.—Other seeming discrepancies, which demand at least an allusion here, occur where persons are returned as of certain special occupations in states where it is notorious that the industries represented are not carried on; or, again, where persons, not more than one, two, or five in number, are returned in a state under a description which implies a large body of workmen, as for example, one silk-mill operative in Colorado or Nevada. An adequate explanation of all cases of this general nature is found in the consideration that the census takes account of persons where they are actually residing and assigns them to their habitual occupation, whether it is being at the time pursued or not.

In the enumeration of hundreds of thousands of persons out of health, or out of employment, traveling, or visiting friends in other states, it is inevitable that such apparent anomalies should arise.

With these remarks we introduce the tables derived from the population or family schedule, showing the number of persons, with distinction of age, sex, and nativity, engaged in manufacturing, mechanical, and mining industries, in each state and territory:

PERSONS ENGAGED IN MANUFACTURES AND MECHANICAL AND MINING INDUSTRIES, BY STATES AND TERRITORIES, WITH AGE, SEX, AND NATIVITY: 1880.

	States and Territories.	Persons occupied.	AGE AND SEX.								NATIVITY.						
			All ages.		10 to 15.		16 to 59.		60 and over.		United States.	Ireland.	Germany.	Great Britain.	Scandinavia.	British America.	Other countries.
			Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.							
	The United States.	3,837,112	3,205,124	631,988	86,677	46,930	2,978,845	577,157	139,602	7,901	2,611,325	284,175	368,110	225,730	44,615	153,935	149,222
1	Alabama	22,996	19,461	3,535	773	394	17,226	3,067	1,462	74	21,139	311	418	296	27	38	767
2	Arizona	7,374	7,272	102	9	3	7,188	99	75	....	4,328	553	429	516	71	211	1,266
3	Arkansas	11,338	10,632	706	138	39	9,993	639	501	28	10,092	201	439	212	46	78	270
4	California	118,282	109,690	8,592	621	193	105,363	8,324	3,706	75	48,084	9,669	9,337	8,869	1,561	5,199	35,563
5	Colorado	47,408	46,439	969	140	8	45,781	956	518	5	31,694	3,030	2,334	5,309	1,027	2,303	1,711
6	Connecticut	116,091	89,192	26,899	3,755	3,083	81,185	23,589	4,252	227	78,465	15,940	5,097	7,469	770	7,043	1,307
7	Dakota	9,101	8,790	311	7	1	8,681	309	102	1	5,417	470	593	726	573	963	359
8	Delaware	14,148	12,284	1,864	401	173	11,252	1,657	631	34	12,327	858	342	473	19	34	95
9	Dist. of Columbia	15,337	12,681	2,656	121	32	12,037	2,584	523	40	12,950	728	1,068	339	19	41	192
10	Florida	8,436	7,803	633	200	50	7,169	567	434	16	6,449	79	131	155	42	60	1,520
11	Georgia	36,167	28,954	7,213	895	659	26,364	6,456	1,695	98	34,910	401	365	273	31	38	149
12	Idaho	6,532	6,468	64	11	....	6,351	64	106	....	2,397	431	267	459	148	195	2,635
13	Illinois	205,570	177,471	28,099	3,228	1,557	168,092	26,299	6,151	243	116,492	12,297	36,391	15,454	10,475	5,012	9,449
14	Indiana	110,127	98,696	11,431	1,850	324	92,513	10,926	4,333	181	89,974	2,419	11,646	3,299	391	653	1,745
15	Iowa	69,941	61,499	8,442	625	80	58,156	8,252	2,718	110	50,180	2,067	8,169	3,807	2,237	1,496	1,985
16	Kansas	36,319	33,292	3,027	272	19	31,974	2,963	1,046	45	28,560	993	2,340	2,077	802	727	820
17	Kentucky	61,481	53,788	7,693	1,354	415	49,903	7,162	2,531	116	50,245	2,103	6,665	1,391	26	237	814
18	Louisiana	30,681	26,459	4,222	478	154	24,018	3,922	1,963	146	22,826	1,245	3,200	546	67	144	2,653
19	Maine	72,662	55,884	16,778	1,320	1,045	51,121	15,518	3,443	215	59,723	2,016	206	2,401	159	7,826	331
20	Maryland	85,337	70,614	14,723	1,921	1,017	65,122	13,389	3,571	317	67,743	2,686	11,446	2,189	50	230	993
21	Massachusetts	370,265	272,246	98,019	8,591	7,272	250,508	89,921	13,147	826	238,255	52,358	6,144	24,649	1,958	43,191	3,710
22	Michigan	130,913	118,284	12,629	1,765	433	112,251	11,974	4,268	222	74,058	5,226	13,559	9,598	3,246	19,685	5,541
23	Minnesota	39,789	35,511	4,278	309	97	34,201	4,149	1,001	32	20,867	1,359	5,460	1,587	5,485	3,394	1,637
24	Mississippi	13,145	11,353	1,792	188	121	10,404	1,647	761	24	11,914	290	363	217	80	56	225
25	Missouri	109,774	98,211	11,563	2,180	694	92,893	10,706	3,138	163	74,703	5,882	19,376	4,209	582	1,300	3,722
26	Montana	8,022	7,946	76	6	1	7,830	75	110	....	3,994	855	415	646	191	663	1,258
27	Nebraska	18,255	16,529	1,726	92	13	16,047	1,694	390	19	12,712	555	1,966	962	649	547	864
28	Nevada	13,231	12,878	353	8	3	12,714	344	156	6	4,912	1,688	643	2,429	172	1,091	2,296
29	New Hampshire	58,037	40,675	17,362	1,257	1,353	37,222	15,808	2,196	201	42,200	3,282	281	1,736	67	10,328	143
30	New Jersey	160,561	131,647	28,914	5,113	3,377	121,180	25,252	5,354	285	109,696	14,532	18,334	12,087	507	896	4,509
31	New Mexico	4,377	4,042	335	18	34	3,938	290	86	11	3,219	189	182	154	30	87	516
32	New York	629,869	492,679	137,190	13,719	10,899	457,597	124,798	21,363	1,493	385,693	70,487	93,118	34,024	3,448	15,834	27,265
33	North Carolina	33,963	28,416	5,547	1,231	779	24,898	4,563	2,287	205	33,271	97	102	156	11	23	303
34	Ohio	242,294	210,362	31,932	6,106	1,795	193,762	29,620	10,494	517	172,097	8,209	35,673	15,649	376	3,145	7,145
35	Oregon	17,458	16,770	688	95	4	16,288	676	387	8	8,245	622	964	967	656	486	5,518
36	Pennsylvania	528,277	451,417	76,860	19,326	6,486	413,928	69,432	18,163	942	388,836	43,246	42,600	40,635	2,247	2,552	8,161
37	Rhode Island	66,160	46,072	20,088	2,957	2,576	41,278	17,372	1,837	140	40,278	9,108	685	7,060	282	8,238	509
38	South Carolina	19,698	15,887	3,811	425	283	14,184	3,415	1,278	113	18,819	260	332	153	11	19	104
39	Tennessee	36,082	32,442	3,640	643	196	29,885	3,343	1,914	101	33,546	642	729	666	80	76	343
40	Texas	30,346	28,238	2,108	265	34	26,927	2,041	1,046	33	22,460	951	2,885	1,066	195	311	2,478
41	Utah	10,212	9,401	811	158	32	8,773	711	470	68	4,249	126	196	3,513	686	540	902
42	Vermont	26,214	22,586	3,628	442	166	20,565	3,361	1,579	101	19,738	1,532	113	904	25	3,804	98
43	Virginia	63,059	54,607	8,452	1,769	577	49,136	7,634	3,702	241	61,191	438	631	506	20	57	216
44	Washington	7,296	7,132	164	38	2	6,955	159	139	3	3,796	302	377	575	262	550	1,434
45	West Virginia	26,288	24,840	1,448	527	32	23,120	1,378	1,193	38	22,861	870	1,457	884	7	76	133
46	Wisconsin	86,510	75,969	10,541	1,328	425	71,275	9,978	3,366	138	44,879	2,454	20,535	4.152	4,760	4,388	5,342
47	Wyoming	1,689	1,615	74	2	....	1,597	74	16	....	841	118	107	286	41	70	226

In introducing the corresponding table for the fifty principal cities of the country a caution needs to be given in addition to those which prefaced the statistics of occupation by states.

This is in regard to the discrepancies caused by the residence of persons outside the cities in which they labor. A similar cause operates, but in only an inconsiderable degree, as between states and territories. Thus, many workmen employed in New York state live across the Hudson, in New Jersey. Many workmen employed in Pennsylvania live across the Delaware, also in New Jersey; but, speaking generally, this cause does not operate to an extent which requires notice to be taken of it when writing of the statistics of occupations by states and territories. When we come to the comparative tables for cities, however, the case is different; this cause becomes one capable of producing great disturbance.

Take New York city for example. In addition to the thousands of persons who live in New Jersey, and cross the Hudson every day to pursue their avocations, and are thus lost to the tables of occupations for New York state, there is a vastly greater number who live in Brooklyn or elsewhere on Long Island, or who live above the Harlem river, coming in every morning by railway or ferry-boat, and thus are lost to the tables of occupations for New York city. This cause explains the fact that, while the manufacturing returns of New York city show 227,352 as the average number of persons employed—a number which would indicate an aggregate manufacturing population, 10 years of age and upward, of 250,000, 260,000, or 270,000, allowance being made on the various accounts heretofore mentioned—we find in fact but 213,003 persons resident in that city reporting themselves upon the population or family schedule as engaged in manufacturing or mechanical industries. On the other hand, although the manufacturing returns of Brooklyn show only 47,587, on the average, employed in establishments situated in that city, the returns of population give 92,669 persons residing there who announce themselves as engaged in manufacturing and mechanical industry. The ample explanation is that vast numbers of New York workmen live in Brooklyn. Put the two cities together, and a great part of the discrepancy disappears. Thus:

New York manufacturing returns	227,352
Brooklyn manufacturing returns	47,587
The two cities	274,939
New York occupation tables	213,003
Brooklyn occupation tables	92,669
The two cities	305,672

This, however, still leaves out of account the large numbers of New York workingmen who, as stated, go out into the country above the city or cross the river into New Jersey. Let us see if we can find any traces of these. Take the statistics for Jersey City:

Persons engaged in manufacturing and mechanical industry, by population returns	17,412
Persons, on the average, employed, as shown by the manufacturing returns	11,138
Difference	6,274

Here we have a large excess, accounted for by the fact that great numbers of persons who live in that "dormitory city", and who are in accordance with the census law returned there as a part of the resident population, work in New York city and are counted there as a part of the laboring population.

The effect of the same cause is seen in the case of another "dormitory city", viz, Camden, New Jersey, on the other side of the state. This city shows—

Persons engaged in manufacturing and mechanical industry, by population returns	7,000
Persons, on the average, employed, as shown by manufacturing returns	4,370
An excess of	2,630

or about 60 per cent., accounted for by the fact that many workmen cross the Delaware every morning to work in Philadelphia and return at night to sleep in another city and another state.

An even more striking instance of the complemental character of two neighboring cities is afforded by Pittsburgh and Allegheny city. In the former case, the numbers taken from the statistics of Manufactures show an excess of 74.17 per cent.; in the latter case, the figures taken from the statistics of Occupations show an excess of 78.69 per cent. The explanation is found in the fact that while Pittsburgh and Allegheny city are two distinct cities in law, they are in fact not only adjacent, but indistinguishable to the eye of the visitor.

Baltimore also shows a great discrepancy between the two sets of tables. Thus we have—

Persons engaged in manufacturing and mechanical industry, as by population returns	49,949
Persons, on average, employed, as by manufacturing returns	56,338
Deficiency	6,389

instead of an excess, as was to have been expected. Why is this? Here is no "dormitory city" to account for the loss, and a stranger might study the map of Baltimore and vicinity for some time without discovering the cause. Upon closer examination, however, he would see that a large body of population, numbering tens of thousands, belonging to what is popularly known as the city of Baltimore, has flowed across the boundary-line of the city and has formed a not inconsiderable suburban city, which is as yet even without a name, not to say a charter. Those who are familiar with Baltimore by personal visitation know that this extensive and closely-settled section is not even to be distinguished by the eye from the city proper. Upon the population schedule the residents of this section are returned as belonging to Baltimore county, yet the greater part of them are employed in the factories, shops, stores, and warehouses of Baltimore city. Boston, on account of its large number of suburban towns and cities (many of which, however, have an industrial *raison d'être* of their own), is another city which exhibits a similar apparent deficiency in the returns of the manufacturing classes on the population schedules.

With these remarks we introduce a table which shows for each of the fifty principal cities of the United States the total number of the manufacturing, mechanical, and mining classes resident in that city, in comparison with the total average number of persons reported on the manufacturing schedule as employed in establishments of productive industry situated therein:

City.	From occupation tables.	From manufacturing tables.	Excess per cent. of former.	Excess per cent. of latter.	City.	From occupation tables.	From manufacturing tables.	Excess per cent. of former.	Excess per cent. of latter.
Albany, N. Y	13, 558	11, 785	15. 04		Lynn, Mass	11, 694	12, 420		6. 21
Allegheny, Pa	11, 563	6, 471	*78. 69		Milwaukee, Wis	18, 265	20, 886		14. 35
Atlanta, Ga	4, 198	3, 680	14. 08		Minneapolis, Minn	8, 921	5, 344	‡66. 93	
Baltimore, Md	49, 949	56, 338		12. 79	Nashville, Tenn	4, 617	4, 791		3. 77
Boston, Mass	53, 900	59, 213		9. 86	Newark, N. J	29, 983	30, 046		. 21
Brooklyn, N. Y	92, 669	47, 587	†94. 74		New Haven, Conn	11, 629	15, 156		30. 33
Buffalo, N. Y	23, 289	18, 021	29. 23		New Orleans, La	19, 108	9, 504	‡101. 05	
Cambridge, Mass	9, 073	7, 543	20. 28		New York, N. Y	213, 003	227, 352		6. 74
Camden, N. J	7, 000	4, 370	†60. 18		Paterson, N. J	15, 919	19, 799		24. 37
Charleston, S. C	5, 134	2, 146	‡139. 24		Philadelphia, Pa	171, 526	185, 527		8. 16
Chicago, Ill	76, 912	79, 414		3. 25	Pittsburgh, Pa	21, 204	36, 930		*74. 17
Cincinnati, Ohio	47, 286	54, 517		15. 29	Providence, R. I	23, 774	22, 891	3. 86	
Cleveland, Ohio	26, 230	21, 724	20. 74		Reading, Pa	7, 850	6, 695	17. 25	
Columbus, Ohio	7, 241	5, 490	31. 89		Richmond, Va	8, 448	14, 047		66. 26
Dayton, Ohio	6, 954	6, 025	15. 42		Rochester, N. Y	17, 910	14, 607	22. 61	
Denver, Colo	6, 422	2, 944	‡118. 14		Saint Louis, Mo	52, 865	41, 825	26. 40	
Detroit, Mich	16, 745	16, 110	3. 94		Saint Paul, Minn	5, 778	5, 230	10. 48	
Fall River, Mass	16, 753	17, 085		1. 98	San Francisco, Cal	37, 475	28, 442	31. 76	
Hartford, Conn	7, 508	6, 300	19. 17		Scranton, Pa	8, 177	3, 549	§130. 40	
Indianapolis, Ind	10, 268	10, 000	2. 68		Syracuse, N. Y	9, 430	10, 966		16. 29
Jersey City, N. J	17, 412	11, 138	†56. 33		Toledo, Ohio	6, 211	6, 738		8. 48
Kansas City, Mo	7, 393	2, 548	‡190. 15		Troy, N. Y	11, 955	22, 434		87. 65
Lawrence, Mass	14, 840	16, 719		12. 66	Washington, D. C	13, 272	7, 146	‡85. 73	
Louisville, Ky	16, 599	17, 448		5. 11	Wilmington, Del	8, 566	7, 852	9. 09	
Lowell, Mass	21, 819	20, 039	8. 88		Worcester, Mass	13, 315	16, 559		24. 36

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* Note the relation of Pittsburgh and Allegheny city, adverted to in the text.

† Note the explanation given in the text of the relations of Brooklyn and Jersey City to New York, and of Camden to Philadelphia, as "dormitory" cities.

‡ The large excess of the numbers reported in the Occupation tables over the numbers appearing in the tables of Manufactures is mainly due in these cases to the preponderance of mechanical trades, like those of carpenter, blacksmith, mason, plumber, painter, etc., which, as already explained, are only very partially returned on the schedules of productive industry, or, like those of tailor, dressmaker, or retail butcher, whose productions are expressly excluded from the tables of Manufactures. Thus, in Kansas City, of the 7,393 "persons engaged in manufacturing, mechanical, and mining industries", as by the tables of Occupations, 1,301 are carpenters and joiners, 465 painters and varnishers, 855 brick and stone masons, 894 tailors, dressmakers, and milliners, etc. On the other hand, in Camden, which has 7,000 "persons engaged in manufacturing, mechanical, and mining industries", but whose population is largely a "dormitory" one, laboring in Philadelphia, we have but 477 carpenters and joiners, 243 painters and varnishers, 167 brick and stone masons, and 747 tailors, dressmakers, and milliners.

§ The large excess of the numbers reported in the Occupation tables over the numbers appearing in the tables of Manufactures is due in this case to chiefly the mining population of Scranton (3,657), which is not represented at all in the second set of tables.

We now introduce a table which shows the distribution of the total number of persons resident in each of the fifty principal cities who report themselves as engaged in manufacturing, mechanical, or mining industries, among several classes, according to age, sex, and nativity.

PERSONS ENGAGED IN MANUFACTURING, MECHANICAL, AND MINING INDUSTRIES, WITH AGE, SEX, AND NATIVITY.

	Cities.	Persons occupied.	AGE AND SEX.								NATIVITY.						
			All ages.		10 to 15.		16 to 59.		60 and over.		United States.	Ireland.	Germany.	Great Britain.	Scandinavia.	British America.	Other countries.
			Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.							
	Total	1,321,610	1,033,654	287,956	33,542	23,505	966,415	261,890	33,697	2,561	770,633	143,033	213,496	80,074	13,857	37,173	63,344
1	Albany, N. Y	13,558	11,119	2,439	234	87	10,370	2,330	515	22	8,676	1,963	1,691	641	59	338	190
2	Allegheny, Pa	11,563	9,938	1,625	311	144	9,354	1,464	273	17	7,575	739	2,228	564	45	27	385
3	Atlanta, Ga	4,198	3,193	1,005	99	73	2,992	925	102	7	3,978	55	76	42	8	10	29
4	Baltimore, Md	49,949	39,579	10,370	943	532	36,866	9,601	1,770	237	37,071	1,736	9,524	640	37	123	818
5	Boston, Mass	53,900	40,694	13,206	356	272	38,752	12,805	1,586	129	32,680	8,858	2,075	3,208	519	5,338	1,222
6	Brooklyn, N. Y	92,669	72,984	19,685	2,349	1,566	69,330	18,032	1,305	87	51,586	12,370	17,264	6,741	1,002	1,075	2,631
7	Buffalo, N. Y	23,289	19,875	3,414	584	234	18,604	3,153	687	27	12,927	1,148	6,083	1,346	56	1,087	642
8	Cambridge, Mass	9,073	7,349	1,724	147	56	6,841	1,648	361	20	5,195	1,428	268	593	90	1,304	195
9	Camden, N. J	7,000	5,710	1,290	145	73	5,380	1,203	185	14	6,004	171	366	379	2	27	51
10	Charleston, S. C	5,131	3,905	1,229	54	20	3,613	1,166	238	43	4,646	175	196	44	3	3	67
11	Chicago, Ill	76,912	62,013	14,899	1,562	1,336	59,394	13,522	1,057	41	31,228	6,450	18,785	4,782	6,467	2,953	6,247
12	Cincinnati, Ohio	47,286	37,572	9,714	1,793	1,143	34,538	8,492	1,241	79	29,519	2,249	12,660	1,089	32	316	1,421
13	Cleveland, Ohio	26,230	22,642	3,588	573	292	21,494	3,282	575	14	11,677	2,081	6,504	2,768	93	998	2,109
14	Columbus, Ohio	7,241	6,192	1,049	163	17	5,808	1,022	221	10	5,262	314	1,101	354	14	50	146
15	Dayton, Ohio	6,954	6,049	905	203	71	5,612	826	234	8	5,088	183	1,378	140	....	39	126
16	Denver, Colo	6,422	5,954	468	28	8	5,849	457	77	3	4,056	391	629	618	148	288	292
17	Detroit, Mich	16,745	13,905	2,840	353	252	13,090	2,574	462	14	7,298	827	4,223	1,369	32	2,085	911
18	Fall River, Mass	16,753	9,850	6,903	1,023	911	8,559	5,976	268	16	5,740	2,805	116	4,399	30	3,595	68
19	Hartford, Conn	7,508	5,748	1,760	127	115	5,372	1,633	249	12	5,124	1,118	499	487	37	158	85
20	Indianapolis, Ind	10,268	8,795	1,473	204	42	8,326	1,423	265	8	7,068	485	1,436	356	22	72	229
21	Jersey City, N. J	17,412	14,580	2,832	410	278	13,742	2,543	428	11	9,386	2,747	2,939	1,517	73	177	573
22	Kansas City, Mo	7,393	6,617	776	108	26	6,422	746	87	4	5,452	509	601	353	141	197	140
23	Lawrence, Mass	14,840	8,226	6,614	542	609	7,406	5,975	278	30	6,555	3,461	574	2,515	10	1,639	86
24	Louisville, Ky	16,599	14,161	2,438	379	95	13,354	2,317	428	26	11,621	856	3,247	337	10	106	422
25	Lowell, Mass	21,819	11,501	10,318	590	705	10,504	9,534	407	79	11,180	4,471	47	1,669	51	4,201	110
26	Lynn, Mass	11,694	8,570	3,124	180	79	8,005	3,035	385	10	9,482	1,010	17	245	17	887	36
27	Milwaukee, Wis	18,265	15,249	3,016	458	255	14,298	2,746	493	15	7,895	504	7,528	608	281	184	1,265
28	Minneapolis, Minn	8,921	7,823	1,098	117	45	7,543	1,050	163	3	4,982	347	784	334	1,343	919	212
29	Nashville, Tenn	4,617	3,782	835	102	47	3,522	778	158	10	4,067	162	173	106	19	13	77
30	Newark, N. J	29,983	23,870	6,113	949	683	21,866	5,381	1,055	49	18,113	2,938	6,097	1,813	34	95	893
31	New Haven, Conn	11,629	9,162	2,467	200	192	8,580	2,254	382	21	8,014	1,781	857	566	28	199	184
32	New Orleans, La	19,108	15,788	3,320	324	108	14,433	3,093	1,031	119	13,277	1,064	2,664	365	42	79	1,617
33	New York, N. Y	213,003	157,419	55,584	4,675	4,659	148,322	50,468	4,422	457	99,287	32,253	48,908	9,918	1,026	1,704	19,907
34	Paterson, N. J	15,919	11,310	4,609	1,030	1,173	9,937	3,415	343	21	9,231	1,791	907	2,641	38	79	1,232
35	Philadelphia, Pa	171,526	128,709	42,817	5,605	4,107	117,504	38,193	5,600	517	119,068	18,663	18,340	11,597	240	517	3,101
36	Pittsburgh, Pa	21,204	19,453	1,751	784	76	18,201	1,659	468	16	12,769	2,492	3,392	1,931	27	123	470
37	Providence, R. I	23,774	17,563	6,211	756	706	16,128	5,461	679	44	15,934	3,711	392	2,698	79	668	292
38	Reading, Pa	7,850	6,433	1,417	402	174	5,738	1,226	293	17	7,003	102	564	120	3	6	52
39	Richmond, Va	8,448	6,993	1,455	104	43	6,624	1,387	265	25	7,788	155	262	128	5	18	92
40	Rochester, N. Y	17,910	12,998	4,912	488	504	11,915	4,362	595	46	11,222	1,041	3,012	932	22	1,039	642
41	Saint Louis, Mo	52,865	45,776	7,089	1,454	622	43,218	6,393	1,104	74	29,414	4,007	14,039	1,974	203	544	2,684
42	Saint Paul, Minn	5,778	4,838	940	50	28	4,706	908	82	4	2,836	390	1,138	222	445	370	377
43	San Francisco, Cal	37,475	32,253	5,222	393	155	31,120	5,025	740	42	14,675	4,712	4,403	2,393	529	886	9,877
44	Scranton, Pa	8,177	7,374	803	965	86	6,209	712	200	5	3,944	1,491	768	1,810	12	33	119
45	Syracuse, N. Y	9,430	7,164	2,266	283	255	6,504	1,998	377	13	6,273	668	1,501	404	3	345	236
46	Toledo, Ohio	6,211	5,217	994	111	58	4,979	926	127	10	3,587	339	1,424	226	16	304	315
47	Troy, N. Y	11,955	8,538	3,417	287	240	7,960	3,148	291	29	7,595	2,276	479	837	53	573	142
48	Washington, D. C	13,272	10,909	2,363	111	22	10,354	2,308	444	33	11,145	646	950	301	18	37	175
49	Wilmington, Del	8,566	7,411	1,155	252	120	6,842	1,020	317	15	7,263	596	272	334	16	19	66
50	Worcester, Mass	13,315	10,901	2,414	182	111	10,335	2,295	384	8	8,577	2,304	115	620	377	1,236	86

WOMEN AND CHILDREN IN MANUFACTURING INDUSTRY.

We have already indicated the cause which makes the returns on the population or family schedule relating to the occupations of women and young children, especially those employed in factory labor, inadequate to the facts.

If we may assume this cause to have been of constant force from 1870 to 1880, comparison of the returns at the two several dates will show that the proportion of women and of young children engaged in manufacturing and mechanical industries has increased during the decade. The same tendency is shown, and that without any occasion for qualification as to the authority of the statement involved, by a comparison directly between the manufacturing statistics of 1880 and those of 1870.

	1870.	1880.	Per cent. of gain.
Males above 16 years	1, 615, 598	2, 019, 035	24. 97
Females above 15 years	323, 770	531, 639	64. 20
Children and youth	114, 628	181, 921	58. 71

The tendency to the introduction of women and young children into mechanical labor varies, of course, very widely as between different branches of productive industry. The following tables show the strong contrast between different industries in this respect:

CERTAIN INDUSTRIES EMPLOYING A LARGE PROPORTION OF WOMEN AND YOUNG CHILDREN.

Industry.	Total persons employed.	Per cent. of males over 16 years.	Per cent. of females over 15 years.	Per cent. of children and youth.
Book-binding and blank-book making	10, 612	48. 31	45. 53	6. 16
Carpet weaving	20, 371	49. 60	42. 07	8. 33
Men's clothing	160, 813	48. 04	50. 37	1. 59
Women's clothing	25, 192	10. 30	88. 33	1. 37
Cotton goods	185, 472	34. 57	49. 14	16. 29
Men's furnishing goods	11, 174	11. 40	85. 60	3. 00
Hosiery and knit goods	28, 885	26. 02	61. 30	12. 68
Millinery and lace goods	6, 555	14. 81	80. 06	5. 13
Shirts	25, 687	11. 20	86. 37	2. 43
Silk and silk goods	31, 337	29. 92	52. 32	17. 76
Straw goods	10, 948	29. 94	68. 52	1. 54
Tobacco, chewing, smoking, and snuff *	32, 756	45. 44	32. 90	21. 66
Umbrellas and canes	3, 608	41. 69	51. 52	6. 79
Woolen goods	86, 504	54. 31	33. 95	11. 74
Worsted goods	18, 803	34. 22	50. 38	15. 40

* Oddly enough, women are not employed in anything like an equal proportion in the manufacture of cigars. The respective numbers are: Males above 16 years, 40,099; females above 15 years, 9, 108; children, 4,090.

CERTAIN INDUSTRIES EMPLOYING A SMALL PROPORTION OF WOMEN AND CHILDREN.

Industry.	Total persons employed.	Per cent. of males over 16 years.	Per cent. of females over 15 years.	Per cent. of children and youth.
Agricultural implements	39, 580	96. 80	0. 18	3. 02
Bread and other bakery products	22, 488	84. 15	9. 83	6. 02
Brick and tile	66, 355	88. 97	0. 40	10. 63
Carriages and wagons	45, 394	96. 11	0. 60	3. 29
Drugs and chemicals	9, 545	85. 32	11. 92	2. 76
Dyeing and finishing textiles	16, 698	76. 58	12. 21	11. 21
Flour- and grist-mills	58, 407	99. 71	0. 07	0. 22
Furniture	48, 729	92. 73	1. 88	5. 39
Glass	24, 177	73. 53	3. 07	23. 40
Jewelry	12, 697	79. 15	15. 74	5. 11
Distilled liquors	6, 502	99. 23	0. 15	0. 62
Malt liquors	26, 220	99. 16	0. 11	0. 73
Musical instruments	11, 350	96. 26	1. 54	2. 20
Printing and publishing	58, 478	78. 46	11. 56	9. 98
Sewing-machines and attachments	9, 553	90. 36	2. 60	7. 04
Tinware, copperware, and sheet-iron ware	26, 248	91. 07	3. 25	5. 68

This widely different tendency of the various manufacturing industries as to calling into service women and young children naturally results in producing very different proportions in the same respects between the several states and the several cities, according as those industries which employ many women and children or those which employ few prevail.

The following table shows, for each state which produces to the value of $20,000,000, the proportions in which the several classes contribute to the aggregate body of persons employed in manufactures:

State.	Total persons employed.*	Per cent. of males over 16 years.	Per cent. of females over 15 years.	Per cent. of children and youth.	State.	Total persons employed.*	Per cent. of males over 16 years.	Per cent. of females over 15 years.	Per cent. of children and youth.
California	43, 693	87. 68	8. 98	3. 34	Missouri	63, 995	84. 69	8. 56	6. 75
Connecticut	112, 915	66. 97	25. 55	7. 48	New Hampshire	48, 831	60. 12	33. 14	6. 74
Delaware	12, 638	81. 11	11. 28	7. 61	New Jersey	126, 038	68. 86	21. 50	9. 64
Georgia	24, 875	76. 13	14. 55	9. 32	New York	531, 533	68. 58	25. 86	5. 56
Illinois	144, 727	83. 30	10. 53	6. 17	North Carolina	18, 109	70. 78	16. 23	12. 99
Indiana	69, 508	89. 30	5. 20	5. 50	Ohio	183, 609	82. 90	10. 11	6. 99
Iowa	28, 372	89. 46	5. 04	5. 50	Pennsylvania	387, 072	73. 46	18. 87	7. 67
Kansas	12, 062	92. 35	3. 25	4. 40	Rhode Island	62, 878	58. 94	29. 06	12. 00
Kentucky	37, 391	82. 77	9. 44	7. 79	Tennessee	22, 445	87. 21	5. 33	7. 46
Louisiana	12, 167	83. 60	10. 97	5. 43	Texas	12, 159	95. 77	0. 96	3. 27
Maine	52, 954	66. 91	26. 02	7. 07	Vermont	17, 540	82. 31	12. 95	4. 74
Maryland	74, 945	62. 31	28. 95	8. 74	Virginia	40, 184	71. 62	15. 29	13, 09
Massachusetts	352, 255	64. 96	30. 09	4. 95	West Virginia	14, 311	90. 14	2. 42	7. 44
Michigan	77, 591	88. 21	6. 17	5. 62	Wisconsin	57, 109	84. 50	10. 93	4. 57
Minnesota	21, 247	89. 13	7. 70	3. 17					

* As by the tables of Manufactures.

The tendency to variation in the respects under consideration is shown even more strikingly in the case of single cities. Thus, in giving the statistics of Pennsylvania as a whole, we merge Pittsburgh, a city which has a very low proportion of women and children employed in manufactures, with Philadelphia, a city which has a high proportion.

We therefore give in the table following the proportions in which the several classes, according to age and sex, contribute to the aggregate number of persons employed in manufactures in the fifty principal cities.

No.	Fifty cities.	Total persons employed.*	Per cent. of males over 16 years.	Per cent. of females over 15 years.	Per cent. of children and youth.	No.	Fifty cities.	Total persons employed.*	Per cent. of males over 16 years.	Per cent. of females over 15 years.	Per cent. of children and youth.
1	New York, N. Y	227, 352	64. 30	31. 58	4. 12	26	Troy, N. Y	22, 434	46. 08	49. 54	4. 38
2	Philadelphia, Pa	185, 527	60. 95	30. 62	8. 43	27	Rochester, N. Y	14, 607	63. 61	27. 74	8. 65
3	Chicago, Ill	79, 414	78. 62	15. 34	6. 04	28	Lawrence, Mass	16, 719	46. 77	47. 30	5. 93
4	Brooklyn, N. Y	47, 587	77. 97	14. 75	7. 28	29	New Haven, Conn	15, 156	65. 97	31. 54	2. 49
5	Boston, Mass	59, 213	67. 23	30. 65	2. 12	30	Albany, N. Y	11, 785	83. 40	12. 97	3. 63
6	Saint Louis, Mo	41, 825	81. 24	11. 38	7. 38	31	Richmond, Va	14, 047	65. 62	20. 45	13. 93
7	Cincinnati, Ohio	54, 517	71. 52	19. 23	9. 25	32	Fall River, Mass	17, 085	48. 18	39. 35	12. 47
8	Baltimore, Md	56, 338	60. 50	32. 19	7. 31	33	New Orleans, La	9, 504	80. 66	13. 53	5. 81
9	San Francisco, Cal	28, 442	83. 19	12. 62	4. 19	34	Syracuse, N. Y	10, 966	68. 51	26. 18	5. 31
10	Pittsburgh, Pa	36, 930	86. 68	4. 55	8. 77	35	Peoria, Ill	4, 067	88. 98	7. 70	3. 32
11	Newark, N. J	30, 046	73. 72	17. 46	8. 82	36	Manchester, N. H	10, 838	42. 74	53. 03	4. 23
12	Jersey City, N. J	11, 138	71. 49	21. 78	6. 73	37	Allegheny, Pa	6, 471	85. 75	9. 49	4. 76
13	Cleveland, Ohio	21, 724	82. 94	10. 52	6. 54	38	Holyoke, Mass	9, 011	49. 19	42. 85	7. 96
14	Milwaukee, Wis	20, 886	76. 68	18. 78	4. 54	39	Reading, Pa	6, 695	80. 85	10. 81	8. 34
15	Buffalo, N. Y	18, 021	83. 42	9. 96	6. 62	40	Wilmington, Del	7, 852	87. 51	5. 84	6. 65
16	Providence, R. I	22, 891	70. 11	22. 39	7. 50	41	Springfield, Mass	7, 360	66. 32	29. 05	4. 63
17	Louisville, Ky	17, 448	77. 26	16. 21	6. 53	42	Trenton, N. J	8, 902	75. 16	12. 18	12. 66
18	Lowell, Mass	20, 039	46. 00	47. 42	6. 58	43	Dayton, O	6, 025	84. 17	8. 51	7. 32
19	Detroit, Mich	16, 110	77. 45	15. 08	7. 47	44	Washington, D. C	7, 146	76. 91	19. 44	3. 65
20	Minneapolis, Minn	5, 344	87. 99	8. 55	3. 46	45	Hartford, Conn	6, 300	72. 59	21. 79	5. 62
21	Indianapolis, Ind	10, 000	86. 71	8. 30	4. 99	46	Toledo, Ohio	6, 738	74. 62	15. 14	10. 24
22	Worcester, Mass	16, 559	82. 64	14. 98	2. 38	47	Bridgeport, Conn	7, 508	72. 93	24. 07	3. 00
23	Lynn, Mass	12, 420	71. 61	28. 09	0. 30	48	Saint Paul, Minn	5, 230	75. 14	20. 88	3. 98
24	Cambridge, Mass	7, 543	82. 26	15. 54	2. 20	49	Salem, Mass	4, 181	62. 95	31. 31	5. 74
25	Paterson, N. J	19, 799	51. 87	33. 21	14. 92	50	New Bedford, Mass	5, 812	67. 36	26. 46	6. 18

* As by the tables of Manufactures.

NATIONALITY IN MANUFACTURING INDUSTRY.

The comparative aptitude of our foreign population as a whole for the several grand classes of occupations may be seen by looking at the following table, derived from the statistics of Occupations:

Grand class of occupations.	Total.	Per cent. of persons engaged who are natives of the United States.	Per cent. of persons engaged who are natives of all foreign countries.
All occupations	100	79.91	20.09
Agriculture	100	89.40	10.60
Professional and personal services	100	75.52	24.48
Trade and transportation	100	74.67	25.33
Manufacturing, mechanical, and mining	100	68.05	31.95

From this it appears that persons of foreign birth constitute a larger part of the total number of persons employed in manufacturing, mechanical, and mining pursuits than is the case in any other of the grand classes of gainful occupations.

As between the different industries embraced in this great class, the foreign element shows very different aptitudes.

The following table shows for each recognized occupation within this class, which employs as many as 20,000 persons, first, the proportion in which the total number of operatives engaged is made up of persons of native and persons of foreign birth, and, secondly, the proportions in which the total number of persons of foreign birth engaged is made up from the different foreign countries on the list:

Industry.	OPERATIVES.			FOREIGN PER CENT. OF EACH CLASS.						
	Total.	Per cent. of native.	Per cent. of foreign.	Total.	Ireland.	Germany.	Great Britain.	Scandinavia.	British America.	Other countries.
Apprentices to trades	100	90.76	9.24	100	14.55	32.09	18.03	4.00	13.45	17.88
Bakers	100	43.84	56.16	100	11.53	65.68	7.85	1.23	4.18	9.53
Blacksmiths	100	72 71	27.29	100	27.04	32.10	15.93	4.78	12.93	7.22
Boot and shoe makers	100	64.24	35.76	100	25.13	40.09	9.66	3.62	10.92	10.58
Brick and tile makers	100	68.17	31.83	100	20.28	27.21	7.74	4.04	30.04	10.69
Butchers	100	61.66	38.34	100	11.92	62.15	10.67	0.99	3.84	10.43
Cabinet makers	100	58.23	41.77	100	5.35	63.00	6.91	5.99	6.71	12.04
Carpenters and joiners	100	77.04	22.96	100	16.65	35.46	15.41	6.20	17.55	8.73
Carriage and wagon makers	100	75.45	24.55	100	11.36	50.57	11.58	4.44	12.99	9.06
Cigar makers	100	55.43	44.57	100	3.38	47.48	5.61	0.82	2.08	40.63
Coopers	100	67.09	32.91	100	20.25	54.79	5.03	2.34	8.18	9.41
Cotton-mill operatives*	100	55.37	44.63	100	26.04	2.64	21.43	0.37	48.03	1.49
Employés in manufacturing establishments (not specified)	100	71.56	28.44	100	26.97	33.65	16.86	2.00	8.85	11.67
Engineers and firemen	100	72.82	27.18	100	32.26	19.94	30.27	2.41	9.15	5.95
Fishermen and oystermen	100	73.33	26.67	100	9.39	6.94	5.27	8.28	25.53	44.59
Gold and silver workers and jewelers	100	72.91	27.09	100	12.01	42.27	20.17	3.24	5.73	16.58
Harness and saddle makers	100	74.50	25.50	100	19.29	43.11	11.08	2.38	11.91	12.23
Iron and steel workers and shop operatives	100	63.67	36.33	100	40.21	22.37	24.45	2.51	5.33	5.13
Leather curriers, dressers, finishers, and tanners	100	54.26	45.74	100	44.16	30.13	6.92	3.19	8.53	7.06
Lumbermen and raftsmen	100	65.82	34.18	100	8.42	9.36	7.13	12.56	53.78	8.75
Machinists	100	69.88	30.12	100	20.70	26.94	32.26	3.20	9.04	7.87
Manufacturers	100	73.73	26.27	100	12.51	43.86	23.20	1.32	6.07	13.03
Marble and stone cutters	100	55.41	44.59	100	42.15	19.76	21.91	1.75	7.43	7.01
Masons, brick and stone	100	64.63	35.37	100	34.79	32.71	15.83	3.65	6.15	6.87
Mill and factory operatives	100	74.21	25.79	100	26.74	21.20	23.52	3.05	16.11	9.38
Millers	100	84.63	15.37	100	10.94	41.07	23.72	4.41	10.93	8.93
Milliners, dressmakers, and seamstresses	100	83.95	16.05	100	35.36	20.30	15.51	3.62	15.39	9.82
Miners	100	46.11	53.89	100	20.17	7.94	37.58	3.82	4.50	25.99
Painters and varnishers	100	76.05	23.95	100	20.06	33.33	20.57	5.71	10.19	10.14
Paper-mill operatives	100	66.80	33.20	100	52.75	9.88	[illegible]	1.13	15.19	5.10
Plasterers	100	72.44	27.56	100	43.17	20.05	20.08	2.68	8.00	6.02
Printers, lithographers, and stereotypers	100	83.00	17.00	100	22.96	27.00	25.39	2.99	13.41	8.25
Saw- and planing-mill operatives	100	73.29	26.71	100	8.33	24.13	5.43	14.36	33.69	14.06
Tailors and tailoresses	100	46.48	53.52	100	14.38	52.65	7.01	5.67	3.23	17.00
Tinners and tinware makers	100	75.86	24.14	100	17.73	44.59	15.42	3.03	8.99	10.24
Tobacco-factory operatives	100	91.31	8.69	100	22.63	37.33	7.94	1.69	4.62	25.79
Woolen-mill operatives	100	60.72	39.28	100	36.85	10.88	30.36	1.30	17.63	2.89

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* Not including persons employed in print works.

Pages might be written of appropriate comment upon the foregoing table. Thus, bearing in mind that the number of Germans engaged in all branches of productive industry is to the number of Irish as 13 to 10, we find members of the two nationalities engaged almost in that proportion as blacksmiths, while as butchers there are more than 5 Germans to 1 Irishman; as cabinet makers, 12 to 1; as cigar makers 14 to 1. On the other hand there are 10 Irish in cotton-mills to 1 German.

Although British Americans are only about one-half the Irish engaged in manufacturing and mechanical pursuits, and are considerably less than one-half the Germans, there are more of British Americans in saw- and planing-mills and in cotton-mills than of Germans and Irish combined, while British Americans as lumbermen and raftsmen exceed the men of all other nationalities from whatever quarter of the globe.

These various industrial aptitudes of the men of the several nationalities appearing in our tables naturally cause those nationalities to be represented in very different proportions in the several cities, states, and sections.

The following table gives the proportions in which the industrial classes of each state producing to the value of $20,000,000 (manufactures) are divided (1) between persons of native and persons of foreign birth, and (2) the proportions in which the aggregate foreign-born class is divided among the several nationalities recognized in the tables of Occupations:

States.	Population.	ALL PERSONS ENGAGED IN MANUFACTURING, MECHANICAL, AND MINING INDUSTRIES.			PERSONS OF FOREIGN BIRTH ENGAGED IN MANUFACTURING, MECHANICAL, AND MINING INDUSTRIES.						
						Per cent. born in—					
		Total per cent.	Per cent. native.	Per cent. foreign.	Total per cent.	Ireland.	Germany.	Great Britain.	Scandinavia.	British America.	Other countries.
The United States	50, 155, 783	100	68. 05	31. 95	100	23. 18	30. 03	18. 42	3. 64	12. 56	12. 17
California	864, 694	100	40. 65	59. 35	100	13. 77	13. 30	12. 63	2. 22	7. 41	50. 67
Connecticut	622, 700	100	67. 59	32. 41	100	42. 36	13. 55	19. 85	2. 05	18. 71	3. 48
Delaware	146, 608	100	87. 13	12. 87	100	47. 12	18. 78	25. 97	1. 04	1. 87	5. 22
Georgia	1, 542, 180	100	96. 52	3. 48	100	31. 90	29. 00	21. 72	2. 47	3. 03	11. 88
Illinois	3, 077, 871	100	56. 67	43. 33	100	13. 80	40. 85	17. 35	11. 76	5. 63	10. 61
Indiana	1, 978, 301	100	81. 70	18. 30	100	12. 00	57. 79	16. 37	1. 94	3. 25	8. 65
Iowa	1, 624, 615	100	71. 75	28. 25	100	10. 46	41. 34	19. 27	11. 32	7. 57	10. 04
Kansas	996, 096	100	78. 64	21. 36	100	12. 80	30. 16	26. 77	10. 34	9. 37	10. 56
Kentucky	1, 648, 690	100	81. 72	18. 28	100	18. 72	59 32	12. 38	0. 23	2. 11	7. 24
Louisiana	939, 946	100	74. 40	25. 60	100	15. 85	40. 74	6. 95	0. 85	1. 83	33. 78
Maine	648, 936	100	82. 19	17. 81	100	15. 58	1. 59	18. 57	1. 23	60. 48	2. 55
Maryland	934, 943	100	79. 38	20. 62	100	15. 27	65. 05	12. 44	0. 28	1. 31	5. 65
Massachusetts	1, 783, 085	100	64. 35	35. 65	100	39. 66	4. 65	18. 67	1. 48	32. 72	2. 82
Michigan	1, 636, 937	100	56. 57	43. 43	100	9. 19	23. 85	16. 88	5. 71	34. 62	9. 75
Minnesota	780, 773	100	52. 44	47. 56	100	7. 18	28. 86	8. 39	28. 99	17. 93	8. 65
Missouri	2, 168, 380	100	68. 06	31. 94	100	16. 77	55. 25	12. 00	1. 66	3. 71	10. 61
Nebraska	452, 402	100	69. 64	30. 36	100	10. 01	35. 47	17. 35	11. 71	9. 87	15. 59
New Hampshire	346, 991	100	72. 71	27. 29	100	20. 72	1. 78	10. 96	0. 42	65. 22	0. 90
New Jersey	1, 131, 116	100	68. 32	31. 68	100	28. 57	36. 04	23. 76	1. 00	1. 76	8. 87
New York	5, 082, 871	100	61. 23	38. 77	100	28. 87	38. 14	13. 93	1. 41	6. 48	11. 17
North Carolina	1, 399, 750	100	98. 02	1. 98	100	14. 02	14. 74	22. 54	1. 59	3. 32	43. 79
Ohio	3, 198, 062	100	71. 03	28. 97	100	11. 69	50. 82	22. 29	0. 54	4. 48	10. 18
Pennsylvania	4, 282, 891	100	73. 60	26. 40	100	31. 02	30. 55	29. 14	1. 61	1. 83	5. 85
Rhode Island	276, 531	100	60. 88	39. 12	100	35. 19	2. 65	27. 28	1. 09	31. 83	1. 96
Tennessee	1, 542, 359	100	92. 97	7. 03	100	25. 32	28. 75	26. 26	3. 15	3. 00	13. 52
Texas	1, 591, 749	100	74. 01	25. 99	100	12. 06	36. 59	13. 52	2. 47	3. 94	31. 42
Vermont	332, 286	100	75. 30	24. 70	100	23. 66	1. 74	13. 96	0. 39	58. 74	1. 51
Virginia	1, 512, 565	100	97. 04	2. 96	100	23. 45	33. 78	27. 09	1. 07	3. 05	11. 56
West Virginia	618, 457	100	86. 96	13. 04	100	25. 39	42. 52	25. 79	0. 20	2. 22	3. 88
Wisconsin	1, 315, 497	100	51. 88	48. 88	100	5. 90	49. 33	9. 97	11. 43	10. 54	12. 83

The following table gives the proportions in which the industrial classes of the fifty principal cities of the United States are divided, (1) between persons of native and persons of foreign birth, (2) the proportions in which the aggregate foreign-born class is divided among the several nationalities recognized in the table of occupations:

No.	Cities.	ALL PERSONS ENGAGED IN MANUFACTURING, MECHANICAL, AND MINING INDUSTRIES.			PERSONS OF FOREIGN BIRTH ENGAGED IN MANUFACTURING, MECHANICAL, AND MINING INDUSTRIES.						
						Per cent. born in—					
		Total per cent.	Per cent. native.	Per cent. foreign.	Total per cent.	Ireland.	Germany.	Great Britain.	Scandinavia.	British America.	Other countries.
	Total	100	58.31	41.69	100	25.96	38.75	14.53	2.51	6.75	11.50
1	Albany, N. Y	100	64.99	35.01	100	40.21	34.64	13.13	1.21	6.92	3.89
2	Allegheny, Pa	100	65.51	34.49	100	18.53	55.87	14.14	1.13	0.68	9.65
3	Atlanta, Ga	100	94.76	5.24	100	25.00	34.55	19.09	3.64	4.54	13.18
4	Baltimore, Md	100	74.22	25.78	100	13.48	73.96	4.97	0.29	0.95	6.35
5	Boston, Mass	100	60.63	39.37	100	41.74	9.78	15.12	2.45	25.15	5.76
6	Brooklyn, N. Y	100	55.67	44.33	100	30.11	42.02	16.41	2.44	2.62	6.40
7	Buffalo, N. Y	100	55.51	44.49	100	11.08	58.70	12.99	0.54	10.49	6.20
8	Cambridge, Mass	100	57.26	42.74	100	36.82	6.91	15.29	2.32	33.63	5.03
9	Camden, N. J	100	85.77	14.23	100	17.17	36.75	38.05	0.20	2.71	5.12
10	Charleston, S. C	100	90.49	9.51	100	35.86	40.16	9.02	0.62	0.61	13.73
11	Chicago, Ill	100	40.60	59.40	100	14.12	41.12	10.47	14.16	6.46	13.67
12	Cincinnati, Ohio	100	62.43	37.57	100	12.66	71.25	6.13	0.18	1.78	8.00
13	Cleveland, Ohio	100	44.52	55.48	100	14.30	44.69	19.02	0.64	6.86	14.49
14	Columbus, Ohio	100	72.67	27.33	100	15.87	55.63	17.89	0.71	2.52	7.38
15	Dayton, Ohio	100	73.17	26.83	100	9.81	73.85	7.50	....	2.09	6.75
16	Denver, Colo	100	63.16	36.84	100	16.53	26.58	26.12	6.26	12.17	12.34
17	Detroit, Mich	100	43.58	56.42	100	8.75	44.70	14.49	0.34	22.07	9.65
18	Fall River, Mass	100	34.26	65.74	100	25.47	1.05	39.95	0.27	32.64	0.62
19	Hartford, Conn	100	68.25	31.75	100	46.90	20.93	20.43	1.55	6.63	3.56
20	Indianapolis, Ind	100	74.68	25.32	100	18.65	55.23	13.69	0.85	2.77	8.81
21	Jersey City, N. J	100	53.91	46.09	100	34.23	36.62	18.90	0.91	2.20	7.14
22	Kansas City, Mo	100	73.75	26.25	100	26.22	30.97	18.19	7.26	10.15	7.21
23	Lawrence, Mass	100	44.17	55.83	100	41.77	6.93	30.36	0.12	19.78	1.04
24	Louisville, Ky	100	70.01	29.99	100	17.19	65.23	6.77	0.20	2.13	8.48
25	Lowell, Mass	100	51.24	48.76	100	42.03	0.44	15.69	0.48	40.33	1.03
26	Lynn, Mass	100	81.08	18.92	100	45.66	0.77	11.07	0.77	40.10	1.63
27	Milwaukee, Wis	100	43.22	56.78	100	4.86	72.60	5.86	2.71	1.77	12.20
28	Minneapolis, Minn	100	55.85	44.15	100	8.81	19.90	8.48	34.10	23.33	5.38
29	Nashville, Tenn	100	88.09	11.91	100	29.46	31.46	19.27	3.45	2.36	14.00
30	Newark, N. J	100	60.41	39.59	100	24.75	51.37	15.27	0.29	0.80	7.52
31	New Haven, Conn	100	68.91	31.09	100	49.27	23.71	15.66	0.77	5.50	5.09
32	New Orleans, La	100	69.48	30.52	100	18.25	45.69	6.26	0.72	1.35	27.73
33	New York, N. Y	100	46.61	53.39	100	28.36	43.01	8.72	0.90	1.50	17.51
34	Paterson, N. J	100	57.98	42.02	100	26.78	13.56	39.49	0.57	1.18	18.42
35	Philadelphia, Pa	100	69.42	30.58	100	35.58	34.96	22.11	0.46	0.98	5.91
36	Pittsburgh, Pa	100	60.22	39.78	100	29.55	40.21	22.89	0.32	1.46	5.57
37	Providence, R. I	100	67.02	32.98	100	47.34	5.00	34.41	1.01	8.52	3.72
38	Reading, Pa	100	89.21	10.79	100	12.04	66.59	14.17	0.35	0.71	6.14
39	Richmond, Va	100	92.19	7.81	100	23.48	39.70	19.39	0.76	2.73	13.94
40	Rochester, N. Y	100	62.66	37.34	100	15.56	45.04	13.93	0.33	15.54	9.60
41	Saint Louis, Mo	100	55.64	44.36	100	17.09	59.87	8.42	0.86	2.32	11.44
42	Saint Paul, Minn	100	49.08	50.92	100	13.26	38.68	7.55	15.12	12.58	12.81
43	San Francisco, Cal	100	39.16	60.84	100	20.67	19.31	10.49	2.32	3.89	43.32
44	Scranton, Pa	100	48.23	51.77	100	35.23	18.14	42.76	0.28	0.78	2.81
45	Syracuse, N. Y	100	66.52	33.48	100	21.16	47.54	12.80	0.09	10.93	7.48
46	Toledo, Ohio	100	57.75	42.25	100	12.92	54.27	8.61	0.61	11.59	12.00
47	Troy, N. Y	100	63.53	36.47	100	52.20	10.99	19.20	1.21	13.14	3.26
48	Washington, D. C	100	83.97	16.03	100	30.37	44.66	14.15	0.85	1.74	8.23
49	Wilmington, Del	100	84.79	15.21	100	45.74	20.87	25.63	1.23	1.46	5.07
50	Worcester, Mass	100	64.42	35.58	100	48.63	2.43	13.08	7.96	26.09	1.81

THE STATISTICS OF CAPITAL INVESTED IN MANUFACTURES.

The statistics of capital invested in manufactures, as obtained by a popular canvass, in which the statements of individual proprietors are necessarily accepted, and, indeed, are by the law intended to be accepted, are always likely to be partial and defective, far beyond the limit of error which pertains to other classes of statistics derived from the manufacturing schedule. The liability to error in this respect inheres in the very nature of the subject, and is probably ineradicable.

When the committee of Congress was, in 1869, engaged in preparing a bill providing for the taking of the Ninth Census, the present writer addressed to that committee a recommendation that the inquiry regarding the amount of capital invested be omitted from the manufacturing schedule; and that bill having failed to become law, and the census of 1870 having been taken under the act of May 23, 1850, the same person, in commenting upon the industrial statistics of that enumeration (see volume on Industry and Wealth, Ninth Census, pages 381, 382), used the following language:

> The census returns of capital invested in manufactures are entirely untrustworthy and delusive. The inquiry is one of which it is not too much to say that it ought never to be embraced in the schedules of the census, not merely for the reason that the results are, and must remain, wholly worthless, the inquiry occupying upon the schedules the place of some technical question which might be made to yield information of great value, but also because the inquiry in respect to capital creates more prejudice and arouses more opposition to the progress of the enumeration than all the other inquiries of the manufacturing schedule united. It is, in fact, the one question which manufacturers resent as needlessly obtrusive, while at the same time it is perhaps the one question in respect to their business which manufacturers, certainly the majority of them, could not answer to their own satisfaction, even if disposed. No man in business knows what he is worth—far less can say what portion of his estate is to be treated as capital. With respect, indeed, to corporations having a determinate capital stock, the difficulty of making a correct return in this particular becomes very much reduced; yet, even here, the difference caused by returning such capital stock at its nominal value on the one hand, or at its actual selling price on the other, whether above or below par, might easily make a difference of 50 or 75 per cent. in the aggregate amount of capital stated for any branch of industry.
>
> Where, however, business is carried on outside of incorporated companies, the difficulty of obtaining even an approximate return of capital, resulting from the nature of the inquiry itself, irrespective of the reluctance of manufacturers, becomes such as to render success hopeless. So numerous are the constructions, possible and even reasonable, in respect to what constitutes manufacturing capital, that anything like harmony or consistency of treatment is not to be expected of a large body of officials pursuing their work independently of each other. The Superintendent is free to confess that he would be puzzled to furnish a definition (fit for practical use by enumerators) of manufacturing capital, or, even in a single case, with complete access to the books of a manufacturing establishment conducted by two or more partners, and with the frankest exhibit of the assets, both of the firm and of the individuals thereof, to make up a statement of the capital of the concern in respect to which he would feel any assurance. When to such difficulties in the nature of the subject is added the reluctance of manufacturers to answer an inquiry of this character, it may fairly be assumed, in advance of any enumerations, that the results will be of the slightest possible value.
>
> It is greatly to be regretted that the census should be incumbered by an inquiry yielding so little, yet provoking so much opposition to the progress of the general work.

A host of illustrations might be offered showing the hopelessness of securing anything like complete and accurate returns of capital invested. Take a single class of difficulties: Here are two shoe factories in the same town, each employing two hundred workmen. In one case the manufacturer owns the building in which his operations are carried on, and reports his capital at $75,000, being the value of his stock and machinery plus the value of the building; the other reports his capital at $25,000, being the value of stock and machinery only. The latter would not, and could not rightfully, report the value of the building as a part of his capital, for it does not belong to him. Yet that building is devoted to manufacturing uses, and any summary of the manufacturing capital of the country which omits consideration of it is, in so far, defective.

Let it not be thought that this element is a slight one. A very large part of the manufacturing establishments of a great city like New York or Philadelphia are located in leased buildings. In a single block may be found twenty clothing manufacturers, corset manufacturers, hat and cap makers, printers and publishers, engravers and die-sinkers, not one of these concerns having a dollar's interest in the building, of which the upper three or five stories may be wholly devoted to manufacturing uses.

In the same way the value of the utilized water-powers of the United States must amount to a vast sum; yet a very large part of this will not be, indeed cannot properly be, included in the returns of manufacturers, being the property of water-power companies or of the individual owners of adjacent lands.

Take still another large class of cases. A manufacturer has habitually $50,000 worth of his paper discounted by one, two, or three banks with which he keeps accounts, or by bill brokers. He cannot return this as a part of his manufacturing capital. It is not his manufacturing capital, for the best reason in the world, viz, that it is not his property at all; it is the capital of the banks or of his individual creditors. That particular portion of wealth is not even capital invested permanently in manufactures. The notes might conceivably be paid off in the course of three months, and the same parties might thereafter loan their capital, not to that manufacturer, not to any manufacturer, but to some person engaged in trade or transportation; yet many hundreds of millions of dollars of borrowed capital are habitually employed in prosecuting the manufacturing enterprises of the country.

A variety of additional illustrations might be offered, were it needed, to show that, altogether in addition to the strong inclination of manufacturers to misrepresent the facts regarding the amount of their invested property, there is found, in the very nature of industrial operations, a liability to the serious understatement of the capital invested. No corresponding difficulty is experienced in obtaining a fair and just statement of the annual value of the product, or of the kind and quantities thereof.

ATTACK UPON THE INDUSTRIAL CENSUS OF PHILADELPHIA.

Ever since the first completion of the canvass the industrial census of Philadelphia has been made the object of the most virulent attacks by a local statistician. Not content with alleging gross carelessness and negligence on the part of the resident officers concerned in the enumeration, this person at last proceeded to the astonishing length of charging that the Superintendent of Census at Washington had deliberately suppressed the returns relating to several hundreds of establishments, for the purpose of disparaging Philadelphia as a manufacturing city in comparison with New York.

It is not necessary to comment upon an attack like this, made not only without a particle of evidence, but directly against the reason of the case, upon the character of a public official. It was deemed best to allow the accuser to proceed, as it was evident he was bent on doing, to the point where he would become, by his own extravagance and inconsistency, the object of public ridicule, rather than of public indignation or of criminal animadversion. This came to pass, with poetical justice, when the assailant of the Census Office himself, in 1882, took and published a so-called census of the industries of Philadelphia. Having committed himself thus irrevocably to definite statements, he was easily dealt with. Mr. Frank R. Williams, the indefatigable and clear-sighted head of the manufacturing division of the census, proceeded to Philadelphia, under instructions from the Census Office, and there, on the ground, began the systematic, critical scrutiny of this work. Under such a test that plausible tissue of manufactured statistics disappeared like frost before the rising sun. Establishments were found upon these lists which were not only situated in other counties (Montgomery, Dauphin, and Lancaster) of Pennsylvania, but even in another state, New Jersey, establishments in the city of Camden, employing many hundreds of hands, being put down to the credit of Philadelphia, while selling agents or commission houses handling goods made in New York and other cities were freely included. The instances where establishments were twice reported were so numerous that it became first ludicrous and then tedious to recount them. In some cases establishments were thrice reported, and in one case not less than nine times. Hundreds of small newspaper and periodical offices and publishing houses were reported as "establishments of productive industry" where not a dollar's worth of printing was done in a year, the edition being set up and printed in job establishments, whose product was already once fully returned. In one case the whole body of carriers attached to a daily newspaper office were reported as manufacturing operatives. Corner drug-stores where prescriptions are compounded, custom tailors, mantua makers, milliners, civil engineers, and even retail butchers, were included to swell the total. As the culmination of this statistical monstrosity, the compiler of the Philadelphia Directory was brought in as a manufacturer.

OTHER ATTACKS ON THE CENSUS OF MANUFACTURES.

No other attack has been made on the census of manufactures comparing in persistency or virulence with that above named; but a host of criticisms, more or less offensive, have been launched against the tables of manufacturing industry as published in bulletins from the Census Office. Not one of these, so far as the writer is aware, has been fairly substantiated upon examination. In most cases they have proved to be founded upon a simple misapprehension of the tables themselves; in some instances even in spite of express cautions appended to the figures. Thus, one assault upon the census, and that from a very respectable source, was due to the failure of the writer in question to add the farm product of butter and cheese to the factory product of the same articles. The two reported amounts, when duly put together, exceeded by a little over one per cent. the total which this writer had indignantly claimed for the region to which the statistics referred. Another attack, which went to the extent of declaring the whole census of manufactures a sham, was due to the failure of its auther to note that the statistics relating to the boot and shoe industry, upon which he was commenting, covered, and professed to cover, only the products of the boot and shoe factories, 1,959 in number, and made no account of the 16,013 small custom shops or cobblers' shops (elsewhere duly reported under the appropriate title), which fell outside the range of the individual table whose statements were disputed. The character of a number of other heedless criticisms from various sources will be seen by reference to the letter which is reprinted upon pages 424 and 425. Still another sweeping attack, from a highly respectable quarter, was based upon a comparison of the statistics of paper-mills in 1870 and in 1880, the person making the comparison having omitted certain classes of mills at the one date which he had included, under precisely the same title, at the other.

No one who has had as much experience in statistical work as the present writer will be disposed to claim for an industrial census of a vast country like the United States, conducted by a large number of agents, many of whom, at the best, have had little training for the service, and all of whom are called to work under palpable disadvantages, anything like absolute and ultimate accuracy. But it does not seem too much to demand that, before men undertake the demolition of a great public work upon which untold labor has been expended, the assailants shall at least read the headings and titles of the tables they attack; and it would not seem to be asking an extravagant degree of caution on the part of the public that they should not condemn a body of official statistics upon the strength of a criticism by a writer whose own work shows that he cannot correctly add a short column of figures.

FRANCIS A. WALKER

APPENDIX.

MANUFACTURES, BY STATES, IN 1810, GIVING THE INDUSTRIES, AS TABULATED BY COUNTIES, WITH PARTICULARS OF INFORMATION FURNISHED ACCORDING TO THE THIRD CENSUS OF THE UNITED STATES.

MAINE.

Cotton goods in families: Yards, Value in dollars, etc.

Blended and unnamed cloths and stuffs: Yards, Value in dollars.

Woolen goods in families: Yards, Value in dollars, etc.

Cotton manufacturing establishments: Number of.

Woolen manufacturing establishments: Number of, Yards, Value in dollars.

Number of looms for cloths of cotton, wool, etc.

Carding machines: Number of machines, Quantity carded, Pounds, Value in dollars.

Fulling-mills: Number, Yards, Value in dollars.

Number of spindles.

Hatteries: Fur hats, Value in dollars.

Number of air-furnaces.

Number of trip-hammers.

Naileries: Number, Pounds made, Value in dollars.

Augers and bits: Number, Value in dollars.

Soap: Pounds, Value in dollars.

Tanneries: Number, Hides, Calfskins, Value in dollars.

Shoes, boots, and slippers: Number, Value in dollars.

Saddlery: Value in dollars.

Flaxseed oil: Mills, Gallons made, Value in dollars.

Liquor distilled from fruit and grain: Distilleries, Gallons, Value in dollars.

Carriages made: Value in dollars.

Paper-mills: Value in dollars.

Rope-walks: Number of tons, Value in dollars.

MASSACHUSETTS.

Cotton manufacturing establishments: Number, Yards, Value in dollars.

Cotton duck: Pieces, Value in dollars.

Hempen manufacturing establishments: Pieces sail duck, Value in dollars.

Blended and unnamed cloths and stuffs: Yards, Value in dollars.

Tow cloth: Yards, Value in dollars.

Woolen manufacturing establishments: Establishments, Yards, Value in dollars.

Cotton and wool spun in mills: Pounds spun, Value in dollars.

Web, lace, and fringe: Value in dollars.

Stockings: Pairs, Value in dollars.

Looms for cloths, cotton, wool, etc.: Number.

Carding machines: Number, Pounds carded, Value in dollars.

Fulling-mills: Number, Yards, Value in dollars.

Sewing silk and raw silk: Pounds, Value in dollars.

Jennies.

Spindles.

Wire-card manufactories: Number, Dozen of hand-cards, Value in dollars, Feet of cards, Value in dollars.

Spinning wheels: Number, Value in dollars.

Hatteries: Fur hats, Value in dollars.

Furnaces: Tons, Value in dollars.

Bar iron, etc.: Forges, Tons, Value in dollars.

Trip-hammers.

Rolling and slitting mills: Number, Tons, Value in dollars.

Naileries: Number, Value in dollars.

Wire-drawing: Value in dollars.

Gunsmiths: Number of muskets, Value in dollars.

Blacksmiths' work: Value in dollars.

Steel furnaces: Number, Tons, Value in dollars.

Hydraulic engine makers: Number, Amount in dollars.

Tacks: Number, Value in dollars.

Clocks and watches: Value in dollars.

Gold and silver work: Value in dollars.

Tin-plate work: Value in dollars.

Manufactures of mixed metals: Pounds made, Value in dollars.

Copper and brass manufactures: Pounds made, Value in dollars.

Bells: Pounds, Value in dollars.

Buttons: Value in dollars.

Lead: Value in dollars.

Tallow candles: Pounds, Value in dollars.

Soap: Barrels, Pounds, Value in dollars.

Spermaceti candles: Pounds, Value in dollars.

Spermaceti oil: Gallons.

Whale oil: Gallons.

Spermaceti and whale oil: Value in dollars.

Tanneries: Number, Hides, Calfskins, Hogskins, Sheepskins, Value in dollars.

Boots, shoes, and slippers: Number, Value in dollars.

Saddlery: Value in dollars.

Morocco skins: Number, Value in dollars.

Leather gloves: Dozen, Value in dollars.

Catgut: Value in dollars.

Flaxseed oil: Number of mills, Gallons, Value in dollars.

Spirits distilled from grain: Gallons.

Spirits distilled from molasses: Gallons.

All kinds of spirits distilled: Value in dollars.

Beer: Gallons, Value in dollars.

Shipping: Number of tons, Value in dollars.

Cabinet work: Value in dollars.

Chairs: Dozen, Value in dollars.

Carriage makers: Number of carriages, Value in dollars.

Wagons: Number, Value in dollars.

MASSACHUSETTS—Continued.

Rakes: Manufactures, Number of rakes, Value in dollars.
Wooden ware unnamed: Value in dollars.
Essence of spruce: Pounds, Value in dollars.
Oil or essence of turpentine: Gallons, Value in dollars.
Sugar, refined: Pounds, Value in dollars.
Paper: Mills, Reams, Rolls, Value in dollars.
Playing cards: Value in dollars.
Marble saw-mills: Saw-mills, Feet, Value in dollars.
Manufactures of soapstone: Value in dollars.
Manufactures of glass: Value in dollars.
Tobacco and snuff: Pounds, Value in dollars.
Potteries: Value in dollars.
Glauber salts: Pounds, Value in dollars.
Laboratories: Value in dollars.
Printers' ink: Pounds, Value in dollars.
Rope-walks: Tons made, Value in dollars.
Brushes: Dozen, Value in dollars.
Chocolate: Pounds, Value in dollars.
Corn brooms: Number, Value in dollars.
Gunpowder: Mills, Pounds, Value in dollars.
Horn combs: Dozen, Value in dollars.
Musical instruments: Value in dollars.
Salt: Feet of roofs of works, Bushels made, Value in dollars.
Straw bonnets: Value in dollars.
Spectacles: Value in dollars.
Steel thimbles: Dozens, Value in dollars.
Whips: Dozens, Value in dollars.
Coopers' shops: Casks, Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Grist-mills: Mills, Bushels ground, Value in dollars.
Saw-mills: Mills, Quantity in feet, Value in dollars.
Ashes: Tons, Value in dollars.
Fisheries: Barrels of mackeral, Value in dollars.
Bricks: Number, Value in dollars.
Saltpeter: Pounds, Value in dollars.

NEW HAMPSHIRE.

Cotton goods in families, etc.: Yards.
Cotton manufacturing establishments.
Mixed goods in families, etc.: Yards.
Flaxen goods in families, etc.: Yards.
Blended and unnamed cloths and stuffs: Yards.
Tow cloths: Yards.
Woolen goods in families, etc.: Yards.
Value of all kinds of cloths and stuffs: Dollars.
Looms: Number.
Carding machines: Number, Pounds carded, Value in dollars.
Fulling-mills: Number, Yards fulled, Value in dollars.
Spindles: Number.
Hatteries: Wool and mixed hats, Fur hats, Value in dollars.
Forges: Number, Tons of iron, Value in dollars.
Number of trip-hammers.
Naileries: Number, Tons of nails, Value in dollars.
Tanneries: Number, Pounds of leather tanned, Value in dollars.
Flaxseed oil: Mills, Gallons, Value in dollars.
Spirits distilled: Distilleries, Gallons, Value in dollars.
Paper: Mills, Value of paper in dollars.
Rope-walks: Number, Value of work in dollars.

VERMONT.

Cotton goods in families, etc.: Yards, Value in dollars.
Cotton manufacturing establishments: Number, Yards, Value in dollars.
Flaxen goods in families, etc.: Yards, Value in dollars.
Mixed cloth and hempen chiefly mixed: Yards, Value in dollars.
Blended and unnamed cloths and stuffs, and values: Yards, Value in dollars.
Woolen goods in families, etc.: Yards, Value in dollars.
Woolen manufacturing establishments: Establishments, Yards, Value in dollars.
Web, lace, and fringe: Yards, Value in dollars.
Cotton and wool spun in mills: Mills, Pounds spun, Value in dollars.
Stockings: Pairs, Value in dollars.
Spinning wheels for cotton, flax, and wool: Number.
Looms for cloths of cotton, wool, etc. Number.
Reeds made: Number, Value in dollars.
Carding machines: Number, Pounds carded, Value in dollars.
Labor-saving machinery: Billies, Jennies, Looms with fly shuttles, Spindles.
Fulling-mills: Mills, Yards fulled, Value in dollars.
Hatteries: Hatteries, Wool, mixed and all kinds of hats, Number, Value in dollars.
Blast and air furnaces: Blast-furnaces, Total number, Value in dollars.
Bloomeries: Tons made, Value in dollars.
Forges: Number, Tons of bar-iron, Value in dollars.
Trip-hammers: Trip-hammers, Tons made, Value in dollars.
Naileries: Naileries, Pounds of nails made, Value in dollars.
Blacksmiths' shops: Number of shops, Dozens of iron shovels, Value in dollars.
Brass clocks: Number of clocks, Value in dollars.
Tin and copper ware: Number of shops, Value in dollars.
Buttons: Value in dollars.
Tanneries: Number of tanneries, Hides and skins, Number, Value in dollars.
Saddlery: Value in dollars.
Shoes, boots, and slippers: Pairs, Value in dollars.
Leather gloves: Dozen, Value in dollars.
Flaxseed oil: Mills, Gallons, Value in dollars.
Spirits distilled from fruit, potatoes, and grain: Distilleries, Gallons, Value in dollars.
Breweries: Number.
Cabinet maker's work: Value in dollars.
Wooden clocks: Number, Value in dollars.
Paper: Mills, Reams, Value in dollars.
Marble saw-mills: Mills, Feet sawed, Value in dollars.
Potteries: Number, Value in dollars.
Sieves: Number, Value in dollars.
Gunpowder: Mills, Pounds, Value in dollars.
Horn combs: Dozen, Value in dollars.
Books printed: Printing offices, Number of volumes printed, Value in dollars.
Straw bonnets: Number, Value in dollars.

ARTICLES OF A DOUBTFUL NATURE AS RETURNED BY THE DEPUTY MARSHALS.

Pot and pearl ashes: Potash, Value in dollars, Pearl ashes, Barrels, Value in dollars, Pot and pearl ashes not distinguished, Value in dollars.
Maple sugar: Pounds, Value in dollars.
Lime: Bushels, Value in dollars.
Copperas: Tons, Value in dollars.
Malt: Malt-houses, Bushels made, Value in dollars.

RHODE ISLAND.

Cotton goods in families, etc.: Yards, Value in dollars.
Cotton manufacturing establishments: Number, Yards, Value in dollars.
Flaxen goods in families, etc.. Yards, Value in dollars.
Blended and unnamed cloths and stuffs: Yards, Value in dollars.
Woolen goods in families, etc.: Yards, Value in dollars.
Woolen manufacturing establishments: Number, Yards, Value in dollars.
Web, lace and fringe: Yards, Value in dollars.
Cotton and wool spun in mills: Pounds, Value in dollars.
Stockings: Pairs, Value in dollars.
Thread: Runs and skeins, Value in dollars.
Number of looms for cloth of cotton, wool, etc.
Carding machines: Number, Pounds carded, Value in dollars.
Fulling-mills: Number, Yards fulled, Value in dollars.
Mules: Number.
Throssels: Number.
Spinning frames: Number.
Spindles: Number.
Mills for making machinery for manufacturing cotton and wool: Mills, Value in dollars.
Hatteries: Hatteries, Wool and mixed hats, Fur hats, Value in dollars.
Furnaces: Number, Tons of iron, Value in dollars.
Bloomeries: Number.
Forges: Number, Tons of iron, Value in dollars.
Trip-hammers: Number, Value of work in dollars.
Rolling and slitting mills: Mills, Tons, Value in dollars.
Naileries: Number, Pounds made, Value in dollars.
Gunsmiths: Establishments, Guns made.
Steel furnaces: Number, Tons of steel, Value in dollars.
Wood-screws manufactory: Manufactures, Gross made, Value in dollars.
Brass founderies: Number, Pounds of brass, Value in dollars.
Tanneries: Tanneries, Hides, Calfskins, Sole leather, Pounds, Hogskins, Sheepskins, Total value in dollars.
Shoes and slippers: Pairs, Value in dollars.
Saddles and bridles, etc.. Number, Value in dollars.
Trunks: Number, Value in dollars.
Morocco: Number of skins, Value in dollars.
Leather gloves: Pairs, Value in dollars.
Mills for dressing leather.
Flaxseed oil: Number of mills, Gallons, Value in dollars.
Spirits distilled: Distilleries, Gallons, Value in dollars.
Currant wine: Gallons, Value in dollars.
Bark-mills: Number.
Sugar refineries: Number.
Paper: Mills, Reams, Tons, Value in dollars.
Paperhanging: Pieces, Value in dollars.
Rope-walks: Number, Tons made, Value in dollars.
Salt: Number of works, Bushels, Value in dollars.
Straw bonnets: Number, Value in dollars.
Candles: Pounds made, Value in dollars.
Snuff-mills: Number.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Grist-mills: Number.
Saw-mills: Number.
Lime: Number of kilns, Bushels, Value in dollars.

CONNECTICUT.

Cotton manufacturing establishments.
Flaxen goods in families, etc.: Yards, Value in dollars.
Hempen manufacturing establishments: Value in dollars of goods made.
Blended and unnamed cloths and stuffs: Yards, Value in dollars.
Woolen goods in families, etc.. Yards, Value in dollars.
Woolen manufacturing establishments.
Stockings and web suspenders: Value in dollars.
Sewing silk and raw silk: Value in dollars.
Looms for cloths of cotton, wool, etc.. Number.
Carding machines: Number, Pounds.
Fulling-mills: Number.
Spindles: Number.
Hats: Value in dollars.
Blast and air furnaces: Number, Value in dollars.
Forges: Forges, Tons of bar iron, Value in dollars.
Trip-hammers: Number, Value in dollars of work.
Rolling and slitting mills.
Nails: Naileries, Value in dollars of nails.
Gunsmiths: Guns, Value in dollars.
Tin-plate work: Value in dollars.
Type founderies.
Brass, jewelry, and plated ware: Value in dollars.
Brass founderies.
Buttons: Gross, Value in dollars.
Tanneries: Number, Value of leather in dollars.
Saddlery, shoes, and shoe binding of leather: Value in dollars.
Flaxseed oil: Mills, Value in dollars.
Spirits distilled: Distilleries, Gallons distilled from fruit and grain, Value in dollars.
Carriages: Value in dollars.
Wooden clocks: Number, Value in dollars.
Paper: Mills, Value in dollars.
Marble work: Value in dollars.
Glass: Works, Value in dollars.
Potteries: Number, Value in dollars of wares.
Rope-walks: Walks, Value in dollars of cordage.
Gunpowder: Mills, Value in dollars.
Combs: Value in dollars.
Straw bonnets: Value in dollars.
Miscellaneous goods: Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Bricks: Value in dollars.

NEW YORK.

Cotton goods made in families, etc.. Yards, Value in dollars.
Cotton manufacturing establishments.
Flaxen goods in families, etc.. Yards, Value in dollars.
Blended and unnamed cloths and stuffs: Yards, Value in dollars.
Tow cloth: Yards, Value in dollars.
Woolen goods in families, etc.: Yards, Value in dollars.
Thread: Runs, Value in dollars.
Looms.
Carding machines: Number, Pounds carded, Value in dollars.
Fulling-mills: Number, Yards fulled, Value in dollars.
Spindles.
Hatteries: Number, Hats, Value in dollars.
Furnaces: Blast furnaces, Air furnaces, Tons of iron, Value in dollars.
Bloomeries: Number, Tons of iron, Value in dollars.
Forges: Number, Tons of iron, Value in dollars.
Trip-hammers.
Rolling and slitting mills: Number, Tons, Value in dollars.
Naileries: Number, Pounds of Nails, Value in dollars.
Tanneries: Number, Hides tanned, Calfskins tanned, Sheepskins tanned, Value in dollars.
Morocco: Skins, dozen, Value in dollars.
Flaxseed oil: Number, Gallons, Value in dollars.
Spirits distilled: Number of distilleries, Gallons, Value in dollars.
Breweries: Number, Gallons brewed, Value in dollars.
Refined sugar: Refineries, Pounds refined, Value in dollars.
Paper: Mills, Reams made, Value in dollars.
Glass: Works, Square feet of glass, Value in dollars.
Tobacco and Snuff: Mills, Pounds of tobacco, Pounds of snuff, Value in dollars.
Rope-walks: Walks, Tons of cordage, Value in dollars.
Chocolate: Mills, Pounds, Value in dollars.
Gunpowder: Mills, Pounds, Value in dollars.

NEW JERSEY.

Cotton manufacturing establishments: Establishments, Yards made, Value in dollars.
Mixed cloth and cotton establishments, chiefly mixed: Yards made, Value in dollars.
Flaxen goods in families, etc.: Yards made, Value in dollars.
Blended and unnamed cloths and stuffs: Yards made, Value in dollars.
Woolen goods in families, etc.: Yards made, Value in dollars.
Blankets of wool: Number, Value in dollars.
Carpeting and coverlets: Yards made, Value in dollars.
Yarn: Pounds, Value in dollars.
Cotton and wool spun in mills: Pounds, Value in dollars.
Silk manufactories: Number, Yards made, Value in dollars.
Stockings: Pairs, Value in dollars.
Looms.
Reed manufactories: Number, Value in dollars.
Carding machines: Number, Pounds, Value in dollars.
Fulling-mills: Number, Yards fulled, Value in dollars.
Labor-saving machinery: Drawing and roving machines, Mules' Billies, Jennies, Throssels, Twisters, Spring frames, Spindles.
Hatteries: Fur hats, Value in dollars.
Blast and air furnaces: Number, Tons, Value in dollars.
Bloomeries: Number, Tons of iron, Value in dollars.
Forges: Number, Tons of bar iron, etc., Value in dollars.
Trip-hammers: Number, Tons of wrought-iron, Value in dollars.
Rolling and slitting mills: Number, Tons rolled and slit, Value in dollars.
Naileries: Number, Pounds, Value in dollars.
Wire-drawing manufactories.
Guns: Establishments, Number made, Value in dollars.
Steel furnaces: Number, Tons, Value in dollars.
Door locks: Number, Value in dollars.
Large screws, steel springs, etc.: Value in dollars.
Tin-plate work: Value in dollars.
Plating manufactories: Number, Value in dollars.
Hydrostatic machines.
Tallow candles: Value in dollars.
Soap: Value in dollars.
Tanneries: Number, Hides, Calfskins, Sheepskins, Leather unnamed, Leather by weight reduced to pounds, Value in dollars.
Shoes, boots, and slippers: Pairs, Value in dollars.
Flaxseed-oil mills: Number, Gallons, Value in dollars.
Distilleries: Number, Gallons, Value in dollars.
Breweries: Number, Gallons brewed, Value in dollars.
Carriages made: Value in dollars.
Bark, ground: Value in dollars.
Paper: Mills, Reams, Value in dollars.
Playing cards: Dozen of packs, Value in dollars.
Glass manufactories: Glass works, Square feet of glass, Bottles, Value in dollars.
Potteries: Number, Value in dollars.
Drugs: Value in dollars.
Paints: Manufactories, Tons, Value in dollars.
Chocolate: Mills, Pounds, Value in dollars.
Gunpowder: Mills, Pounds, Value in dollars.
Straw bonnets: Number, Value in dollars.
Bookbinders.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Mahogany, sawed: Value in dollars.
Bricks: Value in dollars.

PENNSYLVANIA.

Cotton goods in families, etc. Yards made.
Cotton manufacturing establishments: Number, Yards made.
Flaxen cloth in families, etc. Yards made.
Mixed cloth and hempen ditto, chiefly mixed: Yards made.
Hempen cloth manufacturing establishments: Yards made.
Woolen cloth in families, etc.: Yards made.
Woolen cloth manufacturing establishments: Yards made.
Total value in dollars of all kinds of cloths and stuffs.
Carpeting and coverlets: Yards made, Value in dollars.
Hempen and flaxen yarn: Mills, Tons, Value in dollars.
Stockings: Pairs, Value in dollars.
Shirt buttons: Dozens, Value in dollars.
Cotton and wool spun in mills: Pounds, Value in dollars.
Web, lace, and fringe: Yards, Value in dollars.
Hand-cards: Number.
Spinning-wheels: Number.
Looms: Number.
Reeds manufactured: Value in dollars.
Carding machines: Number, Pounds carded, Value in dollars.
Fulling-mills: Number, Yards fulled, Value in dollars.
Labor-saving machinery: Drawing and roving machines, Mules, Billies, Jennies, Throssels, Twisters, Spooling-machines, Stretchers, Looms with fly-shuttles, Water frames, Reeds, Patent shearing machines, Wool-pickers, Spin-frames, Spindles, Manufactories for cotton rollers, Machines for cutting and setting card teeth, Wheel-iron manufactories. Quantity, Value in dollars.
Hand cards: Establishments, Value in dollars,
Floor-cloth stamping: Number, Yards, Value in dollars.
Machine makers: Number, Value in dollars.
Patent hat-looms: Number, Quantity woven of cotton and straw, Value in dollars.
Hats: Number of hatteries, Wool and mixed hats, Fur hats, Value in dollars.
Furnaces: Blast-furnaces, Air-furnaces, Total number, Tons, Value in dollars.
Bloomeries: Number, Value in dollars.
Forges: Number, Tons made, Value in dollars.
Trip-hammers: Number, Value in dollars.
Rolling and slitting mills: Number, Tons of rolled iron, Tons of slit iron, Value in dollars.
Nails: Naileries, Pounds of nails, Value in dollars.
Boring-mills: Number, Guns bored, Cannon bored, Value in dollars.
Wire-drawing: Establishments, Value in dollars.
Gun manufactories: Number, Guns, Rifles, Other, Value in dollars.
Blacksmiths: Number of shops, Value in dollars.
Steel furnaces: Tons, Value in dollars.
Saw manufactories: Number, Value in dollars.
Wire workers: Number, Value in dollars.
Planes: Establishments, Number of planes, Value in dollars.
Cutlers: Number of shops, Value in dollars.
Currycombs: Dozen, Value in dollars.
Mills for grinding flatirons: Number, Value in dollars.
File factories: Number, Value in dollars.
Hydraulic-engine makers: Number, Value in dollars.
Gold and silver work and jewelry: Value in dollars.
Tin-plate work: Quantity, Value included in *Copper, etc.*
Type founderies: Pounds.
Coffee-mills: Number made, Value in dollars.
Copper, brass, and tin: Number of manufactories, Pieces made, Value in dollars, which includes value of tin-plate work.
Bell founderies: Number, Value in dollars.
Buttons: Manufactories, Gross, Value in dollars.
Black lead: Establishments, Value in dollars.
Red and white lead: Tons made.
Leaden shot: Manufactories, Tons made.
Red and white lead, leaden shot and types: Value in dollars.
Plumbers: Establishments, Value in dollars.
Soap and candles: Manufactories, Pounds of soap, Pounds of candles, Value of soap and candles in dollars.
White wax candles: Manufactories, Value in dollars.
Spring oil: Gallons, Value in dollars.
Tanneries: Tanneries, Value in dollars.

PENNSYLVANIA—Continued.

Shoes, boots, slippers, trunks, and saddlery: Pairs of shoes, boots, and slippers, trunks, saddles, and bridles, Value of shoes, boots, and slippers, trunks, and saddlery.
Harness: Value in dollars.
Morocco: Factories, Dozen of skins, Value in dollars.
Moccasins: Pairs, Value in dollars.
Buckskin overalls: Pairs.
Leather gloves: Pairs.
Gloves and overalls: Value in dollars.
Glue: Quantity in pounds, Value in dollars.
Razor strop: Manufactories, Value in dollars.
Furriers: Number, Value in dollars.
Mustard makers: Manufactories, Pounds, Value in dollars.
Flaxseed oil: Mills, Gallons made, Value in dollars.
Distilleries: Number, Gallons, Value in dollars.
Breweries: Number, Barrels, Value in dollars.
Wine: Barrels grape wine, Barrels currant wine, Value in dollars.
Starch and hair powder: Manufactories, Pounds, Value in dollars.
Wafers: Manufactories, Value in dollars.
Shipping: Tons, Value in dollars.
Boats: Tons, value in dollars.
Cabinet makers: Makers, Value of work in dollars.
Wagons: Number, Value in dollars.
Carriages: Number of shops, Value in dollars,
Coopers' shops: Number, Value in dollars.
Water turning machines: Number, Value in dollars.
Saddle-trees: Makers, Value in dollars.
Last and boot trees: Makers, Value in dollars.
Print cutting: Establishments, Value in dollars.
Printing presses: Manufactories, Value in dollars.
Bark: Mills.
Baskets: Number, Value in dollars.
Cork-cutting: Establishments, Value in dollars.
Chip hats: Number.
Spirits of turpentine and varnish: Gallons, Value in dollars.
Sugar: Refineries, Pounds, Value in dollars.
Paper: Mills, Reams, Tons, Value in dollars.
Paperhanging: Manufactories, Pieces stamped, Value in dollars.
Playing cards: Manufactories, Value in dollars.
Marble yards: Number, Value in dollars.
Marble saw-mills: Number, Value in dollars.
Stonecutters: Number, Value in dollars.
Glass: Works, Value in dollars.
Glass cutting: Establishments, Value in dollars.
American cigars: Manufactories, Number made, Value in dollars.
Spanish cigars: Manufactories, Number made, Value in dollars.
Snuff and tobacco: Mills, Value in dollars.
Potteries: Number, Pieces made, Value in dollars.
Drugs: Manufactories, Value in dollars.
Laboratories: Number, Tons of nitre, borax, brimstone, etc., Value in dollars.
Prussian blue: Pounds, Value in dollars.
Lampblack: Manufactories, Value in dollars.
Dyers: Number, Value in dollars.
Rope-walks: Number, Tons made, Value in dollars.
Tobacco and snuff: Pounds.
Brushes: Manufactories, Value in dollars.
Horse-hair cloth: Manufactories, Value in dollars.
Hand-bellows: Manufactories, Value in dollars.
Chocolate: Pounds, Value in dollars.
Composition ornaments: Makers, Value in dollars.
Drums: Manufactories, Value in dollars.
Engravings: Establishments, Value in dollars.
Bookbinders: Number, Value in dollars.
Artificial flowers: Manufactories, Value in dollars.
Gunpowder: Mills, Pounds made, Value in dollars.
Ginger: Manufactories, Pounds, Value in dollars.
Combs: Dozen, Value in dollars.
Looking-glasses: Framers, Value in dollars.
Muslin and linen printers: Establishments, Hands employed, Yards of gown stuff, shawls, handkerchiefs, etc., Value in dollars.
Printing: Offices, Value in dollars.
Salt: Works, Bushels, Value in dollars.
Suspenders: Manufactories, Dozens, Value in dollars.
Umbrellas: Manufactories, Value in dollars.
Upholsterers: Number, Value in dollars.
Whips: Manufactories, Value in dollars.
Hemp: Pounds, Value in dollars.
Wheat mills: Number, Bushels, Barrels, Value in dollars.
Malt: Bushels, Value in dollars.
Hulling-mills: Number, Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Barley: Mills, Pounds, Value in dollars.
Clover: Mills, Bushels, Value in dollars.
Windmills: Value in dollars.
Mahogany: Saw-mills, Feet, Value in dollars.
Saw-mills: Number, Feet, Value in dollars.
Potash: Value in dollars.
Maple sugar: Pounds, Value in dollars.
Rosin and pitch: Barrels.
Slate: Quarries, Value in dollars.
Bricks: Number of kilns, Number of bricks, Value in dollars.
Hemp-mills: Pounds, Value in dollars.
Lime: Kilns, Bushels, Value in dollars.
Plaster of paris: Tons ground, Value in dollars.

DELAWARE.

Cotton in families, etc.. Yards, Value in dollars.
Cotton manufacturing establishments: Number.
Flaxen goods in families, etc.: Yards made, Value in dollars.
Mixed cloth and hempen, chiefly mixed: Yards made, Value in dollars.
Woolen goods in families, etc.: Yards made, Value in dollars.
Woolen manufacturing establishments: Number, Yards made, Value in dollars.
Cotton and wool spun in mills: Pounds, Value in dollars.
Stockings: Pieces, Value in dollars.
Looms: Number.
Carding-machines: Number.
Fulling-mills: Number.
Spindles: Number.
Hatteries: Fur hats, Wool and mixed hats, Value in dollars.
Forges: Number, Tons, Value in dollars.
Rolling and slitting mills: Number, Tons, Value in dollars.
Nails: Naileries, Pounds, Value in dollars.
Tanneries: Number, Hides and skins tanned, Pounds tanned, Value in dollars.
Shoes and boots: Pairs, Value in dollars.
Distilleries: Number, Gallons, Value in dollars.
Breweries: Number, Barrels, Value in dollars.
Paper-mills: Number, Value in dollars.
Snuff-mills: Number, Pounds, Value in dollars.
Rope-walks: Number, Tons, Value in dollars.
Gunpowder: Mills, Pounds, Value in dollars.
Salt: Works, Barrels, Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Grist-mills: Number, Barrels of flour, Barrels of cornmeal, Value in dollars.
Barley-mills: Number, Pounds, Value in dollars.

MARYLAND.

Cotton manufacturing establishments.
Blended and unnamed cloths and stuffs: Yards made, Value in dollars.
Woolen manufacturing establishments.
Carpeting and coverlets: Yards made, Value in dollars.
Cotton and wool spun in mills: Pounds, Value in dollars.
Stockings: Pairs, Value in dollars.
Looms.
Stocking looms.
Carding-machines: Number, Pounds, Value in dollars.
Fulling-mills: Mills, Yards fulled, Value in dollars.
Labor-saving machinery: Drawing and various machines, Mules, Jennies, Looms with flying shuttles, Reeds, Spinning frames, Spindles.
Weaving machines by water.
Hatteries: Number, Wool and mixed hats, Value in dollars.
Furnaces: Blast-furnaces, Air-furnaces, Total number, Tons made, Value in dollars.
Forges: Number, Tons, Value in dollars.
Trip-hammers: Number, Value in dollars.
Rolling and slitting mills: Number, Tons, Value in dollars.
Naileries: Number, Pounds of made, Value in dollars.
Gunsmiths: Number, Rifles, Other, Value in dollars.
Blacksmiths: Number, Value in dollars.
Clocks and watches: Makers, Value in dollars.
Silversmiths.
Tin-plate: Workers, Value in dollars.
Type founderies.
Still manufactories: Number, Stills, Value in dollars.
Brass: Founderies, Value in dollars.
Tanneries: Number, Hides and skins, Value in dollars.
Shoes, boots, and slippers: Manufactories, Pairs, Value in dollars.
Saddlers: Number, Saddles and bridles, Value in dollars.
Harness: Sets.
Morocco dressers.
Glue: Value in dollars.
Flaxseed oil: Mills, Gallons, Value in dollars.
Distilleries: Number, Gallons from fruit and grain, Value in dollars.
Breweries: Number, Barrels, Value in dollars.
Starch and hair powder: Manufactories, Pounds, Value in dollars.
Cabinet makers: Number, Value in dollars.
Candles: Manufactories, Value in dollars.
Carriages: Manufactories, Value in dollars.
Saddle-trees: Makers, Number of saddle-trees, Value in dollars.
Sugar, refined: Refiners, Pounds, Value in dollars.
Paper: Mills, Reams, Value in dollars.
Marble yards: Number, Value in dollars.
Soapstone: Value in dollars.
Millstone manufactories: Number, Value in dollars.
Glass: Works, Square feet, Bottles, Value in dollars.
Tobacco: Manufactories, Value in dollars.
Potteries: Number, Value in dollars.
Drugs and dyestuffs: Gallons, Castor oil, Value in dollars. Jallop, Pounds, Value in dollars. Turmerick, Pounds, Value in dollars. Peruvian bark, Value in dollars.
Rope-walks: Number, Tons, Value in dollars.
Brush makers: Number, Value in dollars.
Curled hair: Manufactories, Value in dollars.
Chocolate: Manufactories, Pounds.
Gunpowder: Mills, Pounds, Value in dollars.
Tortoise, ivory, and horn manufactories: Value in dollars.
Salt: Works, Bushels, Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Flour-mills: Mills, Barrels, Value in dollars.
Saw-mills.
Windmills.
Tobacco: Hogsheads, Value in dollars.

VIRGINIA.

Cotton goods in families, etc.: Yards made.
Mixed goods and cotton goods in families: Yards made.
Flaxen goods in families: Yards made.
Woolen goods in families: Yards made.
The total value of all kinds of cloths and stuffs.
Stockings: Pairs, Value in dollars.
Looms: Number.
Stocking manufactories.
Carding-machines.
Fulling-mills.
Spindles.
Hats: Wool and mixed hats, Value in dollars.
Furnaces: Blast-furnaces, Air-furnaces, Total number, Tons, Value in dollars.
Bloomeries.
Forges: Number, Tons, Value in dollars.
Trip-hammers: Number, Value in dollars.
Rolling and slitting mills: Value in dollars.
Naileries: Pounds, Value in dollars.
Fulling-mills: Yards, Value in dollars.
Spinning frames.
Spinning-wheels: Number.
Cannon: Number, Value in dollars.
Guns: Rifles, Other, Value in dollars.
Swords: Number, Value in dollars.
Blacksmiths' work: Value in dollars.
Steel furnaces: Number, Tons, Value in dollars.
Door locks: Number, Value in dollars.
Augers: Number, Value in dollars.
Clocks and watches: Value in dollars.
Gold and silver work and jewelry: Value in dollars.
Tin and copper ware: Value in dollars.
Stills: Number, Value in dollars.
Copper, brass, and tin: Pounds, Value in dollars.
Buttons: Value in dollars.
Lead: Tons, Value in dollars.
Leaden shot: Value in dollars.
Soap and candles: Pounds of candles, Pounds of soap, Value of candles, Value of soap.
Tanneries: Number, Hides, Value in dollars.
Shoes, boots, and slippers: Pairs, Value in dollars.
Harness: Sets, Value in dollars.
Value of saddlery in dollars.
Flaxseed oil: Mills, Gallons, Value in dollars.
Distilleries: Number, Gallons, Value in dollars.
Breweries: Number, Gallons, Value in dollars.
Windsor chairs: Dozens, Value in dollars.
Cabinet ware: Value in dollars.
Carriages: Number, Value in dollars.
Paper: Mills, Reams, Value in dollars.
Coopers: Barrels made, Value in dollars.
Snuff and tobacco: Pounds, Value in dollars.
Potteries: Number, Value in dollars.
Rope-walks: Number, Value in dollars.
Curled hair: Pounds, Value in dollars.
Gunpowder: Mills, pounds, Value in dollars.
Salt: Bushels, Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Wheat: Mills, Barrels of flour made, Value in dollars.
Number of saw-mills.
Saltpeter: Pounds made, Value in dollars.
Maple sugar: Pounds, Value in dollars.

OHIO.

Cotton goods in families, etc.: Yards, Value in dollars.
Cotton manufacturing establishments.
Flaxen goods in families, etc.: Yards made, Value in dollars.
Blended and unnamed cloths and stuffs: Yards made, Value in dollars.
Woolen goods in families, etc.: Yards made, Value in dollars.
Cotton and wool spun in mills: Pounds, Value in dollars.
Looms: Number.
Carding-machines: Number, Pounds carded, Value in dollars.
Spindles.
Fulling-mills: Number, Value in Dollars.
Furnaces: Number, Tons, Value in Dollars.
Bloomeries: Number, Tons, Value in dollars.
Naileries: Number, Pounds, Value in dollars.
Tanneries: Number, Hides, Value in dollars.
Flaxseed oil mills: Number, Gallons, Value in dollars.
Distilleries: Number, Gallons, Value in dollars.
Breweries: Number, Gallons, Value in dollars.
Paper: Mills, Value in dollars.
Gunpowder: Mills, Pounds, Value in dollars.
Salt: Bushels, Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Maple sugar: Pounds, Value in dollars.

KENTUCKY.

Cotton manufacturing establishments.
Blended and unnamed cloths and stuffs: Yards made, Value in dollars.
Bagging, for cotton, made of hemp: Manufactories, Value in dollars.
Looms: Number.
Carding-machines: Number, Pounds carded.
Fulling-mills: Number, Yards fulled, Value in dollars.
Spindles.
Furnaces: Number, Tons, Value in dollars.
Forges: Number, Tons, Value in dollars.
Naileries: Number, Tons, Value in dollars.
Tanneries: Number, Hides and skins, Value in dollars.
Flaxseed oil: Mills, Gallons, Value in dollars.
Distilleries: Number, Gallons, Value in dollars.
Paper-mills: Number, Reams, Value in dollars.
Rope-walks: Number, Tons, Value in dollars.
Gunpowder mills: Number, Pounds, Value in dollars.
Salt: Works, Bushels, Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Hemp: Tons prepared, Value in dollars.
Maple sugar: Pounds, Value in dollars.
Saltpeter: Pounds, Value in dollars.

NORTH CAROLINA.

Blended and unnamed cloths and stuffs: Yards made, Value in dollars.
Spinning-wheels: Number.
Looms: Number.
Fulling-mills: Number, Yards fulled, Value in dollars.
Labor-saving machinery: Spinning frames, Spindles.
Fur hats: Number, Value in dollars.
Iron works: Bloomeries, Trip-hammers, Rolling and slitting mills, Naileries.
Iron manufactures not marked: Value in dollars.
Gunsmiths: Rifles, Value in dollars.
Blacksmiths: Shops, Value in dollars.
Stills made: Value in dollars.
Candles: Manufactories, Pounds, Value in dollars.
Tanneries: Hides, Value in dollars.
Shoes, boots, and slippers: Value in dollars.
Flaxseed oil: Mills, Gallons, Value in dollars.
Distilleries: Stills, Gallons, Value in dollars.
Essence of turpentine: Stills, Gallons, Value in dollars.
Paper: Mills, Reams, Value in dollars.
Snuff: Mills, Value in dollars.
Rope-walks: Number, Value in dollars.
Gunpowder: Mills, Pounds, Value in dollars.
Salt: Works, Bushels, Value in dollars.

EASTERN DISTRICT OF TENNESSEE.

Blended and unnamed cloths and stuffs: Value in dollars.
Looms: Number.
Fulling-mills: Mills, Value in dollars.
Hats made: Value in dollars.
Furnaces: Number, Value in dollars.
Bloomeries: Number, Value in dollars.
Forges: Number, Value in dollars.
Naileries: Number, Value in dollars.
Guns made: Value in dollars.
Leather tanned: Value in dollars.
Shoes, boots, and slippers: Value in dollars.
Saddlery: Value in dollars.
Flaxseed oil: Value in dollars.
Distilled liquors: Value in dollars.
Paper: Mills, Value in dollars.
Cordage: Value in dollars.
Gunpowder: Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Maple sugar: Value in dollars.
Saltpeter: Value in dollars.

WESTERN DISTRICT OF TENNESSEE.

Cotton cloth in families, etc.: Yards made.
Cotton manufacturing establishments.
Blended and unnamed cloths and stuffs: Yards made.
Woolen cloths in families, etc.: Yards made.
Total: Value in dollars.
Cotton and wool spun in mills: Pounds, Value in dollars.
Looms: Number.
Fulling-mills: Number, Yards fulled, Value in dollars.
Spindles.
Furnaces: Number, Tons, Value in dollars.
Forges: Number, Tons, Value in dollars.
Naileries: Number, Pounds, Value in dollars.
Tanneries: Number, Hides, Value in dollars.
Distilleries: Number, Gallons, Value in dollars.
Glauber salts: Pounds, Value in dollars.
Copperas: Pounds, Value in dollars.
Rope-walks: Number, Tons, Value in dollars.
Gunpowder mills: Number, Pounds, Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Saltpeter caves: Number, Pounds, Value in dollars.
Red ochre: Pounds, Value in dollars.

SOUTH CAROLINA.

Cotton goods in families, etc.: Yards made, Value in dollars.
Mixed goods and cotton goods: Yards made, Value in dollars.
Flaxen goods: Yards made, Value in dollars.
Woolen goods in families, etc.: Yards made, Value in dollars.
Flaxen and mixed goods: Yards made, Value in dollars.
Spinning-wheels: Number.
Looms: Number.
Carding-machines: Number, Value in dollars.
Labor-saving machines: Spinning-jennies, Spindles.
Hatteries: Number, Fur hats, Value in dollars.
Bloomeries.
Naileries: Number, Value in dollars.
Guns: Smiths, Guns, Value in dollars.
Blacksmiths: Number, Value in dollars.
Steel furnaces: Tons, Value in dollars.
Tanneries: Number, Hides, Value in dollars.
Shoemakers: Number, Pairs of shoes, boots, and slippers, Value in dollars.
Saddlery: Value in dollars.
Flaxseed oil: Mills, Gallons, Value in dollars.
Distilleries: Stills, Gallons, Value in dollars.
Paper: Mills.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Wheat- and grist-mills: Wheat-mills, Grist-mills, Barrels of flour made, Value in dollars.
Saw-mills: Number.

GEORGIA.

Cotton goods in families, etc.: Yards made, Value in dollars.
Cotton manufacturing establishments: Number, Yards made, Value in dollars.
Flaxen goods in families, etc.: Yards made, Value in dollars.
Mixed goods and hempen, chiefly mixed: Yards made, Value in dollars.
Blended and unnamed cloths and stuffs: Yards made, Value in dollars.
Woolen goods in families, etc.: Yards made, Value in dollars.
Bagging for cotton or hemp: Yards made, Value in dollars.
Flaxen and mixed goods: Yards made, Value in dollars.
Stockings: Pairs made, Value in dollars.
Carding-machines.
Spinning-wheels: Number.
Looms: Number.
Labor-saving machinery: Drawing and roving machines, Mules, Billies, Jennies, Looms with fly-shuttles, Spinning frames, Spindles.
Bloomeries: Number, Tons, Value in dollars.
Forges: Number, Value in dollars.
Naileries: Number, Value in dollars.
Soap and candles: Manufactories, Pounds of candles, Value in dollars, Pounds of soap, Value in dollars.
Tanneries: Number, Hides, Calfskins, Value in dollars.
Deerskins: Number, Value in dollars.
Distilleries: Number, Gallons, Value in dollars.
Breweries: Number, Barrels, Value in dollars.
Gunpowder: Mills, Pounds, Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Saw-mills: Number, Feet, Value in dollars.

TERRITORY OF ORLEANS.

Cotton goods in families, etc.: Yards made, Value in dollars.
Stockings: Pairs, Value in dollars.
Spinning-wheels.
Looms.
Hats: Hatteries, Fur hats, Value in dollars.
Gunsmiths.
Blacksmiths: Shops, Value in dollars.
Clock and watch makers.
Gold and silver work and jewelry: Shops.
Tin and copper: Shops.
Soap and candles: Manufactories, Pounds of soap, Pounds of candles, Value of soap, Value of candles.
Tanneries: Number, Hides, Calfskins, Value in dollars.
Shoemakers: Number, Pairs of shoes, boots, and slippers, Value in dollars.
Distilleries: Number, Hogsheads, 50 gallons each from molasses, Value in dollars.
Cabinet makers.
Carriages made.
Block and pump makers.
Sugar: Refineries, Pounds, Value in dollars.
American cigar makers.
Tobacco: Pounds, Value in dollars.
Potteries: Number, Pieces.
Drug manufactories.
Rope-walks: Number, Tons, Value in dollars.
Gunpowder: Mills, Pounds, Value in dollars.
Salt: Works, Bushels, Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Saw-mills: Number, Feet, Value in dollars.
Sugar-planters' works: Number, Hogsheads of sugar, Value in dollars.
Bricks: Kilns, Number, Value in dollars.
Tiles: Number, Value in dollars.
Indigo: Works, Pounds, Value in dollars.
Molasses: Hogsheads, Value in dollars.
Cotton, pressed: Presses, Value in dollars.

TERRITORY OF MISSISSIPPI.

Cotton goods in families, etc.: Yards made, Value in dollars.
Cotton manufacturing establishments.
Flaxen goods in families, etc.: Yards made, Value in dollars.
Woolen goods in families, etc.: Yards made, Value in dollars.
Looms: Number.
Carding-machines.
Spindles: Number.
Tin: Manufactories, Value in dollars.
Tanneries: Number, value in dollars.
Distilleries.

TERRITORY OF LOUISIANA.

Spinning-wheels: Number.
Looms.
Spinning-wheel makers.
Hatteries.
Gunsmiths.
Blacksmiths.
Gold and silver work and jewelry shops.
Tin-plate workers.
Copper and brass manufactories.
Leaden shot manufactories.
Soap and candle manufactories.
Tanneries.
Shoemakers.
Saddlers.
Distilleries.
Breweries.
Boat-builders.
Cabinet makers.
Chair makers.
Wagon makers.
American cigar makers.
Potteries.
Manufactories of drugs.
Salt works.
Printing offices.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Wheat-mills.
Horse-mills.
Saw-mills.

TERRITORY OF INDIANA.

Cotton goods in families, etc.: Yards made, Value in dollars.
Mixed goods and cotton: Yards made, Value in dollars.
Cotton manufacturing establishments.
Flaxen goods in families, etc.: Yards made, Value in dollars.
Blended and unnamed cloths and stuffs: Yards made, Value in dollars.
Woolen goods in families, etc.. Yards made, Value in dollars.
Cotton and wool spun in mills: Value in dollars.
Spinning-wheels: Number.
Looms.
Naileries: Number, Pounds, Value in dollars.
Tanneries: Number, Hides, Value in dollars.
Distilleries: Number, Gallons, Value in dollars.
Wine: Gallons, Value in dollars.
Gunpowder: Mills, Pounds, Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Wheat-mills: Number, Barrels, Value in dollars.
Maple sugar: Pounds, Value in dollars.
Horse-mills: Number, Bushels.
Grist-mills: Number, Bushels, Value in dollars.
Saw-mills: Number, Feet, Value in dollars.

TERRITORY OF ILLINOIS.

Blended and unnamed cloths and stuffs: Yards made, Value in dollars.
Spinning-wheels.
Looms.
Blacksmiths.
Tanneries: Number, Hides, Value in dollars.
Shoemakers.
Saddlers.
Distilleries: Number, Gallons, Value in dollars.
Boats: Bushels, Value in dollars.
Cabinet makers.
Cooper shops.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Wheat-mills: Number, Barrels, Value in dollars.
Saw-mills: Mills, Feet, Value in dollars.
Maple sugar: Camps, Pounds, Value in dollars.

TERRITORY OF MICHIGAN.

Flaxen and hempen goods: Yards made, Value in dollars.
Woolen goods in families, etc.
Looms.
Spinning-wheels.
Hats: Number, Hats, Value in dollars.
Soap and candles: Manufactories, Pounds of candles, Pounds of soap, Value of candles, Value of soap.
Tanneries: Number, Hides, Value in dollars.
Saddlery: Number, Saddles and bridles, Value in dollars.
Distilleries: Number, Gallons, Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Grist-mills.
Horse-mills.
Windmills.
Merino sheep.

DISTRICT OF COLUMBIA.

Cotton goods in families, etc.: Yards made, Value in dollars.
Cotton manufacturing establishments: Number, Yards made, Value in dollars.
Blended and unnamed cloths and stuffs: Yards made, Value in dollars.
Spinning-wheels.
Looms.
Carding-machines: Number, Pounds, Value in dollars.
Labor-saving machinery: Drawing and roving machines, Looms with fly shuttles, Reels, Spinning frames, Spindles.
Hatteries: Number, Fur hats, Value in dollars.
Tanneries.
Distilleries.
Breweries: Number, Barrels, Value in dollars.
Sugar refineries: Number, Pounds, Value in dollars.
Paper-mills.
Glass works: Works, Square feet, Value in dollars.
Potteries: Number, Value in dollars.
Rope-walks: Number, Tons, Value in dollars.
Suspender manufactories: Number, Dozen, Value in dollars.

CLASSED AS "ARTICLES OF A DOUBTFUL NATURE".

Grist-mills: Number, Bushels of meal, Barrels of flour, Value in dollars.

REPORT

UPON THE

STATISTICS OF MANUFACTURES;

COMPILED FROM RETURNS RECEIVED AT THE

TENTH CENSUS.

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LIST OF SPECIAL AGENTS AND ASSISTANTS APPOINTED TO COLLECT MANUFACTURING STATISTICS IN THE CITIES AND TOWNS SPECIFIED.

City.	Name of special agent.	Length of service in days.	Compensation in dollars.
Total (*a*)		16, 138¾	68, 825
Adrian, Mich	Bradley, W. F	10	40
Akron, Ohio	Atterholt, Frank M	22½	90
Albany, Cohoes, Troy, and West Troy, N. Y.	Wadhams, F. E., *Chief Special Agent.*	50	250
	Assistants:		
Albany	Bedell, Edwin A	58	232
	Ryan, John K	50	200
Cohoes	Zander, John A., jr	41	164
Troy	Ahern, John	18	72
	Evers, Thomas	50	200
Troy and West Troy	Lansing, John P	47	188
Alexandria, Va	Garwood, Samuel N. (*b*)		
Allegheny, Pa. (*See* Pittsburgh.)			
Allentown, Pa	Fry, George	24	96
Alton, Ill	Sontag, William	12	48
Altoona, Pa	Davis, John N	18	72
Ann Arbor, Mich	Clark, William A	10	40
Atchison, Kans	Pierce, Thomas M	12	48
Atlanta, Ga	Simmons, Moses T	20	80
Attleborough, Mass	Porter, Burrill, jr	9	36
Auburn, N. Y	McDonald, Minard	30	120
Augusta, Ga	Doscher, Ernest E	20	80
Augusta, Me	Badger, Joseph E	15	60
Aurora, Ill	Gates, Roswell W	15	60
Baltimore, Md	Creager, Noble H., *Chief Special Agent.*	65	390
	Assistants:		
	Knodle, Charles S	65	260
	Williamson, William	65	260
	Hause, William F	65	260
	Addison, George Mead	65	260
	Askew, Jehu B	65	260
	Plummer, Nathan	65	260
Bangor, Me	Duren, E. F	20	80
Belleville, Ill	Thoma, J. C	12	48
Beloit, Wis	Carr, W. H	10	40
Bethlehem, Pa	Pomeroy, A. Slemmer	20	80
Biddeford, Me	Andrews, George R	15	60
Binghamton, N. Y	Bates, Charles A	30	120
Bloomington, Ill	Ladd, William P	20	80
Boston, Mass	Swan, Robert T., *Chief Special Agent.*	85	510
	Assistants:		
	Lord, Charles V	81	324
	Bruce, Charles E	79	316
	Magee, James R	82	328
	Crane, E. W	80	320
	Janes, H. B	79	316
	Meehan, Arthur	113	452
Bradford, Pa	Graham, J. K	15	60
Bridgeport, Conn	Disbrow, William E	25	100
Bridgeton, N. J. (*See* Camden, N. J.)			
Brockton, Mass	Laws, Alfred	20	80
Brooklyn, N. Y	Frothingham, Jas. H., *Chief Special Agent.*	351	2, 106
	Assistants:		
	Stephenson, Edward H	257½	1, 030
	Gessner, George W	60	240
	Assistants—Continued.		
Brooklyn, N. Y	Pollock, James	43	172
	Green, Wilkins Updike	255½	1, 022
	Allaben, Charles S	163	652
	Hill, William	23½	94
	Taylor, William H	279	1, 116
	Josnë, Max	253	906
Buffalo, N. Y	Douglas, Silas J., *Chief Special Agent.*	60	300
	Assistants:		
	Pierce, E. P	65	260
	Beam, L. M	50	200
Burlington, Iowa	Sanderland, N. P	25	100
Burlington, Vt	Kinsley, C. S	20	80
Cambridge, Mass	Snow, Simeon	39	156
Camden, Bridgeton, and Vineland, N. J.	Fox, Joseph B	47	188
Canton, Ohio	Stadden, Isaac	15	60
Cedar Rapids, Iowa	Lawrence, Alexander	16	64
Charleston, S. C	Stuart, B. R	25	100
Chattanooga, Tenn	Simms, Martin	10	40
Chelsea, Mass	Sale, John	25	100
Chester, Pa	Lyons, Samuel	25	100
Chicago, Ill	Randolph, Charles, *Chief Special Agent.*	80	480
	Assistants:		
	McChesney, Robert	80	320
	Richards, John J	60	240
	Randolph, Frederick W	58	232
	Newell, Harmon S	75	300
	Conner, Freeman	72	288
	Waterman, William E	66¼	265
	Braun, Charles H	50	200
Chicopee, Mass	Carter, Edwin O	15	60
Chillicothe, Ohio	Nye, A. Spencer	15	60
Cincinnati and Hamilton, Ohio.	Cole, Henry, *Chief Special Agent.*	237	1, 422
	Assistants:		
	Pearce, John J	9	36
	Brooks, R. B	110	440
	Haughton, S. M	104	416
	Warren, E. B	108	432
	Thorpe, C. M	112	448
	Stephens, B. F	60	240
Hamilton	Hey, James H	30	120
Cleveland, Ohio	Hobart, M. M., *Chief Special Agent.*	108	540
	Assistants:		
	App, Michael	74	296
	Westbrook, J. A	10	40
Cohoes, N. Y. (*See* Albany.)			
Columbia, S. C	Lamotte, J. W	11	44
Columbus, Ga	Beall, L. A	15	60
Columbus, Ohio	Tucker, Isaac W	55	220
Concord, N. H	Secomb, Daniel F	15	60
Council Bluffs, Iowa	Flickinger, A. T	23	92
Covington, Ky	Blackburn, J. M	30	120
Cumberland, Md	Turner, James M	13½	54
Dallas, Texas	Harris, L. F	15	60
Danbury, Conn	Flint, Harrison	12	48
Danville, Ill	Elliott, Jesse W	12	48
Danville, Pa	Chalfant, Charles	12	48

a These totals do not include clerk hire, traveling expenses and other items embraced by the figures published in the *Compendium*.

b Paid as a clerk in the Census Office.

LIST OF SPECIAL AGENTS AND ASSISTANTS, ETC.—Continued.

City.	Name of special agent.	Length of service in days.	Compensation in dollars.
Danville, Va	Bowen, F. F	14	56
Davenport, Iowa	Graham, James R	30	120
Dayton, Ohio	Thomas, J. H	75	300
Decatur, Ill	Paine, Jno. W., jr	20	80
Denver, Colo	Odenheimer, William	20	100
Des Moines, Iowa	Bushnell, J. P	25	100
Detroit, Mich	Tryon, James E., *Chief Special Agent.*	107	535
	Assistants:		
	Mothersill, Wm	50	200
	Latham, James C	50	200
Dover, N. H	Twombly, Ezra H	12	48
Dubuque, Iowa	Bunting, Abram S	40	160
Easton, Pa	Smith, Samuel S	20	80
East Saginaw, Mich	Wyckoff, Fayette	28	112
East Saint Louis, Ill	Fekete, Thomas L	12	48
Elgin, Ill	Davidson, O	10	40
Elizabeth, N. J	Wiley, J. T	25	100
Elmira, N. Y	Pickering, E. B	30	120
Erie, Pa	Sterrett, Joseph R	25	100
Evansville, Ind	McCarer, Charles H	45	180
Fall River, Mass	Burt, William J	47	188
Fitchburg, Mass	Mason, Charles	15	00
Fond du Lac, Wis	Simmons, M. W	25	100
Fort Wayne, Ind	Noll, Martin A	44	176
Frederick, Md	Holbruner, Thomas M	15	60
Freeport, Ill	Mayer, Urias M	13	52
Galena, Ill	Lorrain, Jno	12	48
Galesburgh, Ill	Thain, Alexander R	15	60
Galveston, Tex	Byrne, Edward J	25	100
Gloucester, Mass	Sanford, H. Frank	20	80
Grand Rapids, Mich	Gage, George W	44	176
Hagerstown, Md	Garlinger, Benjamin A	13	52
Hamilton, Ohio. (*See* Cincinnati.)			
Hannibal, Mo	Jones, George H	12	48
Hartford, Conn	Bates, George D	54	216
Harrisburg, Pa	Boyle, John T	20	80
Haverhill, Mass	Gay, Moses S	20	80
Hoboken, N. J. (*See* Jersey City.)			
Holyoke, Mass	Higgenbottom, Allen	22	88
Houston, Tex	Taylor, E. W	15	60
Hudson, N. Y	Waterman, Henry, 2d	15	60
Huntsville, Ala	Blair, W. A	10	40
Indianapolis, Ind	Ridenour, J. M., *Chief Special Agent.*	70	350
	Assistant:		
	Sullivan, B. W	60	240
Iowa City, Iowa	Fyffe, H. W	10	40
Ithaca, N. Y	Beers, Samuel B	15	60
Jackson, Mich	Penny, Charles W	20	80
Jacksonville, Fla	Babcock, William H	12	48
Jacksonville, Ill	Barr, William P	15	60
Jamestown, N. Y	Stearns, Charles	12	48
Janesville, Wis	Balch, J. H	12	48
Jeffersonville and New Albany, Ind.	Bailey, Leon O	35	140
Jersey City and Hoboken, N. J.	Van Winkle, Daniel, jr., *Chief Special Agent.*	65	325
	Assistants:		
	Waite, Edmond T	50	200
	Earle, R. D	50	200
	Garrison, Samuel W	50	200
	Mabon, John S	50	200
Johnstown township, N. Y	Lownsbery, Willard G	33	132
Joliet, Ill	Millar, John S	15	60
Joplin, Mo	Workizer, C. J. G	8	32
Kalamazoo, Mich	Bush, Henry W	24	96
Kansas City, Mo	Nickerson, E. J	50	200
Kenosha, Wis	Mygatt, Wallace	10	40
Keokuk, Iowa	Fulton, Harry	18	72
Key West, Fla	Jones, James G	12	48
Kingston, N. Y	Lefever, Silas	25	100
Knoxville, Tenn	McLemore, P. B	10	40
La Fayette, Ind	Davis, A. F	30	120
Lancaster, Pa	Lebkicher, William H	25	100
La Salle, Ill	Annable, Edward	8	32
Lawrence, Kans	Nicholson, William	10	40
Lawrence, Mass	Harman, Robert A	35	140
Leavenworth, Kans	Tomb, John W	25	100
Lewiston, Me	Douglas, Oscar G	18	72
Lexington, Ky	Stoll, C. H	25	100
Lincoln, R. I	Newell, Frank A	10	40
Little Rock, Ark	Farquhar, George K	20	80
Lockport, N. Y	McDonough, Mark	15	60
Logansport, Ind	Powell, John T	18	72
Long Island City, N. Y	Manning, Charles L	15	60
Louisville, Ky	Caron, C. K., *Chief Special Agent.*	40	200
	Assistants:		
	Smith, Stephen D	40	160
	Pilson, Benjamin F	40	160
	Morningstar, C. E	40	160
	Milward, John H	44	176
Lowell, Mass	Holton, Frederick	65	260
Lynchburg, Va	Dabney, D. M	20	80
Lynn, Mass	Merritt, C. M	50	200
Macon, Ga	Freeman, James S	15	60
Madison, Ind	Davis, Lyman S	11	44
Madison, Wis	Mayers, Charles G	15	60
Malden, Mass	Atwood, George M	15	60
Manchester, N. H	Luce, Charles A	20	80
Mansfield, Ohio	Emminger, George L	15	60
Marblehead, Mass	Cloutman, John Merrill	10	40
Marlborough, Mass	Morse, Henry	12	48
Memphis, Tenn	Hill, William A	25	100
Meriden, Conn	Hull, Hobert C	15	60
Middletown, Conn	Hall, James D	12	48
Milford, Mass	Thayer, Henry B	10	40
Milwaukee, Wis	Loper, A. A., *Chief Special Agent.*	44	220
	Assistants:		
	Parsons, William G	44	176
	Martin, John	44	176
Minneapolis, Minn	Johnson, Charles W	50	300
Mobile, Ala	Ledyard, Erwin	25	100
Moline, Ill	Starr, J. C	16	64
Montgomery, Ala	Leak, W. W	12	48
Muscatine, Iowa	Jack, O. G	14½	58
Muskegon, Mich	Parker, Edmund C	12	48
Nashville, Tenn	Paul, Franc M	40	160
Nashua, N. H	Buxton, Mark R	15	60
Natchez, Miss	Greene, Theodore H	15	60
New Albany, Ind. (*See* Jeffersonville.)			
Newark, N. J	Quinn, P. T., *Chief Special Agent.*	75	375
	Assistants:		
	Lozier, De Forest P	75	300
	Colburn, J. F	75	300
New Bedford, Mass	Chapman, C. W	30	120
New Berne, N. C	Winfield, James L	10	40
New Britain, Conn	Williams, W. C	12	48
New Brunswick, N. J., and Milltown, adjoining.	Hatfield, Augustus	25	100
Newburg, N. Y	Shafer, Joseph D	25	100
Newburyport, Mass	Woodwell, D. T	18	72

LIST OF SPECIAL AGENTS AND ASSISTANTS, ETC.—Continued.

City.	Name of special agent.	Length of service in days.	Compensation in dollars.
New Haven, Conn	Barnes, T. Attwater	75	300
New London, Conn	Adams, Horace A	13	52
New Orleans, La	Deslonde, Edward A., *Chief Special Agent.*	99	594
	Assistants:		
	Zacharie, James S	75	300
	Darrington, John	50	200
	Hyams, Isaac S	48	192
	Walker, Norman C	50	200
Newport, Ky	Bodley, John H	15	60
Newport, R. I	Brayton, James B	15	60
Newton, Mass	Bridges, George E	20	80
New York, N. Y	Hill, Charles E., *Chief Special Agent.*	282	1,692
	Assistants:		
	Okershausen, H. J	75	300
	Olmsted, Ingersoll	55	220
	Homer, Charles H	60	240
	Pollock, James	143	572
	Howland, Isaac	129½	518
	Smith, J. Bryant	77½	310
	Tichenor, Edmund J	153	612
	Carrington, Zebulon E	164	656
	Parkin, Henry H	230½	922
	Gates, P. T	152	608
	Jackson, Robert	143	572
Norfolk and Portsmouth, Va	Morris, D. P	20	80
Norristown, Pa	Schall, George	18	72
North Adams, Mass	Miller, George F	18	72
Northampton, Mass	Munyan, A. J	18	72
Norwalk, Conn	Ells, Joseph B	15	60
Norwich, Conn	Bill, Palmer	15	60
Oakland, Cal	Ayers, William H	20	100
Ogdensburg, N. Y	Ames, Leverett E	22½	90
Omaha, Nebr	Andres, Philip	25	100
Orange, N. J	Lighthipe, Charles F	15	60
Oshkosh, Wis	Webster, W. N	20	80
Oswego, N. Y	Buell, Adelbert E	25	100
Ottawa, Ill	Hitt, R. C	10	40
Ottumwa, Iowa	Rounds, Charles B	12	48
Owensboro', Ky	Osborne, William D	15	60
Paducah, Ky	Exall, George G	19	76
Paterson, N. J	Van Gieson, Henry	35	140
Pawtucket, R. I	Carpenter, E. J	40	160
Peabody, Mass	Winchester, Charles T	10	40
Peoria, Ill	Bestor, Harry C	35	140
Petersburg, Va	Northington, S. S	35	140
Philadelphia, Pa	Arrott, William, *Chief Special Agent.*	166	996
	Assistants:		
	Matlock, Joseph B	70	280
	Getty, Frank	49	196
	Richards, George	89	356
	Jones, Lucian	89	356
	Zebley, John	89	356
	Harrison, Wolcott R	89	356
	Dittie, James	70	280
	McIntyre, William	70	280
	Heath, William McK	70	280
	Getty, Archibald	89	356
	Siddall, H. W	70	280
Pittsburgh, Pa	Mills, A. B., *Chief Special Agent.*	56	280
	Assistants:		
	Rhoades, William B	56	224
	McKinley, D. E	56	224
	Gormley, William M	56	224
	Bracken, Robert C	56	224
Pittsfield, Mass	Whiting, W. H	10	40

City.	Name of special agent.	Length of service in days.	Compensation in dollars.
Portland, Me	Rich, Marshall N	36½	146
Portland, Oreg	Clay, Oscar J	15	75
Portsmouth, N. H	Bailey, Charles W	10	40
Portsmouth, Ohio	Hall, Henry	20	80
Portsmouth, Va. (*See* Norfolk.)			
Pottsville, Pa	Beard, Samuel	23	92
Poughkeepsie, N. Y	Farnum, Samuel J	20	80
Providence, R. I	Monroe, J. Albert, *Chief Special Agent.*	60	300
	Assistants:		
	Patten, Nathaniel F	60	240
	Turner, William H	60	240
Queensbury, N. Y	Mott, Edward P	11	44
Quincy, Ill	Langdon, A. L	50	200
Quincy, Mass	Fellows, Ensign S	12	48
Racine, Wis	Whiteley, Simeon	30	120
Raleigh, N. C	Page, Rufus H	12	48
Reading, Pa	Snyder, John B	40	160
Richmond, Ind	Lippincott, Samuel R	23	92
Richmond, Va	Cabell, James Alston	75	300
Rochester, N. Y	Graham, James S., *Chief Special Agent.*	40	200
	Assistant:		
	Kane, John	40	160
Rockford, Ill	Clark, Orlando	15	60
Rock Island, Ill	Stoddard, Charles H	30	120
Rome, N. Y	Davidson, H. Whitfield	20	80
Rondout, N. Y	Colville, Walter	12	48
Rutland, Vt	Swinnington, Fred. G	15	60
Sacramento, Cal	Reid, F. W	35	175
Saint Joseph, Mo	Sherwood, Willis M	45	180
Saint Louis, Mo	Gould, David B., *Chief Special Agent.*	99	594
	Assistants:		
	Cahill, J. F	30	120
	Jones, L. H	70	280
	Wright, G. L	45	180
	Hawley, J. H	76	304
	Allen, M. V	86	344
	Throckmorton, W	90	360
Saint Paul and Stillwater, Minn.	Solberg, C. F	100	400
	Fernald, George W	32	128
Salem, Mass	Valentine, Elmer	35	140
Salt Lake City, Utah	Leonard, A. A	25	100
San Antonio, Tex	Newendorf, Max	25	100
Sandusky, Ohio	Hunt, William B. H	22	88
San Francisco and San José, Cal.	Langley, Henry G., *Chief Special Agent.*	178	1,068
	Assistants:		
	Disturnell, William C	70	280
	Bear, C. N	60	240
	Milton, Thomas S	60	240
	Wade, Edward G	60	240
	Bailey, Frank L	60	240
San José, Cal. (*See* San Francisco.)			
Saratoga Springs, N. Y	McDonald, Frank H	10	40
Savannah, Ga	Gray, B. Frank	30	120
Schenectady, N. Y	Dorn, Henry A	18	72
Scranton, Pa	Boland, C. G	40	160
Selma, Ala	Hooper, William E	6	24
Sheboygan, Wis	Wilgus, M. H	10	40
Somerville, Mass	Ashley, John E	12	48
South Bend, Ind	Witherill, O. S	22	88
Springfield, Ill	Humphrey, J. O	35	140
Springfield, Mass	Burt, Roderick	45	180
Springfield, Ohio	Benson, J. Milton	45	180
Stamford, Conn	Morgan, O. B	14	56

LIST OF SPECIAL AGENTS AND ASSISTANTS, ETC.—Continued.

City.	Name of special agent.	Length of service in days.	Compensation in dollars.
Steubenville, Ohio	Hanvey, Alexander	20	80
Stillwater, Minn. (*See* Saint Paul.)			
Stockton, Cal	Orr, N. M	15	75
Syracuse, N. Y	Fernald, George W., *Chief Special Agent.*	50	250
	Assistants:		
	Brown, Aloysius P	30	120
	Robinson, Thomas	30	120
Taunton, Mass	Mitchell, Daniel L	35	140
Terre Haute, Ind	Gaddes, Joseph B	30	120
Titusville, Pa	Smith, Wilson	12	48
Toledo, Ohio	Hiett, John W	60	240
Topeka, Kans	Hebbard, J. C	18	72
Trenton, N. J., including the borough of Chambersburg.	Fitzgerald, Thomas F	41	164
Troy, N. Y. (*See* Albany.)			
Utica, N. Y	Northup, A. B	50	200
Vicksburg, Miss	McMichael, Eugene H	15	60
Vincennes, Ind	Willoughby, B. M	10	40
Vineland, N. J. (*See* Camden.)			
Virginia City, Nev	Gray, W. C	12	60
Waltham, Mass	Brown, Laroy	12	48
Warwick, R. I	Thornton, Stephen W	8	32
Washington, D. C	Boyd, William H., *Chief Special Agent.*	50	250
	Assistants:		
	Boudinot, George S	50	200
	Powell, John T	50	200
	Wall, John C	50	200
Waterbury, Conn	Lum, Edwin A	25	100
Waterloo, Iowa	Kuhns, Joseph H	10	40
Watertown, N. Y	Graves, T. S	15	60
Westfield, Mass	Van Deusen, Merritt	13	52
West Troy, N. Y. (*See* Albany.)			
Weymouth, Mass	Cook, L. A	14	56
Wheeling, W. Va	Hubbard, Dana L	35	140
Wilkesbarre, Pa	Allen, D. G	20	80
Williamsport, Pa	Otto, John B	19	76
Wilmington, Del	Henry, James B	60	240
Wilmington, N. C	Myers, C. D	18	72
Woburn, Mass	Dow, James N	14	56
Woonsocket, R. I	Kelly, Francis E	25	100
Worcester, Mass	Marshall, A. R	66	264
Yonkers, N. Y	Keyes, Malcolm S	18	72
York, Pa	Spangler, F. L	20	80
Youngstown, Ohio	Hughes, William T	18	72
Zanesville, Ohio	Josselyn, Amos P	18	72

STATISTICS OF MANUFACTURES.

TABULAR STATEMENTS.

NOTES ON THE STATISTICS OF MANUFACTURES.

THE SCOPE OF THESE TABLES.—These tables include every establishment of mechanical or manufacturing industry which was returned at the Tenth Census as having had during the census year a product of five hundred dollars or more in value, except those engaged in the manufacture of fishery products, quartz milling, petroleum refining, the printing and publishing of newspapers, the manufacture of gas, and the manufacture and repair by steam railroad companies of their rolling stock and supplies, the statistics of which will form the subjects of separate reports.

Establishments, wherever practicable, have been referred to the locality where *the works* were situated.

The statistics of cotton goods include: (1) specific mills, *i. e.*, mills which manufacture cotton into a fabric known and sold under that name; and (2) special mills, working raw cotton, waste, or cotton yarn into hose, webbing, tapes, fancy fabrics, or mixed goods, or other fabrics which are not sold as specific manufactures of either cotton or wool.

Dyeing and finishing textiles do not include the statistics of establishments connected with cotton, woolen, or silk factories, but only the operations of independent dye-works, bleacheries, and print-works, the values of the products reported being merely the values added to the fabrics by the processes of these establishments.

The statistics of manufacture of iron and steel embrace blast furnaces, bloomaries and forges, rolling-mills, and steel works of all kinds.

Shipbuilding includes the building and repairing of iron and wooden vessels of all classes, boats and canal-boats, and the manufacture of blocks and spars, marine engines, oakum, oars, and sails. The operations of the various navy-yards of the United States are not included.

COMPARISONS BETWEEN 1870 AND 1880.—In all comparisons between values reported in 1870 and in 1880 it should be borne in mind that *the values of* 1870 *were expressed in a currency which was at a great discount in gold.* The average premium on gold during the twelve months (June 1, 1869, to May 31, 1870) which constituted the census year was almost exactly one-fourth (25.3) per cent. A premium on gold of one-fourth is equal to a discount on currency of one-fifth. For purposes of comparison, therefore, the values of 1870 should be reduced in that ratio.

The fact that, in the face of a large increase in the number of hands employed in manufactures, of the amount of material consumed, and of the values of the products, THE NUMBER OF ESTABLISHMENTS shows hardly an appreciable gain from 1870 to 1880, notwithstanding an increase of 30 per cent. in population, is amply accounted for by the well-known tendency to the concentration of labor and capital in large shops and factories. The establishments of 1870 showed 8 as the average number of hands and $8,400 as the average amount of capital; those of 1880 showed 10.7 as the average number of hands and $10,992 as the average amount of capital. A very good example of the effect of this cause is found in the coopers' trade, where, with a reduction in the number of establishments from 4,961 to 3,898 (or 22 per cent. nearly), the hands employed have increased 11 per cent. This cause has not, however, operated equally to produce a proportional reduction in all branches of industry. Thus, in the carpenters' trade (*a*) we have the average number of hands employed 5.9 in 1880, against 3.9 in 1870. But this increase in the average number of hands does not alone explain the decrease in the number of establishments We have also to take into account the effect of the growth of the sash, door, and blind factories, doing on a large scale and by the aid of machinery what was formerly done slowly on the spot by the individual carpenter. We have, then, to take into account the growth of the wheelwright trade. In 1870 there were 3,613 establishments, employing an aggregate of 6,989 hands; in 1880 there were 10,701 establishments, employing 16,108 hands. We have next to take into account the introduction of machinery into the furniture and cabinet-making industry, replacing much of the former work of the local carpenter in rural districts and small towns. We have then to consider the

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[a] The statistics of manufactures in a census of the United States have never embraced the full production of the hand-trades of mason, carpenter, blacksmith, cooper, painter, plumber, and perhaps some others of less importance. The reason for this is stated in the remarks which preface the tables of occupations. (See Population volume, p. 709.)

In the text above we assume that the tendency to omit the productions of artisans working singly at these trades, having perhaps no distinct shops, and working perhaps (in rural districts) but a part of the year, operated with approximately equal force in 1870 and 1880.

immense extension of the contract system of erecting buildings, the effect of which is to disconnect an increasing proportion of the working carpenters of every city or large town from actual shops and constitute them a movable, readily disposable force, to be hired now by this contractor and now by that, according as jobs arise. We have, last, to consider the rapid substitution of brick and stone for wood in building, evidenced by the fact that the number of persons employed in the manufacture of brick in the United States has increased more than 50 per cent. in ten years. In the same way, while the cross-roads blacksmith-shop is still a necessity of tens of thousands of localities, very much of the work formerly done by blacksmiths is now done on a larger scale by wheelwrights, locksmiths, or machinists, or in hardware factories or establishments producing numerous specialties in iron and steel.

RELATION OF WAGES AND MATERIALS TO PRODUCTS.—It is evident that in any comparison of state with state or of city with city as regards their respective manufacturing importance, or of industry with industry as regards their respective contributions to the wealth of the country, the value of the materials consumed should be deducted from the reported aggregate value of the products before such comparisons are made.

The neglect of this simple and natural rule has led to grave misunderstanding of the proper effect of the census statistics of manufactures, and to many bitter complaints on the part of cities and of states deeming themselves injured. (*a*)

It is also evident that, in estimating the contributions made by the manufacturing industries, as a whole, to the annual revenue of the country, a similar deduction should be made. Thus, while the aggregate value of the manufactures of the United States is reported at $5,369,579,191, the value of the materials consumed therein is given at not less than $3,396,823,549. It is the difference between these two sums, $1,972,755,642, which measures the net product of our manufacturing industries. This deduction would require to be made were all the materials of manufacture drawn in every case directly from agriculture; but, as a matter of fact, the products of one industry often become the materials of another, and the products of this, perhaps, in turn, the materials of a third industry; and so the values of manufactured products are swollen by the repeated inclusion of the same original subject-matter. Thus, certain amounts of coal, iron-ore, limestone, and labor—not to speak of other elements—enter to make up the value of a certain quantity of pig-iron. All the latter may, a few months later, become the material for the manufacture of a certain quantity of bar-iron, the reported value of which, of course, includes the value of the pig-iron as well as of the labor and other elements in the production of the bar. The bar-iron, again, may become the material for the manufacture of a certain body of machinery, the value of the latter including the value of the bar-iron as well as of labor and other elements in its own production. In this way the value of the coal, iron-ore, and limestone reappears again and again through successive processes of manufacture. And this is statistically right. Only in this way can the facts of each industry by turns be exhibited. To omit these elements at any stage of production would be to misstate the facts of the particular industry concerned. But it is evident that this statistical condition renders it imperative not to consider the aggregated values of all products of manufacture as an addition to the wealth of the country; but, on the contrary, in all comparisons of the nature referred to the value of materials should uniformly be deducted.

The relation of materials to product, in the statistics of industry, needs to be carefully borne in mind; otherwise the most mistaken views of the importance of the several branches of industry will result.

The manufacturing and mechanical industries may be grouped in respect of the value of materials into four classes:

First. Those industries in which the subject-matter is of a distinct and immediate commercial value, but the property does not reside in the person who treats it. In these cases, still, the value of the subject-matter treated is not embraced in the return of materials. A familiar illustration is that of horse-shoeing. It would be the height of absurdity for the smith, for example, to return the value of unshod horses among his "materials", and the value of the same, when shod, in his product. The census assigns as the materials of his industry merely the coal, iron, steel, etc., used, and, as the value of his product, merely the price of the personal service he renders, plus the cost of those materials. In the same category are many of the trades. The returns in respect to the industries of painting, plastering, and plumbing, for example, do not take into account the value of the houses, stores, factories, etc., before and after these operations, but regard only the added value given as the product, and, in the same way, only the paints, the plaster and lime, the tubing, iron, and brass-ware, etc., used, as the "materials" of these industries.

Second. Those industries in which the entire value of the subject-matter is carried into the value of "materials", and appears again in the product, enhanced by the value of labor, by the charges for the use of capital, for rent, freight, etc., but in which the value of such subject-matter is small, compared to the cost of labor. The cabinet-maker takes a few dollars' worth of woods, coarse or fine, and works up this material into articles bearing ten times the value. The cutler takes a few pounds of steel, and produces edged or pointed instruments of high cost, because of the time and skill required in their fabrication. In all these cases the value of the product is not greatly enhanced by the fact that the entire subject-matter of the industry is included.

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[a] See letter of the late Superintendent of Census with reference to the Manufacturing Statistics of Philadelphia, reprinted on the pages immediately following the table for that city.

Third. Industries which are otherwise under the same conditions as those of the second class, but in which the value of the materials approaches, or even moderately exceeds, the value of the labor employed, and becomes thus an important element in the final value of the product as reported, enhancing the apparent production of the industry in a high degree. Here come in the great body of the industries known technically as the "manufactures" of the country, the mill and factory industries, whose productions appear oftentimes enormous as compared with those of bodies of craftsmen more skilled and receiving higher wages, and do so merely because of the high cost of the materials consumed in the former case.

Fourth. Industries in which the value of the materials far exceeds all the other elements in the cost of production combined, and thus carries up the apparent product of these industries to a very high point, although, in fact, comparatively little value has been added by these operations, and only a small number of artisans or laborers supported.

The reduction of gold and silver, calico-printing, bleaching and dyeing, the currying of leather, the packing of meat, the refining of sugar and molasses, and the production of flour and meal, are among the most important industries of this class.

The distribution of the industries embraced in Table II, as nearly as possible, according to the classification just indicated, yields the following instructive results:

RELATION OF WAGES AND MATERIALS TO PRODUCTS IN MANUFACTURING AND MECHANICAL INDUSTRIES.*

1880.

Class.	Number of hands employed.	Amount paid in wages.	Value of materials.	Value of products.	Excess of products over materials.	Excess of products over wages and materials.	Wages in $100 of products.	Materials in $100 of products.	Wages and materials in $100 of products.	Product, per capita, gross.	Product, per capita, deducting materials.
I	123, 787	$46, 972, 802	$64, 875, 494	$164, 523, 518	$99, 648, 024	$52, 675, 222	$28 55	$39 43	$67 98	$1, 329 08	$804 99
II	240, 365	91, 618, 876	86, 007, 672	252, 180, 128	166, 172, 456	74, 553, 580	36 33	34 10	70 43	1, 049 15	691 33
III	2, 254, 204	768, 628, 877	2, 227, 225, 636	3, 796, 006, 063	1, 568, 780, 427	800, 151, 550	20 25	58 67	78 92	1, 683 96	695 93
IV..........	114, 239	40, 733, 240	1, 018, 714, 747	1, 156, 869, 482	138, 154, 735	97, 421, 495	3 52	88 05	91 57	10, 126 74	1, 209 34
Total	2, 732, 595	947, 953, 795	3, 396, 823, 549	5, 369, 579, 191	1, 972, 755, 642	1, 024, 801, 847	17 65	63 26	80 91	1, 965 01	721 93

1870.†

Class.	Number of hands employed.	Amount paid in wages.	Value of materials.	Value of products.	Excess of products over materials.	Excess of products over wages and materials.	Wages in $100 of products.	Materials in $100 of products.	Wages and materials in $100 of products.	Product, per capita, gross.	Product, per capita, deducting materials.
I	110, 504	35, 689, 883	67, 850, 482	154, 692, 177	86, 841, 695	51, 151, 812	23 07	43 86	66 93	1, 400 00	785 87
II	380, 112	160, 543, 329	172, 617, 561	503, 281, 690	330, 664, 129	170, 120, 800	31 89	34 30	66 19	1, 324 03	869 91
III	1, 420, 345	535, 293, 694	1, 483, 951, 729	2, 636, 790, 545	1, 152, 838, 816	617, 545, 122	20 30	56 28	76 58	1, 856 44	811 66
IV..........	98, 778	30, 769, 841	692, 676, 576	822, 792, 139	130, 115, 563	99, 345, 722	3 74	84 18	87 92	8, 329 71	1, 317 25
Total	2, 009, 739	762, 296, 747	2, 417, 096, 348	4, 117, 556, 551	1, 700, 460, 203	938, 163, 456	18 51	58 70	77 21	2, 048 80	846 11

* All the industries in Table II were assigned entire to one class or another, according to the principles indicated in the text. The lines of division taken for the second, third, and fourth classes were: 1, where the value of the materials is less than two-fifths of that of the ultimate product; 2, where the value of the materials is from two-fifths to four-fifths of that of the ultimate product; and, 3, where the value of the materials is over four-fifths of that the ultimate product.

† In this table the same groups of industries in 1870 are compared with each other. The table differs from that contained in the volume on Manufactures of the Ninth Census and in the Compendium of that census in this, that the mining and fishing interests, and the statistics of a few industries which form the subject of special reports in the census of 1880, are, for purposes of comparison, excluded herefrom.

The calculations which have been added to show the number of dollars' worth of wages and of materials, separately and combined, in each hundred dollars of product, and also the average value of production, gross and net, to each hand employed, are well worth studying.

It appears that the value of the materials consumed in the several groups of industries range from $34 10 to $88 05 in each $100 of product; that the amount of wages ranges (going, so to speak, in the opposite direction) from $36 33 to $3 52 in each $100 of product, while the gross product per capita ranges from $1,049 15 to $10,126 74, and the net product ranges from $691 33 to $1,209 34. The reason for these astonishing differences is not found chiefly in any difference in the quality of labor, or in the more extensive application of machinery in one class than in another, but almost wholly in the treatment of this subject of the materials consumed in the successive industries and classes of industries.

THE PERIOD COVERED BY THE RETURNS.—It needs to be borne carefully in mind in the use of the above tables that the period covered by the returns is the twelve months from June 1, 1879, to May 31, 1880, inclusive. The fluctuations of productive industry are so incessant and so extensive that it is necessary to fix precisely the period covered by any statement before tests can be supplied to ascertain its completeness and accuracy. Especially in the United States, where these fluctuations are far greater than in older manufacturing countries, is it essential to observe this caution. It often happens that the comparison of two twelve-months' periods, having so many as ten or eleven months in common, will exhibit important differences caused by the eleventh or twelfth month, or both.

This caution is of especial importance in connection with the Tenth Census, inasmuch as the first portion of the census year was embraced within the long period of industrial inactivity which had succeeded the panic of 1873, while the later months of the year witnessed an almost fierce resumption of manufacturing industry.

TABLE I.—MANUFACTURES, BY TOTALS OF STATES AND TERRITORIES, FOR THE CENSUSES OF 1880, 1870, 1860, AND 1850.

1880.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	253, 852	$2, 790, 272, 606	2, 019, 035	531, 639	181, 921	$947, 953, 795	$3, 396, 823, 549	$5, 369, 579, 191
Alabama	2, 070	9, 668, 008	8, 368	842	809	2, 500, 504	8, 545, 520	13, 565, 504
Arizona	66	272, 600	216	2	2	111, 180	380, 023	618, 365
Arkansas	1, 202	2, 953, 130	4, 307	90	160	925, 358	4, 392, 080	6, 756, 159
California	5, 885	61, 243, 784	38, 311	3, 922	1, 460	21, 065, 905	72, 607, 709	116, 218, 973
Colorado	599	4, 311, 714	4, 652	266	156	2, 314, 427	8, 806, 762	14, 260, 159
Connecticut	4, 488	120, 480, 275	75, 619	28, 851	8, 445	43, 501, 518	102, 183, 341	185, 697, 211
Dakota	251	771, 428	854	8	[illegible]	339, 375	1, 523, 761	2, 373, 970
Delaware	746	15, 655, 822	10, 250	1, 426	962	4, 267, 349	12, 828, 461	20, 514, 438
District of Columbia	971	5, 552, 526	5, 496	1, 389	261	3, 924, 612	5, 365, 400	11, 882, 316
Florida	426	3, 210, 680	4, 564	558	382	1, 270, 875	3, 040, 119	5, 546, 448
Georgia	3, 593	20, 672, 410	18, 937	3, 619	2, 319	5, 266, 152	24, 143, 939	36, 440, 948
Idaho	162	677, 215	374	8	6	136, 326	844, 874	1, 271, 317
Illinois	14, 549	140, 652, 066	120, 558	15, 233	8, 936	57, 429, 085	289, 843, 907	414, 864, 673
Indiana	11, 198	65, 742, 962	62, 072	3, 615	3, 821	21, 960, 888	100, 262, 917	148, 006, 411
Iowa	6, 921	33, 987, 886	25, 382	1, 431	1, 559	9, 725, 962	48, 704, 311	71, 045, 926
Kansas	2, 803	11, 192, 315	11, 139	392	531	3, 995, 010	21, 453, 141	30, 843, 777
Kentucky	5, 328	45, 813, 039	30, 949	3, 529	2, 913	11, 657, 844	47, 461, 890	75, 483, 377
Louisiana	1, 553	11, 462, 468	10, 171	1, 335	661	4, 360, 371	14, 442, 506	24, 205, 183
Maine	4, 481	49, 988, 171	35, 431	13, 777	3, 746	13, 623, 318	51, 120, 708	79, 829, 793
Maryland	6, 787	58, 742, 384	46, 698	21, 700	6, 547	18, 904, 965	66, 937, 846	106, 780, 563
Massachusetts	14, 352	303, 806, 185	228, 834	105, 976	17, 445	128, 315, 362	386, 972, 655	631, 135, 284
Michigan	8, 873	92, 930, 959	68, 445	4, 784	4, 362	25, 313, 682	92, 900, 269	150, 715, 025
Minnesota	3, 493	31, 004, 811	18, 937	1, 636	674	8, 613, 094	55, 660, 681	76, 065, 198
Mississippi	1, 479	4, 727, 600	4, 887	413	527	1, 192, 645	4, 667, 183	7, 518, 302
Missouri	8, 592	72, 507, 844	54, 200	5, 474	4, 321	24, 309, 716	110, 798, 392	165, 386, 205
Montana	196	899, 390	574	3	1	318, 759	1, 006, 442	1, 835, 867
Nebraska	1, 403	4, 881, 150	4, 464	120	209	1, 742, 311	8, 208, 478	12, 627, 336
Nevada	184	1, 323, 300	556	5	16	461, 807	1, 049, 794	2, 179, 626
New Hampshire	3, 181	51, 112, 263	29, 356	16, 184	3, 291	14, 814, 793	43, 552, 462	73, 978, 028
New Jersey	7, 128	106, 226, 593	86, 787	27, 099	12, 152	46, 083, 045	165, 285, 779	254, 380, 236
New Mexico	144	463, 275	553	....	4	218, 731	871, 352	1, 284, 846
New York	42, 739	514, 246, 575	364, 549	137, 455	29, 529	198, 634, 029	679, 612, 545	1, 080, 696, 596
North Carolina	3, 802	13, 045, 639	12, 818	2, 939	2, 352	2, 740, 768	13, 090, 937	20, 095, 037
Ohio	20, 699	188, 939, 614	152, 217	18, 563	12, 829	62, 103, 800	215, 334, 258	348, 298, 390
Oregon	1, 080	6, 312, 056	3, 280	96	97	1, 667, 046	6, 954, 436	10, 931, 232
Pennsylvania	31, 232	474, 510, 993	284, 359	73, 046	29, 667	134, 055, 904	465, 020, 563	744, 818, 445
Rhode Island	2, 205	75, 575, 943	37, 060	18, 270	7, 548	21, 355, 619	58, 103, 443	104, 163, 621
South Carolina	2, 078	11, 205, 894	13, 687	1, 023	1, 118	2, 836, 289	9, 885, 538	16, 738, 008
Tennessee	4, 326	20, 092, 845	19, 575	1, 195	1, 674	5, 254, 775	23, 834, 262	37, 074, 886
Texas	2, 996	9, 245, 561	11, 645	116	398	3, 343, 087	12, 956, 269	20, 719, 928
Utah	640	2, 656, 657	2, 042	221	232	858, 863	2, 561, 737	4, 324, 992
Vermont	2, 874	23, 265, 224	14, 488	2, 271	831	5, 164, 479	18, 330, 677	31, 354, 366
Virginia	5, 710	26, 968, 990	28, 779	6, 144	5, 261	7, 425, 261	32, 883, 933	51, 780, 992
Washington	261	3, 202, 497	1, 110	25	12	532, 226	1, 967, 469	3, 250, 134
West Virginia	2, 375	13, 883. 390	12, 900	346	1, 065	4, 313, 965	14, 027, 388	22, 867, 126
Wisconsin	7, 674	73, 821, 802	48, 255	6, 241	2, 613	18, 814, 917	85, 796, 178	128, 255, 480
Wyoming	57	364, 673	380	....	11	187, 798	601, 214	898, 494

TABLE I.—MANUFACTURES, BY TOTALS OF STATES AND TERRITORIES—Continued.

1870.

States and Territories.	No. of establish-ments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	252, 148	$2, 118, 208, 769	1, 615, 598	323, 770	114, 628	$775, 584, 343	$2, 488, 427, 242	$4, 232, 325, 442
Alabama	2, 188	5, 714, 032	7, 196	664	388	2, 227, 968	7, 592, 837	13, 040, 644
Arizona	18	150, 700	84			45, 580	110, 090	185, 410
Arkansas	1, 079	1, 782, 913	3, 077	47	82	673, 963	2, 536, 998	4, 629, 234
California	3, 984	39, 728, 202	24, 040	873	479	13, 136, 722	35, 351, 193	66, 594, 556
Colorado	256	2, 835, 605	874	2		528, 221	1, 593, 280	2, 852, 820
Connecticut	5, 128	95, 281, 278	61, 684	20, 810	7, 029	38, 987, 187	86, 419, 579	161, 065, 474
Dakota	17	79, 200	89		2	21, 106	105, 997	178, 570
Delaware	800	10, 839, 093	7, 705	1, 199	806	3, 692, 195	10, 206, 397	16, 791, 382
District of Columbia	952	5, 021, 925	4, 333	216	136	2, 007, 600	4, 754, 883	9, 292, 173
Florida	659	1, 679, 930	2, 670	20	59	989, 592	2, 330, 873	4, 685, 403
Georgia	3, 836	13, 930, 125	15, 078	1, 498	1, 295	4, 844, 508	18, 583, 731	31, 196, 115
Idaho	101	742, 300	264		1	112, 372	691, 785	1, 047, 624
Illinois	12, 597	94, 368, 057	73, 045	6, 717	3, 217	31, 100, 244	127, 600, 077	205, 620, 672
Indiana	11, 847	52, 052, 425	54, 412	2, 272	2, 168	18, 366, 780	63, 135, 492	108, 617, 278
Iowa	6, 566	22, 420, 183	23, 395	951	686	6, 893, 292	27, 682, 096	46, 534, 322
Kansas	1, 477	4, 319, 060	6, 599	118	127	2, 377, 511	6, 112, 163	11, 775, 833
Kentucky	5, 390	29, 277, 809	27, 687	1, 159	1, 790	9, 444, 524	29, 497, 535	54, 625, 809
Louisiana	2, 557	18, 313, 974	23, 637	4, 210	2, 224	4, 593, 470	12, 412, 023	24, 161, 905
Maine	5, 550	39, 796, 190	34, 310	13, 448	1, 422	14, 282, 205	49, 379, 757	79, 497, 521
Maryland	5, 812	36, 438, 729	34, 061	8, 278	2, 521	12, 682, 817	46, 897, 032	76, 593, 613
Massachusetts	13, 212	231, 677, 862	179, 032	86, 229	14, 119	118, 051, 886	334, 413, 982	553, 912, 568
Michigan	9, 455	71, 712, 283	58, 347	2, 941	2, 406	21, 205, 355	68, 142, 515	118, 394, 676
Minnesota	2, 270	11, 993, 729	10, 892	259	139	4, 052, 837	13, 842, 902	23, 110, 700
Mississippi	1, 731	4, 501, 714	5, 500	191	250	1, 547, 428	4, 364, 206	8, 154, 758
Missouri	11, 871	80, 257, 244	55, 904	3, 884	5, 566	31, 055, 445	115, 533, 269	206, 213, 429
Montana	201	1, 794, 300	697	2	2	370, 843	1, 316, 331	2, 494, 511
Nebraska	670	2, 169, 963	2, 558	81	26	1, 429, 913	2, 902, 074	5, 738, 512
Nevada	330	5, 127, 790	2, 856	3		2, 498, 473	10, 315, 984	15, 870, 539
New Hampshire	3, 342	36, 023, 743	25, 829	12, 775	2, 179	13, 823, 091	44, 577, 967	71, 038, 249
New Jersey	6, 636	79, 606, 719	58, 115	11, 198	6, 239	32, 648, 409	103, 415, 245	169, 237, 732
New Mexico	182	1, 450, 695	423	1	3	167, 281	880, 957	1, 489, 868
New York	36, 206	366, 994, 320	267, 378	63, 795	20, 627	142, 466, 758	452, 065, 452	785, 194, 651
North Carolina	3, 642	8, 140, 473	11, 339	1, 422	861	2, 195, 711	12, 824, 693	19, 021, 327
Ohio	22, 773	141, 923, 964	119, 686	11, 575	5, 941	49, 066,488	157, 131, 697	269, 713, 610
Oregon	969	4, 376, 849	2, 753	67	64	1, 120, 173	3, 419, 756	6, 877, 387
Pennsylvania	37, 200	406, 821, 845	256, 543	43, 712	19, 232	127, 976, 594	421, 197, 673	711, 894, 344
Rhode Island	1, 850	66, 557, 322	28, 804	14, 752	5, 861	19, 354, 256	73, 154, 109	111, 418, 354
South Carolina	1, 584	5, 400, 418	7, 099	578	464	1, 543, 715	5, 855, 736	9, 858, 981
Tennessee	5, 317	15, 595, 295	17, 663	1, 089	660	5, 390, 630	19, 657, 027	34, 362, 636
Texas	2, 399	5, 284, 110	7, 450	157	320	1, 787, 835	6, 273, 193	11, 517, 302
Utah	533	1, 391, 898	1, 465	43	26	395, 365	1, 238, 252	2, 343, 019
Vermont	3, 270	20, 329, 637	16, 301	1, 872	513	6, 264, 581	17, 007, 769	32, 184, 606
Virginia	5, 933	18, 455, 400	22, 175	2, 259	2, 540	5, 343, 099	23, 832, 384	38, 364, 322
Washington	269	1, 893, 674	1, 025	1		574, 936	1, 435, 128	2, 851, 052
West Virginia	2, 444	11, 084, 520	10, 728	287	657	4, 322, 164	14, 503, 701	24, 102, 201
Wisconsin	7, 013	41, 981, 872	40, 296	2, 114	1, 500	13, 575, 642	45, 851, 266	77, 214, 326
Wyoming	32	889, 400	500	1	1	347, 578	280, 156	705, 424

TABLE I.—MANUFACTURES, BY TOTALS OF STATES AND TERRITORIES—Continued.

1860.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	AVERAGE NUMBER OF HANDS EMPLOYED. Females above 15 years.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	140, 433	$1, 009, 855, 715	1, 040, 349	270, 897	$378, 878, 966	$1, 031, 605, 092	$1, 885, 861, 676
Alabama	1, 459	9, 098, 181	6, 792	1, 097	2, 132, 940	5, 489, 963	10, 588, 566
Arkansas	518	1, 316, 610	1, 831	46	554, 240	1, 280, 503	2, 880, 578
California	8, 468	22, 043, 096	49, 171	55	28, 402, 287	27, 051, 674	68, 253, 228
Connecticut	3, 019	45, 590, 430	44, 002	20, 467	19, 026, 196	40, 909, 090	81, 924, 555
Delaware	615	5, 452, 887	5, 465	956	1, 905, 754	6, 028, 918	9, 892, 902
District of Columbia	429	2, 905, 865	2, 653	495	1, 139, 154	2, 884, 185	5, 412, 102
Florida	185	1, 874, 125	2, 297	157	619, 840	874, 506	2, 447, 969
Georgia	1, 890	10, 890, 875	9, 492	2, 083	2, 925, 148	9, 986, 532	16, 925, 564
Illinois	4, 268	27, 548, 563	22, 489	479	7, 637, 921	35, 558, 782	57, 580, 886
Indiana	5, 323	18, 451, 121	20, 563	732	6, 318, 335	27, 142, 597	42, 803, 469
Iowa	1, 939	7, 247, 130	6, 142	165	1, 922, 417	8, 612, 259	13, 971, 325
Kansas	344	1, 084, 935	1, 700	35	880, 346	1, 444, 975	4, 357, 408
Kentucky	3, 450	20, 256, 579	19, 587	1, 671	6, 020, 082	22, 295, 759	37, 931, 240
Louisiana	1, 744	7, 151, 172	7, 873	916	3, 683, 679	6, 738, 486	15, 587, 473
Maine	3, 810	22, 044, 020	24, 827	9, 792	8, 368, 691	21, 553, 066	38, 193, 254
Maryland	3, 083	23, 230, 608	21, 630	6, 773	7, 190, 672	25, 494, 007	41, 735, 157
Massachusetts	8, 176	132, 792, 327	146, 268	71, 153	56, 960, 913	135, 053, 721	255, 545, 922
Michigan	3, 448	23, 808, 226	22, 144	1, 046	6, 735, 047	17, 635, 611	32, 658, 356
Minnesota	562	2, 388, 310	2, 104	19	712, 214	1, 904, 070	3, 373, 172
Mississippi	976	4, 384, 492	4, 572	203	1, 618, 320	3, 146, 636	6, 590, 687
Missouri	3, 157	20, 034, 220	18, 628	1, 053	6, 669, 916	23, 849, 941	41, 782, 731
Nebraska	107	266, 575	334	2	105, 332	237, 215	607, 328
New Hampshire	2, 592	23, 274, 094	18, 379	13, 961	8, 110, 561	20, 539, 857	37, 586, 453
New Jersey	4, 173	40, 521, 048	43, 198	12, 829	16, 277, 337	41, 429, 100	76, 306, 104
New Mexico	82	2, 008, 350	1, 044	30	341, 306	367, 892	1, 249, 123
New York	22, 624	172, 895, 652	176, 885	53, 227	65, 446, 759	214, 813, 061	378, 870, 939
North Carolina	3, 689	9, 693, 703	12, 102	2, 115	2, 689, 441	10, 203, 228	16, 678, 698
Ohio	11, 123	57, 295, 303	65, 749	9, 853	22, 302, 989	69, 800, 270	121, 691, 148
Oregon	309	1, 337, 238	968	10	635, 256	1, 431, 952	2, 976, 761
Pennsylvania	22, 363	190, 055, 904	182, 593	39, 539	60, 369, 165	153, 477, 698	290, 121, 188
Rhode Island	1, 191	24, 278, 295	20, 795	11, 695	8, 760, 125	19, 858, 515	40, 711, 296
South Carolina	1, 230	6, 931, 756	6, 096	898	1, 380, 027	5, 198, 881	8, 615, 195
Tennessee	2, 572	14, 426, 261	11, 582	946	3, 370, 687	9, 416, 514	17, 987, 225
Texas	983	3, 272, 450	3, 338	111	1, 162, 756	3, 367, 372	6, 577, 202
Utah	148	443, 356	380	9	231, 701	439, 512	900, 153
Vermont	1, 883	9, 498, 617	8, 563	1, 934	3, 004, 986	7, 608, 858	14, 637, 807
Virginia	5, 385	26, 935, 560	32, 606	3, 568	8, 544, 117	30, 840, 531	50, 652, 124
Washington	52	1, 296, 200	866	4	453, 601	502, 021	1, 406, 921
Wisconsin	3, 064	15, 831, 581	14, 641	773	4, 268, 708	17, 137, 334	27, 849, 467

TABLE I.—MANUFACTURES, BY TOTALS OF STATES AND TERRITORIES—Continued.

1850.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.		Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.			
The United States	123, 025	$533, 245, 351	731, 137	225, 922	$236, 755, 464	$555, 123, 822	$1, 019, 106, 616
Alabama	1, 626	3, 450, 606	4, 397	539	1, 105, 824	2, 224, 960	4, 528, 876
Arkansas	261	305, 015	812	30	159, 876	215, 789	537, 908
California	1, 003	1, 006, 197	3, 964	....	3, 717, 180	1, 201, 154	12, 862, 522
Connecticut	3, 737	25, 876, 648	34, 248	16, 483	12, 435, 984	23, 608, 971	47, 114, 585
Delaware	531	2, 978, 945	3, 237	651	936, 924	2, 864, 607	4, 649, 296
District of Columbia	403	1, 001, 575	2, 034	536	757, 584	1, 405, 871	2, 690, 258
Florida	103	547, 060	876	115	199, 452	220, 611	668, 335
Georgia	1, 522	5, 456, 483	6, 650	1, 718	1, 709, 664	3, 404, 917	7, 082, 075
Illinois	3, 162	6, 217, 765	11, 066	493	3, 204, 336	8, 959, 327	16, 534, 272
Indiana	4, 392	7, 750, 402	13, 748	692	3, 728, 844	10, 369, 700	18. 725, 423
Iowa	522	1, 292, 875	1, 687	20	473, 016	2, 356, 881	3, 551, 783
Kentucky	3, 609	11, 810, 462	19, 576	1, 900	5, 106, 048	12, 165, 075	21, 710, 212
Louisiana	1, 008	5, 032, 424	5, 458	759	2, 033, 928	2, 459, 508	6, 779, 417
Maine	3, 974	14, 699, 152	21, 853	6, 167	7, 485, 588	13, 553, 144	24, 661, 057
Maryland	3, 725	14, 934, 450	22, 729	7, 483	7, 403, 832	17, 690, 836	33, 043, 892
Massachusetts	8, 852	88, 940, 292	107, 784	69, 677	41, 954, 736	85, 856, 771	157, 743, 994
Michigan	2, 033	6, 563, 660	8, 990	354	2, 717, 124	6, 136, 328	11, 169, 002
Minnesota	5	94, 000	63	....	18, 540	24, 300	58, 300
Mississippi	947	1, 815, 820	3, 046	108	771, 528	1, 275, 771	2, 912, 068
Missouri	2, 923	8, 576, 607	14, 880	928	4, 692, 648	12, 798, 351	24, 324, 418
New Hampshire	3, 211	18, 242, 114	14, 103	12, 989	6, 128, 876	12, 745, 466	23, 164, 503
New Jersey	4, 207	22, 293, 258	29, 068	8, 762	9, 364, 740	22, 011, 871	39, 851, 256
New Mexico	23	68, 300	81	....	20, 772	110, 220	249, 010
New York	23, 553	99, 904, 405	147, 737	51, 612	49, 131, 000	134, 655, 674	237, 597, 249
North Carolina	2, 663	7, 456, 860	12, 473	2, 128	2, 383, 456	4, 602, 501	9, 111, 050
Ohio	10, 622	29. 019, 538	47, 054	4, 437	13, 467, 156	34, 678, 019	62, 692, 279
Oregon	52	843, 600	285	....	388, 620	809, 560	2, 236, 640
Pennsylvania	21, 605	94, 473, 810	124, 688	22, 078	37, 163, 232	87, 206, 377	155, 044, 910
Rhode Island	864	12, 935, 676	12, 923	8, 044	5, 047, 080	13, 186, 703	22, 117, 688
South Carolina	1, 430	6, 053, 265	5, 992	1, 074	1, 127, 712	2, 787, 534	7, 045, 477
Tennessee	2, 887	6, 527, 729	11, 080	959	2, 247, 492	5, 166, 886	9, 725, 608
Texas	309	539, 290	1, 042	24	322, 368	394, 642	1, 168, 538
Utah	14	44, 400	51	....	9, 984	337, 381	291, 220
Vermont	1, 849	5, 001, 377	6, 894	1, 551	2, 202, 848	4, 172, 552	8, 570, 920
Virginia	4, 740	18, 109, 143	25, 790	3, 320	5, 434, 476	18, 101, 131	29, 602, 507
Wisconsin	1, 262	3, 382, 148	5, 798	291	1, 712, 496	5, 414, 931	9, 293, 068

NOTE.—The above table is an exact reproduction of Table 4 of the Abstract of Manufactures at the Seventh Census. [Senate Ex. Doc. No. 39, 2d session 35th Congress.] The table is arithmetically imperfect, and it is not known whether the errors are in the items or total of the table, or in both. The true total line of the items as printed is: Establishments, 123,029; capital, $533,245,351; hands employed, male, 732,157; female, 225,922; wages, $236,759,464; materials, $555,174,320; products, $1,019,109,616.

TABLE II.—THE UNITED STATES, BY SPECIFIED INDUSTRIES: 1880.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	253, 852	$2, 790, 272, 606	2, 019, 035	531, 639	181, 921	$947, 953, 795	$3, 396, 823, 549	$5, 369, 579, 191
Agricultural implements (see also Table VII, and Report by Special Agent C. H. Fitch, *post*).	1, 943	62, 109, 668	38, 313	73	1, 194	15, 359, 610	31, 531, 170	68, 640, 486
Ammunition (see also Report by Special Agent C. H. Fitch, *post*).	4	824, 000	498	553	15	361, 778	1, 223, 452	1, 904, 966
Artificial feathers and flowers (see also Millinery and lace goods).	174	1, 253, 050	550	3, 577	215	1, 081, 040	2, 444, 418	4, 879, 324
Artificial limbs (see also Surgical appliances)	33	82, 600	71	....	1	43, 833	31, 370	137, 024
Awnings and tents	151	522, 700	526	699	43	334, 463	1, 230, 558	1, 968, 942
Axle-grease	16	372, 600	67	2	3	41, 407	209, 152	365, 048
Babbitt metal and solder	9	73, 100	44	....	....	18, 745	214, 193	262, 950
Bagging, flax, hemp, and jute	27	2, 491, 500	1, 330	1, 226	653	827, 759	2, 058, 017	3, 511, 653
Bags, other than paper	37	2, 425, 900	1, 175	903	164	776, 026	8, 027, 770	9, 726, 600
Bags, paper	80	1, 304, 700	546	883	140	439, 620	3, 037, 319	4, 112, 566
Baking and yeast powders (see also Drugs and chemicals)	110	1, 350, 600	660	326	56	466, 252	3, 333, 868	4, 760, 598
Baskets, rattan and willow ware	304	1, 852, 917	1, 976	552	591	657, 405	867, 031	1, 992, 851
Bellows	3	8, 750	15	....	....	6, 875	13, 500	26, 900
Bells	20	793, 120	570	14	189	280, 169	525, 175	1, 065, 824
Belting and hose, leather	96	2, 748, 799	1, 138	39	50	606, 087	5, 019, 853	6, 525, 737
Belting and hose, linen	1	10, 000	10	....	....	4, 500	12, 000	23, 000
Belting and hose, rubber	2	265, 000	342	2	20	131, 721	863, 000	1, 085, 000
Billiard tables and materials	46	1, 078, 169	849	....	8	400, 779	1, 080, 466	2, 289, 758
Blacking	48	494, 625	251	174	11	168, 183	710, 629	1, 491, 474
Blacksmithing (see also Wheelwrighting)	28, 101	19, 618, 852	33, 992	18	516	11, 126, 001	14, 572, 363	43, 774, 271
Bluing	23	178, 650	88	53	5	50, 245	197, 463	344, 824
Bone-, ivory-, and lamp-black	18	627, 350	198	2	24	80, 249	440, 068	661, 376
Bookbinding and blank-book making	588	5, 798, 671	5, 127	4, 831	654	3, 927, 349	5, 195, 771	11, 976, 764
Boot and shoe cut stock	172	1, 210, 300	1, 235	1, 422	228	735, 482	5, 939, 249	7, 531, 635
Boot and shoe findings	135	770, 800	758	652	88	451, 075	1, 188, 817	2, 144, 945
Boot and shoe uppers	81	209, 264	245	174	18	170, 425	448, 104	790, 842
Boots and shoes, including custom work and repairing (see also Table VII).	17, 972	54, 358, 301	104, 021	25, 946	3, 852	50, 995, 144	114, 966, 575	196, 920, 481
Boots and shoes, rubber	9	2, 425, 000	2, 514	1, 984	164	1, 469, 038	6, 023, 053	9, 705, 724
Boxes, cigar	221	1, 023, 777	1, 274	718	373	748, 657	1, 389, 700	2, 903, 465
Boxes, fancy and paper	369	2, 496, 496	2, 194	6, 836	648	2, 373. 948	3, 578, 827	7, 665, 553
Boxes, wooden, packing	602	5, 304, 212	6, 611	405	706	2, 769, 135	7, 674, 921	12, 687, 068
Brass and copper, rolled	26	9, 057, 600	4, 105	673	304	2, 524, 169	9, 523, 157	14, 329, 731
Brass castings (see also Bronze castings)	396	5, 740, 237	5, 573	263	401	2, 729, 794	5, 894, 452	10, 808, 742
Brass ware	20	594, 582	662	336	144	411, 329	948, 118	1, 523, 098
Bread and other bakery products	6, 396	19, 155, 286	18, 925	2, 210	1, 353	9, 411, 328	42, 612, 027	65, 824, 896
Brick and tile (see also Drain and sewer pipe; Terra-cotta ware; also Table VII).	5, 631	27, 673, 616	59, 032	268	7, 055	13, 443, 532	9, 774, 834	32, 833, 587
Bridges	75	4, 058, 649	4, 153	....	140	1, 882, 179	5, 669, 793	8, 978, 122
Bronze castings (see also Brass castings)	7	186, 500	140	6	7	64, 072	498, 170	670, 912
Brooms and brushes	980	4, 186, 897	5, 798	1, 715	1, 260	2, 424, 040	[illegible], 694, 855	10, 560, 855
Buttons	124	2, 013, 350	2, 128	3, 052	645	1, 645, 130	1, 792, 891	4, 449, 542
Calcium lights	4	19, 500	20	....	....	10, 912	25, 031	51, 443
Cardobard	8	443, 000	166	126	53	116, 410	637, 971	959, 145
Card cutting and designing	9	13, 793	42	12	10	18, 215	15, 610	51, 670
Carpentering	9, 184	19, 541, 358	53, 547	74	517	24, 582, 077	51, 621, 120	94, 152, 139
Carpets, rag	396	252, 604	573	88	63	190, 792	424, 943	861, 710
Carpets, other than rag (see also Woolen goods; also Report by Special Agent G. W. Bond, *post*).	195	21, 468, 587	10, 104	8, 570	1, 697	6, 835, 218	18, 984, 877	31, 792, 802
Carpets, wood	5	41, 600	108	....	11	23, 750	23, 500	102, 170
Carriage and wagon materials	412	7, 034, 718	7, 237	35	230	2, 733, 004	4, 781, 095	10, 114, 352
Carriages and sleds, children's	67	770, 000	1, 152	70	88	462, 852	868, 054	1, 677, 776
Carriages and wagons (see also Wheelwrighting)	3, 841	37, 973, 493	43, 630	273	1, 491	18, 988, 615	30, 597, 086	64, 951, 617
Cars, railroad, street, and repairs, not including establishments operated by steam railroad companies.	130	9, 272, 680	13, 885	13	334	5, 507, 753	19, 780, 271	27, 997, 591
Celluloid and celluloid goods	6	1, 214, 000	452	175	109	242, 798	389, 262	1, 261, 540
Charcoal	175	457, 484	1, 393	2	6	390, 697	320, 735	975, 540
Cheese and butter, factory (see also Table VII)	3, 932	9, 604, 803	6, 419	1, 330	154	1, 546, 495	18, 363, 579	25. 742, 510
Chocolate	7	530, 500	110	113	....	82, 258	812, 403	1, 302, 153

TABLE II.—THE UNITED STATES, BY SPECIFIED INDUSTRIES: 1880—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Cigar-molds	3	$69, 800	64	....	12	$32, 020	$55, 210	$111, 820
Cleansing and polishing preparations	21	412, 325	181	15	13	91, 455	237, 070	500, 280
Clock cases and materials (see also Watch and clock materials).	2	6, 000	44	2	....	15, 000	19, 000	50, 500
Clocks (see also Report by Special Agent C. H. Fitch, *post*)	22	2, 474, 900	2, 807	630	503	1, 622, 693	1, 908, 411	4, 110, 267
Cloth finishing	20	137, 350	135	18	23	62, 790	71, 960	222, 560
Clothing, horse	3	410, 000	73	492	....	137, 400	453, 700	695, 000
Clothing, men's	6, 166	79, 861, 696	77, 255	80, 994	2, 564	45, 940, 353	131, 363, 282	209, 548, 460
Clothing, women's	562	8, 207, 273	2, 594	22, 253	345	6, 661, 005	19, 559, 227	32, 004, 794
Coal-tar	3	385, 000	174	....	5	65, 500	285, 200	466, 800
Coffee and spices, roasted and ground	300	6, 366, 392	2, 125	438	153	1, 370, 699	18, 201, 302	22, 924, 894
Coffins, burial cases, and undertakers' goods	769	5, 735, 392	3, 762	481	172	1, 895, 805	3, 776, 222	8, 157, 760
Coke (see also Report by Special Agent J. D. Weeks, *post*)	149	5, 545, 058	3, 068	3	71	1, 198, 654	2, 995, 441	5, 359, 489
Collars and cuffs, paper	13	901, 233	151	284	....	151, 576	1, 166, 000	1, 582, 571
Combs	38	533, 390	743	250	33	374, 785	341, 719	951, 395
Confectionery	1, 450	8, 486, 874	6, 157	2, 827	817	3, 242, 852	17, 125, 775	25, 637, 033
Cooperage	3, 898	12, 178, 726	24, 435	42	1, 496	8, 992, 603	18, 441, 064	33, 714, 770
Coppersmithing (see also Tinware, copperware, and sheet-iron ware).	98	915, 102	852	2	14	520, 302	1, 227, 947	2, 087, 773
Cordage and twine	165	7, 140, 475	2, 926	1, 480	1, 029	1, 558, 676	9, 330, 261	12, 492, 171
Cordials and sirups	16	128, 400	81	....	....	42, 928	210, 506	331, 233
Cork cutting	46	872, 384	382	270	140	232, 846	976, 274	1, 566, 555
Corsets	113	1, 611, 695	776	7, 487	539	1, 745, 969	3, 686, 821	6, 494, 705
Cotton compressing	29	3, 243, 800	1, 008	....	....	573, 005	326, 808	1, 271, 700
Cotton goods (see also Hosiery and knit goods; Mixed textiles; also Introductory note and Report by Special Agent E. Atkinson, *post*).	1, 005	219, 504, 794	64, 107	91, 148	30, 217	45, 614, 419	113, 765, 537	210, 950, 383
Cotton-ties	6	70, 500	100	....	31	38, 069	170, 198	262, 351
Crucibles	11	1, 450, 250	691	....	3	284, 169	955, 841	1, 445, 641
Cutlery and edge tools (see also Hardware; Tools)	429	9, 859, 885	9, 458	380	681	4, 447, 349	4, 682, 222	11, 661, 370
Dentistry, mechanical	753	773, 670	469	35	37	269, 044	455, 037	1, 860, 647
Dentists' materials	20	840, 800	405	70	15	237, 729	247, 824	860, 758
Drain and sewer pipe (see also Brick and tile; Terra-cotta ware).	51	489, 163	270	....	5	114, 542	176, 143	480, 261
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds; also Report by Special Agent W. L. Rowland, *post*).	592	28, 598, 458	8, 144	1, 138	263	4, 157, 163	24, 380, 566	38, 173, 658
Dyeing and cleaning	303	851, 110	893	499	75	511, 886	581, 886	1, 613, 943
Dyeing and finishing textiles (see Introductory note and Table VII).	191	26, 223, 981	12, 788	2, 038	1, 872	6, 474, 364	13, 664, 295	32, 297, 420
Dyestuffs and extracts	41	2, 363, 700	976	10	6	512, 097	3, 918, 741	5, 253, 038
Electric lights	3	425, 000	214	....	15	117, 500	150, 650	458, 400
Electrical apparatus and supplies (see also Telegraph and telephone apparatus).	36	873, 300	335	35	8	224, 758	360, 579	1, 074, 388
Electroplating	221	865, 898	1, 257	89	95	620, 848	663, 588	1, 975, 700
Emery wheels	11	397, 900	111	....	1	58, 253	109, 952	322, 022
Enameled goods	3	150, 000	211	....	....	41, 926	236, 817	321, 511
Enameling	19	145, 200	113	54	9	56, 836	69, 562	182, 758
Engravers' materials	11	54, 500	66	3	1	39, 840	26, 464	85, 764
Engraving and die-sinking	246	416, 840	698	62	92	419, 646	262, 828	1, 180, 165
Engraving, steel	55	2, 387, 050	1, 118	661	137	1, 951, 745	648, 994	2, 998, 616
Engraving, wood	167	183, 733	468	20	21	333, 590	68, 605	734, 728
Envelopes	12	923, 800	233	948	23	344, 143	2, 346, 500	3, 000, 617
Explosives and fireworks	39	579, 750	313	217	205	216, 069	840, 877	1, 391, 132
Fancy articles	151	1, 359, 450	1, 676	654	463	1, 036, 672	1, 065, 335	2, 817, 230
Felt goods (see also Woolen goods; also Report by Special Agent G. W. Bond, *post*).	26	1, 958, 254	1, 203	233	88	439, 760	2, 530, 710	3, 619, 652
Fertilizers	364	17, 913, 660	8, 377	75	146	2, 648, 422	15, 595, 078	23, 650, 795
Files (see also Saws)	179	1, 666, 550	2, 191	49	268	957, 412	787, 569	2, 486, 533
Fire-arms (see also Report by Special Agent C. H. Fitch, *post*).	39	8, 115, 489	4, 578	87	197	2, 700, 281	1, 859, 026	5, 736, 936
Fire extinguishers, chemical	3	400, 000	117	....	2	84, 750	81, 840	204, 693
Flags and banners	11	54, 300	15	50	3	27, 375	48, 200	119, 600
Flavoring extracts (see also page 39)	58	404, 615	238	104	32	129, 343	796, 049	1, 195, 637
Flax, dressed	79	620, 455	786	57	176	268, 420	818, 243	1, 310, 231
Flouring- and grist-mill products (see also Table VII)	24, 338	177, 361, 878	58, 239	42	126	17, 422, 316	441, 545, 225	505, 185, 712

Table II.—THE UNITED STATES, BY SPECIFIED INDUSTRIES: 1880—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Food preparations (see also page 39)	109	$1, 293, 905	863	312	158	$318, 253	$1, 604, 660	$2, 493, 224
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus.	4, 958	154, 519, 484	140, 459	675	4, 217	65, 982, 133	103, 345, 083	214, 378, 468
Foundery supplies	15	126, 500	72	....	2	27, 303	132, 220	215, 650
Fruit-jar trimmings	1	150, 000	230	93	25	104, 501	318, 708	485, 503
Fruits and vegetables, canned and preserved	411	8, 247, 488	10, 638	15, 463	5, 804	2, 679, 960	12, 051, 293	17, 599, 576
Fuel, artificial	1	100, 000	70	....	....	10, 000	55, 000	102, 000
Furnishing goods, men's	161	3, 724, 664	1, 274	9, 565	335	2, 644, 155	6, 503, 164	11, 506, 857
Furniture (see also Mattresses and spring beds; Upholstering).	4, 843	38, 669, 764	45, 186	917	2, 626	20, 383, 794	31, 416, 768	68, 037, 902
Furniture, chairs	384	6, 276, 364	7, 832	1, 301	1, 442	3, 311, 286	4, 443, 438	9, 807, 823
Furs, dressed	192	3, 598, 887	1, 453	2, 604	77	1, 389, 284	5, 338, 242	8, 238, 712
Galvanizing	21	671, 450	501	....	17	244, 799	1, 103, 186	1, 884, 695
Gas and lamp fixtures	35	3, 248, 400	2, 660	243	166	1, 469, 287	1, 675, 875	4, 329, 656
Gas machines and meters	34	1, 147, 000	807	12	34	397, 108	636, 676	1, 334, 091
Glass (see also Report by Special Agent J. D. Weeks, *post*)	211	19, 844, 699	17, 778	741	5, 658	9, 144, 100	8, 028, 621	21, 154, 571
Glass, cut, stained, and ornamented	170	945, 180	1, 281	139	166	706, 768	1, 156, 866	2, 535, 009
Gloves and mittens (see also Hosiery and knit goods; Woolen goods).	300	3, 379, 648	2, 102	5, 249	346	1, 655, 695	4, 351, 469	7, 379, 605
Glucose	7	2, 255, 000	1, 167	5	20	605, 802	3, 044, 450	4, 551, 212
Glue	82	3, 916, 750	1, 486	186	129	600, 018	2, 786, 342	4, 324, 072
Gold and silver leaf and foil	60	498, 500	542	383	30	410, 647	1, 011, 792	1, 614, 040
Gold and silver, reduced and refined (not from the ore)	28	817, 100	299	....	5	178, 696	9, 128, 811	9, 548, 188
Graphite	4	113, 000	69	17	3	35, 225	144, 100	210, 000
Grease and tallow	156	2, 566, 779	1, 075	3	13	556, 015	11, 779, 482	13, 730, 013
Grindstones	14	125, 261	231	....	....	57, 040	85, 366	184, 555
Gunpowder (see also High explosives)	33	4, 983, 560	988	20	3	510, 550	2, 053, 488	3, 348, 941
Hairwork	299	613, 040	205	937	30	323, 315	667, 132	1, 467, 723
Hammocks	5	22, 300	28	49	5	17, 576	61, 830	110, 352
Hand-knit goods	39	152, 700	50	1, 378	386	137, 720	239, 040	446, 354
Hand-stamps	46	103, 150	151	8	4	82, 895	103, 648	318, 618
Handles, wooden	206	1, 032, 090	1, 504	11	60	436, 664	697, 320	1, 656, 698
Hardware (see also Cutlery and edge tools; Tools; also Report by C. H. Fitch, *post*).	492	15, 363, 551	14, 481	814	1, 506	6, 846, 913	10, 097, 577	22, 653, 693
Hardware, saddlery	64	1, 655, 550	2, 167	321	327	960, 432	1, 851, 436	3, 651, 021
Hat and cap materials	64	746, 828	819	355	41	463, 854	1, 325, 231	2, 217, 250
Hats and caps, not including wool hats	489	5, 455, 468	11, 373	5, 337	530	6, 635, 522	9, 341, 352	21, 303, 107
High explosives (see also Gunpowder)	21	1, 601, 625	328	1	....	164, 864	1, 218, 061	2, 453, 088
Hones and whetstones	25	132, 525	136	83	6	52, 961	92, 461	224, 130
Hooks and eyes	5	420, 188	139	63	26	88, 321	214, 986	370, 078
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods; also Report by Special Agent G. W. Bond, *post*).	359	15, 579, 591	7, 517	17, 707	3, 661	6, 701, 475	15, 210, 951	29, 167, 227
Housefurnishing goods	48	456, 806	405	137	50	216, 890	812, 361	1, 332, 188
Ice, artificial	35	1, 251, 200	389	50	8	140, 885	158, 112	544, 763
Ink	63	1, 251, 050	339	79	62	260, 284	864, 765	1, 629, 413
Instruments, professional and scientific	171	1, 342, 196	1, 011	37	51	588, 751	444, 425	1, 639, 094
Iron and steel (see Introductory note, and Report by Special Agent J. M. Swank, *post*).	1, 005	230, 971, 884	133, 203	45	7, 730	55, 476, 785	191, 271, 150	296, 557, 685
Iron bolts, nuts, washers, and rivets	100	4, 933, 019	4, 264	182	618	1, 981, 300	6, 097, 011	10, 073, 330
Iron doors and shutters	6	79, 375	211	....	12	103, 269	296, 600	495, 060
Iron forgings	91	3, 598, 241	2, 977	95	138	1, 329, 151	3, 960, 780	6, 492, 028
Iron nails and spikes, cut and wrought	62	3, 877, 805	2, 011	519	380	1, 255, 171	3, 312, 602	5, 629, 240
Iron pipe, wrought	35	6, 129, 565	4, 909	13	288	1, 788, 258	9, 480, 049	13, 292, 162
Iron railing, wrought	131	662, 197	728	....	38	369, 903	615, 648	1, 300, 549
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	89	738, 000	1, 152	....	16	474, 711	1, 083, 817	2, 109, 537
Ivory and bone work	55	775, 564	843	137	125	414, 701	734, 654	1, 454, 901
Japanning	30	78, 710	135	24	24	65, 562	63, 743	190, 080
Jewelry	739	11, 431, 164	10, 050	1, 998	649	6, 441, 688	10, 324, 990	22, 201, 621
Jewelry and instrument cases	17	62, 000	102	31	5	51, 000	48, 550	131, 670
Jute and jute goods	4	415, 000	205	302	18	141, 979	447, 094	696, 982
Kaolin and ground earths	63	1, 291, 527	866	3	29	310, 909	697, 006	1, 455, 757

TABLE II.—THE UNITED STATES, BY SPECIFIED INDUSTRIES: 1880—Continued.

Mechanical and manufacturing industries.	No of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Kindling wood	213	$1,018,490	1,187	14	242	$526,861	$1,403,010	$2,480,953
Labels and tags	19	451,500	191	81	56	149,268	492,655	865,825
Lamps and reflectors	74	1,873,625	1,478	81	171	742,423	1,852,906	3,357,829
Lapidary work	55	176,875	207	17	28	142,075	226,277	544,089
Lard, refined	26	2,513,066	1,030	46	105	546,258	21,948,826	23,195,702
Lasts	62	477,692	497	18	22	308,975	221,905	765,296
Lead, bar, pipe, sheet, and shot	32	2,466,375	551	5	15	316,363	4,363,200	5,600,671
Leather board (see also Paper)	24	856,200	342	27	10	121,015	400,975	689,300
Leather curried (see Introductory note and Table VII)	2,319	16,878,520	10,808	77	168	4,845,413	59,306,509	71,351,297
Leather, dressed skins	202	6,266,237	4,966	208	221	2,441,372	11,063,265	15,399,311
Leather goods	57	561,900	864	131	41	459,318	1,097,373	2,020,343
Leather, morocco (see Leather, dressed skins)								
Leather, patent and enameled	2	17,100	20	2		12,800	65,136	166,000
Leather, tanned (see Introductory note and Table VII)	3,105	50,222,054	23,287	188	337	9,204,243	85,949,207	113,348,336
Lightning rods	20	431,750	168			73,718	526,691	801,192
Lime and cement	615	6,332,338	5,493	7	169	1,579,313	2,649,189	5,772,318
Linen goods	5	406,800	211	200	73	124,046	381,875	602,451
Liquors, distilled	844	24,247,595	6,452	10	40	2,663,967	27,744,245	41,063,663
Liquors, malt	2,191	91,208,224	26,001	29	190	12,198,053	56,836,500	101,058,385
Liquors, vinous (see also Liquors, distilled)	117	2,581,910	781	57	129	216,559	1,340,629	2,169,193
Lithographing (see also Printing and publishing)	167	4,501,825	3,641	308	373	2,307,302	2,755,264	6,912,338
Lock- and gun-smithing	607	705,815	818	6	63	368,967	398,642	1,317,810
Looking-glass and picture frames	645	4,437,666	5,224	316	643	2,471,105	4,831,248	9,596,219
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	1,203	17,612,923	14,614	23	652	5,890,724	24,477,543	36,803,356
Lumber, sawed (see also Table VII)	25,708	181,186,122	141,564	425	5,967	31,845,974	146,155,385	233,268,729
Malt	216	14,390,441	2,320	8	4	1,004,548	14,321,423	18,273,102
Mantels, slate, marble, and marbleized	46	750,300	690		35	313,009	476,431	1,030,660
Marble and stone work	2,846	16,498,221	21,112	23	336	10,238,885	12,743,345	31,415,150
Masonry, brick and stone	1,591	3,990,706	15,877	1	142	6,880,866	10,123,478	20,586,553
Matches	37	2,114,850	868	1,120	231	535,911	3,298,562	4,668,446
Mats and matting	12	212,000	199	12	74	125,129	233,707	439,370
Mattresses and spring beds (see also Furniture)	357	1,749,750	1,770	466	158	868,325	3,116,471	5,288,234
Millinery and lace goods (see also Artificial feathers and flowers).	247	2,678,880	971	5,248	336	1,661,044	6,142,091	9,577,840
Millstones	16	178,900	170	1	3	96,534	172,725	355,519
Mineral and soda waters	512	2,569,561	2,480	27	219	1,065,633	2,147,764	4,741,709
Mirrors	7	155,800	74		3	42,900	212,500	304,000
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods; also Table VII).	470	37,996,057	17,471	20,520	5,382	13,316,753	37,227,741	66,221,703
Models and patterns	230	377,551	699	21	19	389,837	168,696	908,830
Mucilage and paste	4	3,100	8		1	3,090	8,770	16,700
Musical instruments and materials (not specified)	84	654,850	528	29	16	293,062	385,776	853,746
Musical instruments, organs and materials	171	3,922,338	3,948	89	165	2,142,539	2,692,332	6,136,472
Musical instruments, pianos and materials	174	9,869,577	6,449	57	69	4,663,193	5,283,119	12,264,521
Needles and pins	40	1,144,550	604	380	93	392,214	591,013	1,378,023
Nets and seines	13	140,650	79	114	17	54,112	180,215	291,765
Oil, castor	8	474,000	107		1	44,714	384,890	653,900
Oil, cottonseed and cake	45	3,862,300	3,114	33	172	880,836	5,091,251	7,690,921
Oil, essential	124	67,755	273	1	4	24,030	125,167	248,858
Oil, illuminating, not including petroleum refining	7	128,500	50			20,950	414,600	510,000
Oil, lard	28	1,127,500	424		8	161,672	4,184,450	4,721,066
Oil, linseed	81	5,872,750	1,378	17	21	681,677	12,874,294	15,393,812
Oil, lubricating	51	1,370,225	399	8	6	208,145	2,129,589	2,925,501
Oil, neat's-foot	15	433,050	50			16,554	210,524	259,086
Oil, resin	3	82,523	23			14,590	189,622	238,471
Oilcloth, enameled	4	315,000	215	2	41	116,627	864,200	1,062,000
Oilcloth, floor	25	3,429,550	1,690	5	40	733,235	3,118,708	4,752,587
Oleomargarine	15	1,680,300	561	18	20	212,952	5,486,141	6,892,939
Painting and paperhanging	3,968	5,645,950	17,271	131	309	7,920,866	8,762,780	22,457,560
Paints (see also Varnish)	244	13,555,292	4,192	188	103	2,132,255	17,062,552	23,390,767
Paper, (see also Collars and cuffs, paper; Envelopes; Leather board; Wood pulp; also Table VII).	692	46,241,202	16,133	7,640	649	8,525,355	33,951,297	55,109,914
Paperhangings	25	3,560,500	1,666	150	671	874,921	3,629,222	6,267,303

TABLE II.—THE UNITED STATES, BY SPECIFIED INDUSTRIES: 1880—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Paper patterns	4	$105, 100	13	84	....	$40, 538	$44, 000	$512, 550
Patent medicines and compounds (see also Drugs and chemicals).	563	10, 620, 880	2, 504	1, 186	335	1, 651, 596	6, 704, 729	14, 682, 494
Paving materials	46	745, 750	755	....	2	244, 339	576, 301	1, 024, 243
Pencils, lead	4	341, 597	116	144	139	102, 233	97, 344	279, 427
Pens, gold	16	370, 150	226	19	19	172, 207	190, 906	533, 061
Pens, steel	3	182, 500	34	230	16	88, 500	38, 950	164, 000
Perfumery and cosmetics	67	813, 827	352	357	32	238, 259	1, 201, 409	2, 203, 004
Photographic apparatus	10	90, 800	89	9	6	41, 314	40, 658	104, 305
Photographing	1, 287	3, 131, 895	2, 860	986	131	1, 751, 118	1, 671, 455	5, 935, 311
Photographing materials	5	63, 000	31	30	2	25, 310	89, 900	142, 000
Pickles, preserves, and sauces	109	841, 023	592	230	108	259, 454	1, 472, 639	2, 407, 342
Pipes, tobacco	37	233, 800	500	65	80	226, 306	209, 518	628, 638
Plated and britannia ware (see also Silverware)	55	5, 862, 025	3, 742	831	102	2, 453, 361	4, 100, 116	8, 596, 181
Plumbing and gasfitting	2, 161	5, 950, 512	9, 217	15	452	4, 770, 389	9, 095, 308	18, 133, 250
Pocket-books	53	598, 350	890	416	107	484, 947	930, 033	1, 769, 036
Postal cards	1	20, 000	10	18	....	10, 000	200, 000	190, 000
Printing and publishing (see also Lithographing; also Introductory note).	3, 467	62, 983, 704	45, 880	6, 759	5, 839	30, 531, 657	32, 400, 395	90, 780, 341
Printing materials	27	199, 900	164	7	20	98, 878	190, 353	421, 216
Pumps, not including steam pumps	411	2, 383, 482	1, 692	3	36	652, 749	2, 038, 634	3, 644, 631
Racking-hose	1	500	2	....	....	1, 200	1, 350	5, 512
Refrigerators	71	727, 220	975	14	64	423, 680	881, 842	1, 739, 731
Regalia and society banners and emblems	47	452, 590	175	376	38	174, 097	429, 227	815, 638
Registers, car-fare	1	300, 000	7	....	....	4, 876	870	6, 600
Rice cleaning and polishing	22	562, 200	376	94	46	110, 467	2, 666, 497	3, 133, 324
Roofing and roofing materials	493	2, 329, 277	3, 019	22	41	1, 411, 133	3, 382, 354	6, 227, 284
Rubber and elastic goods	90	6, 057, 987	3, 693	2, 281	294	2, 295, 972	9, 249, 967	13, 751, 724
Rubber, vulcanized	3	226, 200	335	150	10	154, 700	391, 200	767, 200
Rules, ivory and wood	6	54, 200	52	1	3	19, 974	16, 075	66, 200
Saddlery and harness	7, 999	16, 508, 019	20, 024	561	861	7, 997, 752	19, 968, 716	38, 081, 643
Safes, doors, and vaults, fire-proof	40	2, 201, 600	2, 173	....	33	1, 096, 504	1, 431, 083	3, 352, 396
Salt (see also Table VII)	268	8, 225, 740	4, 125	20	144	1, 260, 023	2, 074, 049	4, 829, 566
Salt, ground (see also Table VII)	8	322, 900	149	47	8	44, 997	280, 693	361, 656
Sand and emery paper and cloth	6	121, 500	52	21	9	30, 970	148, 477	262, 374
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	1, 288	20, 457, 670	20, 544	79	1, 275	8, 540, 930	20, 790, 919	36, 621, 325
Saws	89	3, 281, 135	2, 288	23	255	1, 226, 370	1, 744, 083	3, 943, 105
Scales and balances	64	3, 814, 981	1, 527	1	26	783, 019	654, 711	3, 252, 460
Screws	20	4, 265, 000	943	378	264	456, 542	935, 800	2, 184, 532
Sewing-machine cases	18	741, 300	1, 536	....	286	683, 338	1, 239. 400	2, 064, 837
Sewing machines and attachments (see also Report by Special Agent C. H. Fitch, *post*).	106	12, 501, 830	8, 632	248	673	4, 636, 099	4, 829, 106	13, 863, 188
Shingles, split	45	17, 770	162	11	20	11, 394	20, 470	47, 952
Shipbuilding (see Introductory note)	2, 188	20, 979, 874	21, 338	....	7	12, 713, 813	19, 736, 358	36, 800, 327
Shirts	549	6, 841, 778	2, 878	22, 186	623	5, 403, 696	11, 306, 444	20, 130, 031
Shoddy (see also Mixed textiles)	73	1, 165, 100	695	496	91	400, 326	3, 366, 650	4, 989, 615
Show-cases	93	341, 970	640	4	48	329, 230	519, 585	1, 172, 172
Silk and silk goods (see also Mixed textiles; also Report by Special Agent W. C. Wyckoff, *post*).	382	19, 125, 300	9, 375	16, 396	5, 566	9, 146, 705	22, 467, 701	41, 033, 045
Silversmithing	38	257, 198	123	8	....	76, 640	102, 058	263, 931
Silverware (see also Plated and britannia ware)	39	1, 640, 900	882	34	113	675, 943	1, 028, 502	2, 253, 630
Slaughtering and meat-packing, not including retail butchering establishments (see also Table VII).	872	49, 419, 213	26, 113	....	1, 184	10, 508, 530	267, 738, 902	303, 562, 413
Smelting and refining (base scrap metal, not from the ore).	4	162, 100	309	....	2	158, 300	8, 171, 900	8, 411, 100
Soap and candles	629	14, 541, 294	4, 368	388	533	2, 219, 513	19, 907, 444	26, 552, 627
Soda-water apparatus	8	413, 000	308	17	7	169, 235	565, 538	1, 075, 569
Spectacles and eyeglasses	62	643, 825	872	113	103	450, 897	417, 472	1, 182, 142
Sporting goods	86	1, 444. 750	565	734	102	411, 854	692, 616	1, 556, 258
Springs, steel, car, and carriage	59	1, 769, 293	1, 487	1	42	699, 412	2, 346, 818	3, 654, 862
Stamped ware (see also Tinware, copperware, and sheet-iron ware).	26	2, 175, 940	1, 831	331	220	868, 043	2, 104, 141	3, 512, 423

TABLE II.—THE UNITED STATES, BY SPECIFIED INDUSTRIES: 1880—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Starch	139	$5, 328, 256	2, 710	301	108	$919, 197	$4, 911, 060	$7, 477, 742
Stationery goods	159	3, 286, 325	1, 871	1, 028	218	1, 159, 893	3, 501, 426	5, 898, 322
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	95	3, 075, 751	2, 425	....	49	1, 305, 739	2, 857, 000	5, 127, 842
Stencils and brands	104	224, 525	261	11	33	139, 639	144, 554	472, 514
Stereotyping and electrotyping (see also Type founding)	45	536, 000	562	44	36	312, 208	200, 491	724, 689
Stone- and earthen-ware	686	6, 380, 610	7, 205	948	1, 341	3, 279, 535	2, 564, 359	7, 942, 729
Straw goods	77	3, 333, 560	3, 278	7, 501	169	2, 556, 197	5, 455, 559	9, 345, 759
Sugar and molasses, beet	4	365, 000	350	....	....	62, 271	186, 128	282, 572
Sugar and molasses, refined	49	27, 432, 500	5, 832	....	25	2, 875, 032	144, 698, 499	155, 484, 915
Surgical appliances (see also Artificial limbs)	71	843, 142	308	154	15	265, 372	286, 720	906, 303
Tar and turpentine, not including farm products	508	1, 866, 390	9, 955	338	242	1, 623, 061	2, 324, 637	5, 876, 983
Taxidermy	16	25, 750	27	102	21	22, 000	21, 850	82, 500
Telegraph and telephone apparatus (see also Electrical apparatus and supplies).	40	636, 458	797	37	59	458, 406	755, 891	1, 580, 648
Terra-cotta ware (see also Brick and tile; Drain and sewer pipe).	15	496, 550	407	....	45	206, 650	168, 561	554, 343
Thread, linen	1	500, 000	200	730	....	260, 000	750, 000	1, 200, 000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing; Stamped ware).	7, 595	22, 252, 290	23, 903	853	1, 492	10, 722, 974	25, 232, 281	48, 096, 038
Tinfoil	4	686, 000	101	70	15	100, 673	198, 942	416, 849
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	477	17, 207, 401	14, 886	10, 776	7, 094	6, 419, 024	34, 397, 072	52, 793, 056
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	7, 145	21, 698, 549	40, 099	9, 108	4, 090	18, 464, 562	29, 577, 833	63, 979, 575
Tobacco stemming	52	1, 089, 342	567	596	371	170, 871	1, 409, 502	1, 897, 535
Tools (see also Cutlery and edge tools; Hardware)	145	4, 384, 109	3, 042	29	80	1, 489, 531	1, 532, 556	4, 236, 568
Toys and games	106	915, 575	1, 153	618	425	512, 786	595, 833	1, 562, 513
Trunks and valises	265	2, 792, 256	3, 805	254	475	1, 786, 586	3, 910, 133	7, 252, 470
Type founding (see also Stereotyping and electrotyping)	48	2, 772, 690	1, 327	406	253	958, 693	660, 748	2, 330, 298
Umbrellas and canes	172	2, 658, 725	1, 504	1, 859	245	1, 158, 682	4, 502, 777	6, 917, 463
Upholstering (see also Furniture)	781	2, 885, 401	2, 456	690	212	1, 353, 334	4, 150, 884	7, 158, 893
Upholstering materials	79	1, 690, 200	961	306	210	523, 417	1, 023, 154	1, 837, 705
Varnish (see also Paints)	81	3, 778, 100	550	....	23	366, 716	3, 699, 684	5, 721, 174
Vault lights and ventilators	12	138, 450	115	....	....	66, 204	108, 981	273, 395
Veneering	5	261, 500	105	6	30	35, 730	137, 082	292, 205
Vinegar	306	2, 151, 766	1, 160	44	53	413, 451	1, 888, 173	3, 418, 038
Washing-machines and clothes-wringers	61	652, 549	398	18	60	176, 287	587, 643	1, 182, 714
Watch and clock materials (see also Clock cases and materials).	20	117, 550	184	45	49	86, 050	130, 315	300, 195
Watch and clock repairing	1, 202	1, 704, 571	1, 547	32	78	866, 996	763, 249	2, 712, 819
Watch cases	27	1, 584, 740	1, 418	139	201	976, 041	2, 812, 922	4, 589, 314
Watches (see also Report by Special Agent C. H. Fitch, *post*)	11	4, 144, 327	2, 127	1, 219	....	1, 712, 276	982, 224	3, 271, 244
Whalebone and rattan	12	166, 450	123	42	10	75, 003	371, 450	526, 777
Wheelbarrows	22	266, 200	220	....	19	72, 489	101, 853	227, 392
Wheelwrighting (see also Blacksmithing; Carriages and wagons).	10, 701	10, 641, 080	15, 821	17	270	5, 074, 799	6, 703, 677	18, 892, 858
Whips	88	1, 078, 070	742	266	48	415, 007	701, 225	1, 698, 633
Windmills	69	697, 100	585	3	8	244, 197	523, 594	1, 010, 542
Window blinds and shades	131	1, 385, 515	1, 015	143	121	479, 133	1, 635, 700	2, 826, 518
Wire	40	4, 230, 071	5, 544	172	453	1, 982, 731	7, 034, 065	10, 836, 605
Wirework	305	3, 681, 893	3, 595	300	564	1, 708, 165	5, 410, 084	9, 127, 818
Wood-preserving	2	120, 000	36	....	....	14, 717	62, 700	101, 110
Wood pulp	50	1, 898, 450	1, 184	8	17	444, 778	910, 835	2, 256, 946
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	710	3, 450, 710	4, 933	131	601	2, 148, 914	2, 940, 630	6, 770, 119
Wooden ware	287	3, 606, 794	4, 268	144	621	1, 539, 571	2, 635, 720	5, 235, 474
Wool hats (see also Woolen goods; also Report by Special Agent G. W. Bond, *post*).	43	3, 615, 830	3, 222	1, 459	789	1, 893, 215	4, 785, 774	8, 516, 569
Woolen goods (see also Carpets, other than rag; Felt goods; Gloves and mittens; Mixed textiles; Wool hats; Worsted goods; also Report by Special Agent G. W. Bond, *post*).	1, 990	96, 095, 564	46, 978	29, 372	10, 154	25, 836, 392	100, 845, 611	160, 606, 721
Worsted goods (see also Woolen goods; also Report by Special Agent G. W. Bond, *post*).	76	20, 374, 043	6, 435	9, 473	2, 895	5, 683, 027	22, 013, 628	33, 549, 942
Zinc	16	2, 022, 600	1, 286	....	12	666, 970	1, 771, 055	2, 725, 165

TABLE III.—GENERAL STATISTICS OF MANUFACTURES FOR EACH SPECIFIED INDUSTRY, BY STATES AND TERRITORIES: 1880.

NOTE.—All industries specified in Table II for 1880 will be found in the following table or by the reference notes appended thereto. Industries which appear in less than eight states and territories are omitted from the present table. Reference notes have been made indicating the states in which these industries obtain, and giving the number of the table where the figures relating to them may be found. Industries published *in extenso* in the Special Statistics of Manufactures are also omitted from this table. Reference notes have been inserted, indicating the number of the table where each such industry will be found.

AGRICULTURAL IMPLEMENTS.

(See Table VII; also Report by Special Agent C. H. Fitch, *post.*)

AMMUNITION.

(See Table IV (B) for Connecticut and Massachusetts; also Report by Special Agent C. H. Fitch, *post.*)

1.—ARTIFICIAL FEATHERS AND FLOWERS.

(See also Millinery and lace goods.)

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	174	$1, 253, 050	550	3, 577	215	$1, 081, 040	$2, 444, 418	$4, 879, 324
California	4	2, 550	2	1	....	962	2, 700	5, 850
Massachusetts	4	20, 000	16	162	....	25, 540	21, 350	124, 900
Missouri	3	36, 000	9	50	15	25, 450	66, 000	147, 250
New Hampshire	1	50	1	2	....	1, 000	100	1, 300
New Jersey	5	5, 300	32	2	7	7, 500	575	14, 100
New York	150	1, 101, 650	455	3, 047	109	950, 938	2, 257, 623	4, 343, 924
Pennsylvania	6	81, 500	34	264	84	65, 330	91, 070	229, 500
Wisconsin	1	6, 000	1	49	....	4, 320	5, 000	12, 500

2.—ARTIFICIAL LIMBS.

(See also Surgical appliances.)

The United States	33	$82, 600	71	....	1	$43, 833	$31, 370	$137, 024
Connecticut	1	250	....	....	....	....	100	850
District of Columbia	1	1, 600	1	....	....	930	600	1, 725
Indiana	1	2, 000	1	....	....	800	500	3, 000
Kansas	1	500	2	....	....	900	600	2, 000
Kentucky	1	2, 500	....	....	....	....	1, 000	2, 800
Maryland	1	100	1	....	....	472	200	1, 200
Massachusetts	4	14, 000	6	....	....	5, 766	3, 224	14, 056
Michigan	1	6, 000	4	....	....	3, 500	560	6, 500
Missouri	1	2, 000	3	....	....	2, 000	2, 000	6, 000
New York	10	30, 500	22	....	....	15, 037	9, 556	57, 120
Ohio	4	3, 850	11	....	1	4, 904	3, 655	14, 225
Pennsylvania	6	16, 300	18	....	....	7, 724	6, 875	20, 548
Wisconsin	1	3, 000	2	....	....	1, 800	2, 500	7, 000

3.—AWNINGS AND TENTS.

The United States	151	$522, 700	526	699	43	$834, 463	$1, 230, 558	$1, 968, 942
California	6	34, 300	7	7	3	8, 175	19, 750	37, 242
Colorado	2	19, 500	13	62	....	15, 000	95, 000	135, 000
Connecticut	4	4, 200	9	2	....	3, 260	9, 700	17, 000
District of Columbia	3	2, 050	4	6	....	3, 581	4, 643	13, 924
Illinois	12	13, 300	33	28	1	16, 415	51, 947	82, 251
Indiana	4	3, 700	13	7	....	3, 250	6, 500	12, 000
Iowa	2	2, 150	4	4	....	950	4, 250	6, 700
Kentucky	3	15, 400	15	109	2	10, 500	37, 800	59, 650
Maine	2	800	5	3	....	2, 750	5, 500	9, 500
Maryland	3	4, 600	11	30	....	7, 900	16, 800	36, 100
Massachusetts	8	22, 700	19	43	2	24, 350	52, 240	92, 750
Michigan	1	500	2	....	....	300	1, 000	1, 700
Minnesota	4	11, 950	9	20	4	8, 060	96, 700	131, 400
Missouri	11	129, 400	50	167	5	57, 200	259, 885	403, 740
New Jersey	2	600	8	....	....	1, 700	2, 900	6, 100
New York	46	178, 000	182	101	11	106, 275	364, 794	569, 339
Ohio	15	23, 250	44	55	4	29, 004	73, 910	134, 662
Oregon	1	10, 000	7	....	....	5, 000	30, 000	38, 000
Pennsylvania	18	45, 250	84	51	11	26, 714	89, 239	166, 084
Utah	3	900	6	4	....	3, 437	7, 000	13, 800
Wyoming	1	150	1	....	....	642	1, 000	2, 000

AXLE-GREASE.

(See Table IV (B) for California, Illinois, Kentucky, New York, Ohio, Pennsylvania, and South Carolina.)

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

BABBITT METAL AND SOLDER.

(See Table IV (B) for California, Maine, Maryland, Missouri, and New York.)

4.—BAGGING, FLAX, HEMP, AND JUTE.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	27	$2, 491, 500	1, 330	1, 226	653	$827, 759	$2, 058, 017	$3, 511, 653
Georgia	1	40, 000	17	20	13	10, 400	50, 000	65, 000
Illinois	3	175, 000	95	40	40	47, 531	109, 000	215, 110
Indiana	3	97, 000	88	72	61	69, 000	59, 500	189, 000
Kentucky	1	150, 000	35	105	10	28, 500	150, 000	218, 500
Massachusetts	5	960, 000	483	390	253	246, 682	531, 521	963, 213
Missouri	3	370, 000	149	161	76	150, 216	545, 900	867, 395
New Jersey	3	380, 000	281	272	139	195, 007	335, 560	574, 835
Ohio	4	167, 500	128	96	48	49, 000	152, 600	237, 600
South Carolina	1	100, 000	35	66	8	23, 473	96, 736	148, 000
Virginia	1	40, 000	15	2	5	6, 500	25, 000	32, 500
Washington	1	5, 000	1	....	....	450	1, 200	2, 000
West Virginia	1	7, 000	3	2	....	1, 000	1, 000	3, 500

5.—BAGS, OTHER THAN PAPER.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	37	$2, 425, 900	1, 175	903	164	$776, 026	$8, 027, 770	$9, 726, 600
California	5	600, 000	672	50	14	233, 585	1, 715, 000	2, 102, 500
Illinois	1	25, 000	13	7	....	12, 000	130, 000	150, 000
Indiana	1	5, 000	1	2	....	700	55, 000	60, 000
Kansas	1	18, 000	10	10	8	5, 000	82, 500	100, 000
Louisiana	2	900	5	....	....	1, 124	1, 850	4, 800
Maryland	2	185, 000	26	110	10	33, 052	770, 000	850, 000
Massachusetts	1	10, 000	7	13	5	7, 000	60, 000	75, 000
Minnesota	1	2, 000	4	1	....	1, 200	20, 000	24, 000
Missouri	3	575, 000	90	110	8	82, 000	1, 466, 000	1, 730, 000
New York	8	755, 500	271	454	82	338, 850	3, 119, 600	3, 884, 300
Ohio	2	25, 000	13	9	6	9, 000	65, 000	99, 000
Pennsylvania	7	202, 000	54	117	....	43, 215	482, 820	560, 500
South Carolina	1	7, 500	1	10	5	1, 100	35, 000	40, 000
Texas	1	3, 000	4	....	....	2, 200	7, 000	11, 500
Virginia	1	12, 000	4	10	26	6, 000	18, 000	35, 000

6.—BAGS, PAPER.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	80	$1, 304, 700	546	883	140	$439, 620	$3, 037, 319	$4, 112, 566
California	2	27, 500	10	....	....	5, 524	60, 300	83, 528
Connecticut	3	92, 500	16	75	5	33, 594	141, 500	208, 800
Delaware	1	500	4	....	....	600	800	1, 800
District of Columbia	1	800	1	1	....	234	1, 310	3, 000
Georgia	1	75, 000	45	30	20	30, 000	100, 000	140, 000
Illinois	3	101, 200	29	37	6	24, 375	532, 300	608, 800
Indiana	1	3, 000	1	4	....	1, 000	6, 000	8, 000
Iowa	2	13, 500	4	1	3	2, 150	45, 000	55, 000
Maryland	3	78, 500	24	22	4	17, 704	152, 270	236, 700
Massachusetts	4	9, 200	9	14	....	4, 240	17, 100	28, 200
Missouri	5	88, 750	14	30	43	30, 450	177, 800	238, 100
New Jersey	5	14, 550	15	27	....	8, 429	28, 550	50, 275
New York	20	212, 100	158	144	7	98, 219	452, 890	691, 072
Ohio	8	157, 000	67	167	28	60, 445	573, 872	739, 808
Pennsylvania	15	358, 600	123	277	6	107, 376	618, 027	852, 478
Tennessee	1	50, 000	10	12	3	6, 480	71, 300	88, 005
Texas	1	4, 000	10	....	....	1, 000	4, 000	6, 000
Virginia	3	12, 000	1	39	14	5, 200	14, 300	23, 000
Wisconsin	1	6, 000	5	3	1	2, 600	40, 000	50, 000

7.—BAKING AND YEAST POWDERS.

(See also Drugs and chemicals.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	110	$1, 350, 600	660	326	56	$466, 252	$3, 333, 868	$4, 760, 598
Arkansas	2	4, 500	6	....	1	2, 450	5, 000	15, 500
California	4	48, 000	24	3	....	16, 575	97, 490	142, 345
Colorado	1	200	1	1	1	626	500	1, 200
Connecticut	1	5, 000	3	....	....	375	400	1, 000
Georgia	1	5, 000	3	2	....	1, 100	10, 000	15, 000
Illinois	9	151, 700	90	45	1	51, 069	519, 750	686, 600
Indiana	4	6, 300	18	2	....	6, 815	37, 000	50, 000
Iowa	3	7, 500	12	....	....	7, 560	38, 200	54, 500
Kansas	1	5, 000	2	1	....	1, 164	5, 000	8, 000
Kentucky	2	11, 000	7	3	....	4, 604	22, 000	38, 000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

7.—BAKING AND YEAST POWDERS—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Maryland	4	$70,600	12	14	....	$16,000	$111,040	$167,808
Massachusetts	7	281,750	45	44	8	31,980	234,830	393,070
Michigan	8	44,000	39	12	3	20,896	109,300	178,000
Minnesota	1	500	....	....	1	150	500	1,800
Mississippi	1	2,000	3	....	1	200	500	1,500
Missouri	12	176,900	74	28	18	56,914	288,400	468,500
New York	28	434,200	249	155	16	215,585	1,644,714	2,142,730
Ohio	10	51,150	43	....	4	16,010	131,197	241,125
Pennsylvania	6	27,000	15	13	2	11,324	53,747	105,600
Texas	1	13,000	7	....	....	2,000	3,000	6,500
Utah	1	500	....	....	....	....	300	500
West Virginia	1	3,000	1	1	....	500	15,000	20,000
Wisconsin	2	1,800	6	2	....	2,355	6,000	11,720

8.—BASKETS, RATTAN AND WILLOW WARE.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	304	$1,852,917	1,976	552	591	$657,405	$867,031	$1,992,851
California	9	9,325	20	5	3	6,560	4,865	21,200
Connecticut	9	32,150	26	6	....	7,868	6,810	23,975
Delaware	8	60,725	106	29	18	26,950	42,700	110,725
District of Columbia	1	100	1	....	....	218	150	750
Illinois	15	108,222	121	1	14	49,550	54,810	124,785
Indiana	5	1,390	6	....	....	830	1,350	5,920
Iowa	4	575	1	....	....	350	1,075	2,275
Kentucky	10	3,600	6	2	3	2,046	2,355	9,520
Louisiana	2	2,200	7	....	1	3,384	2,900	10,200
Maine	1	300	4	....	....	700	250	2,000
Maryland	19	19,610	28	3	139	17,094	17,735	48,826
Massachusetts	29	1,148,925	636	251	51	269,494	405,645	791,687
Michigan	11	24,600	37	12	22	24,100	17,295	58,000
Minnesota	2	300	2	....	....	500	200	2,000
Missouri	7	9,015	13	....	....	6,140	3,960	18,020
New Hampshire	2	2,750	7	....	....	3,250	1,575	6,575
New Jersey	18	13,825	42	28	15	15,135	17,035	46,099
New York	72	162,000	520	172	86	83,805	124,210	309,982
Ohio	25	75,775	119	6	27	43,975	65,110	139,560
Oregon	1	500	1	....	....	560	100	1,200
Pennsylvania	31	34,680	51	1	27	16,409	31,751	63,031
South Carolina	2	500	1	....	1	626	750	1,951
Tennessee	1	500	....	1	....	250	325	1,800
Utah	3	1,300	2	....	....	775	750	3,420
Vermont	4	20,000	54	20	3	8,896	5,450	25,250
Virginia	1	150	1	....	....	400	100	600
West Virginia	3	2,200	3	....	....	1,580	1,100	4,700
Wisconsin	9	117,700	161	15	181	65,960	56,675	158,800

BELLOWS.

(See Table IV (B) for Iowa and Pennsylvania.)

9.—BELLS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	20	$793,120	570	14	189	$280,169	$525,175	$1,065,824
California	1	2,000	2	....	....	1,800	2,000	6,500
Connecticut	6	115,870	137	14	9	55,515	91,765	251,024
Kentucky	2	26,000	15	....	....	5,460	12,800	34,300
Maryland	2	480,000	355	....	180	189,640	295,000	580,000
Massachusetts	2	1,350	2	....	....	1,025	2,750	6,100
Minnesota	1	500	2	....	....	500	400	1,600
New York	3	110,000	22	....	....	9,729	95,860	133,800
Ohio	1	17,000	20	....	....	6,000	9,000	21,000
Pennsylvania	2	40,400	15	....	....	10,500	15,600	31,500

10.—BELTING AND HOSE, LEATHER.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	96	$2,748,799	1,138	39	50	$606,087	$5,019,853	$6,525,737
California	4	85,000	31	....	....	18,565	73,100	117,780
Connecticut	6	548,500	178	15	....	84,200	778,000	944,000
Delaware	1	30,000	10	....	....	3,500	38,000	44,576
Illinois	2	192,796	58	....	....	26,710	225,000	302,275
Indiana	2	25,000	9	....	....	3,600	40,693	47,759
Kentucky	2	19,000	5	....	....	3,300	17,000	30,000
Maine	4	20,200	19	....	....	10,120	44,600	61,104
Maryland	1	2,500	7	....	....	2,000	28,000	30,000
Massachusetts	16	293,100	130	2	....	69,626	676,863	836,766
Michigan	2	10,500	11	....	5	5,640	49,000	74,000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

10.—BELTING AND HOSE, LEATHER—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Missouri	1	$100, 000	60	....	....	$31, 000	$91, 000	$210, 000
New Hampshire	5	286, 094	127	....	6	60, 974	433, 185	606, 944
New Jersey	8	42, 700	37	....	5	17, 134	78, 296	112, 145
New York	22	674, 209	318	22	26	196. 674	1, 904, 513	2, 365, 139
Ohio	7	64, 700	35	....	1	18, 329	96, 107	136, 554
Pennsylvania	9	280, 500	76	....	6	42, 465	367, 571	476, 545
Rhode Island	4	74, 000	27	....	1	12, 250	83, 925	130, 150

BELTING AND HOSE, LINEN.

(See Table IV (B) for Massachusetts.)

BELTING AND HOSE, RUBBER.

(See Table IV (B) for Connecticut and Ohio.)

11.—BILLIARD TABLES AND MATERIALS.

The United States	46	$1, 078, 169	849	....	8	$400, 779	$1, 080, 466	$2, 289, 758
California	5	102, 000	39	....	....	24, 632	45, 618	98, 360
Connecticut	1	100, 000	200	....	....	62, 266	100, 000	400, 000
Illinois	4	263, 200	300	....	....	137, 225	283, 900	665, 400
Maryland	1	8, 000	28	....	....	10, 000	18, 000	33, 000
Massachusetts	6	58, 200	56	....	....	25, 800	48, 700	106, 300
Michigan	2	18, 000	17	....	....	11, 500	24, 000	42, 000
Missouri	2	48, 000	7	....	....	2, 840	25, 800	51, 500
Nebraska	1	400	1	....	....	200	1, 800	2, 400
New Jersey	1	1, 000	2	....	2	1, 250	650	3, 500
New York	15	370, 069	135	....	5	82, 216	368, 618	583, 518
Ohio	4	83, 300	46	....	....	30, 550	135, 080	249, 080
Pennsylvania	3	25, 000	16	....	....	10, 300	26, 300	49, 700
Vermont	1	1, 000	2	....	1	2, 000	2, 000	5, 000

12.—BLACKING.

The United States	48	$494, 625	251	174	11	$168, 183	$710, 629	$1, 491, 474
California	3	3, 500	3	....	....	1, 809	2, 250	7, 400
Connecticut	1	2, 000	2	1	....	450	1, 500	3, 000
Illinois	1	10, 000	5	....	....	2, 400	6, 000	20, 000
Maine	1	8, 000	4	13	....	5, 000	10, 000	36, 000
Maryland	1	25	....	....	....	....	800	1, 500
Massachusetts	22	91, 550	67	47	....	43, 346	254, 905	419, 920
Michigan	4	7, 650	13	1	....	3, 130	11, 000	23, 060
New Jersey	1	8, 000	2	....	....	500	1, 200	3, 000
New York	6	133, 500	102	15	6	62, 300	200, 300	488, 160
Ohio	3	5, 400	2	....	....	600	1, 613	3, 722
Pennsylvania	5	225, 000	51	97	5	48, 648	221, 061	485, 706

13.—BLACKSMITHING.

(See also Wheelwrighting.)

The United States	28, 101	$19, 618, 852	33, 992	18	516	$11, 126, 001	$14, 572, 363	$43, 774, 271
Alabama	210	72, 760	274	....	9	62, 152	63, 118	224, 011
Arizona	16	21, 500	38	....	....	28, 400	19, 550	72, 300
Arkansas	181	76, 621	216	....	1	49, 330	67, 067	210, 195
California	632	742, 853	1, 066	1	20	519, 082	632, 138	1, 908, 969
Colorado	47	92, 805	155	....	5	99, 805	79, 725	287, 085
Connecticut	381	284, 375	528	....	5	223, 674	219, 063	730, 114
Dakota	37	26, 395	53	....	1	23, 745	30, 830	89, 988
Delaware	67	91, 590	157	....	3	53, 125	49, 600	148, 663
District of Columbia	77	31, 165	113	....	1	45, 408	39, 474	146, 219
Florida	26	23, 800	57	....	1	16, 641	21, 675	56, 085
Georgia	435	159, 700	596	....	8	123, 198	146, 269	472, 945
Idaho	28	39, 750	39	....	....	24, 791	36, 203	97, 250
Illinois	1, 856	1, 366, 074	2, 082	....	39	753, 289	990, 046	3, 020, 521
Indiana	1, 384	821, 051	1, 443	2	13	414, 713	668, 855	1, 940, 362
Iowa	1, 073	758, 812	1, 079	2	45	342, 066	524, 583	1, 551, 837
Kansas	567	293, 857	607	....	18	194, 266	263, 183	816, 156
Kentucky	884	424, 324	924	1	15	243, 604	355, 244	1, 104, 527
Louisiana	191	94, 035	271	1	12	103, 233	100, 099	334, 888
Maine	562	334, 110	573	....	2	130, 108	237, 826	665, 237
Maryland	651	417, 135	847	....	10	247, 290	300, 171	942, 077
Massachusetts	1, 030	1, 074, 486	1, 874	....	13	820, 999	796, 399	2, 501, 006
Michigan	965	692, 108	1, 113	....	17	358, 604	503, 784	1, 539, 195
Minnesota	437	371, 100	499	....	3	182, 100	265, 767	765, 807
Mississippi	156	62, 925	204	3	4	43, 173	53, 650	166, 291
Missouri	1, 249	827, 105	1, 436	....	26	510, 890	727, 585	2, 122, 068

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

13.—BLACKSMITHING—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Montana	34	$43, 015	68	....	....	$47, 402	$56, 950	$145, 500
Nebraska	245	159, 595	309	....	1	98, 867	121, 740	393, 509
Nevada	36	57, 300	77	....	....	71, 227	82, 418	200, 595
New Hampshire	324	262, 458	336	....	2	107, 655	157, 340	474, 123
New Jersey	744	482, 961	922	....	17	332, 229	409, 608	1, 207, 951
New Mexico	11	4, 950	17	....	....	5, 944	6, 675	20, 550
New York	3, 769	3, 213, 002	4, 715	1	60	1, 751, 612	2, 034, 407	6, 253, 634
North Carolina	186	61, 070	242	....	12	45, 139	65, 963	192, 507
Ohio	2, 175	1, 344, 232	2, 527	1	23	736, 553	974, 710	3, 038, 310
Oregon	146	120, 225	157	....	2	63, 190	102, 118	311, 450
Pennsylvania	3, 246	2, 236, 418	3, 591	....	49	1, 014, 454	1, 542, 876	4, 324, 460
Rhode Island	164	170, 550	271	....	2	125, 610	132, 410	405, 727
South Carolina	175	70, 745	290	....	6	50, 146	66, 289	192, 371
Tennessee	722	226, 067	756	2	16	134, 970	219, 686	698, 469
Texas	467	299, 645	688	3	16	180, 502	247, 464	727, 079
Utah	60	30, 775	78	....	1	33, 582	29, 084	99, 651
Vermont	426	317, 930	399	....	4	106, 531	187, 847	522, 575
Virginia	688	213, 657	830	....	15	134, 455	188, 706	602, 627
Washington	47	55, 225	62	....	....	37, 029	63, 220	160, 175
West Virginia	278	99, 475	235	....	1	47, 455	83, 806	257, 095
Wisconsin	1, 007	928, 021	1, 145	1	17	366, 663	594, 742	1, 581, 417
Wyoming	9	21, 100	33	....	1	21, 015	12, 400	50, 700

14.—BLUING.

The United States	23	$178, 650	88	53	5	$50, 245	$197, 463	$344, 824
District of Columbia	1	550	1	....	....	220	300	850
Kentucky	1	2, 000	4	3	1	1, 500	4, 000	7, 500
Maryland	1	1, 000	3	4	....	1, 000	3, 000	8, 000
Massachusetts	4	47, 400	15	7	....	13, 050	81, 125	109, 174
Missouri	3	7, 700	8	....	3	2, 950	9, 400	18, 100
New York	8	69, 700	40	19	....	18, 775	73, 850	124, 700
Pennsylvania	4	50, 200	17	19	1	12, 500	25, 438	75, 300
Utah	1	100	....	1	....	250	350	1, 200

BONE-, IVORY-, AND LAMP-BLACK.

(See Table IV (B) for Connecticut, Illinois, Massachusetts, Missouri, New York, Pennsylvania, and West Virginia.)

15.—BOOKBINDING AND BLANK-BOOK MAKING.

The United States	588	$5, 798, 671	5, 127	4, 831	654	$3, 927, 349	$5, 195, 771	$11, 976, 764
Alabama	2	2, 300	2	....	....	1, 100	2, 000	5, 000
Arkansas	1	5, 000	3	5	....	2, 500	3, 500	7, 000
California	15	111, 000	122	55	33	112, 578	173, 730	386, 140
Connecticut	15	115, 500	119	49	4	69, 440	87, 762	209, 322
Delaware	2	4, 000	4	3	....	2, 050	3, 800	7, 000
District of Columbia	4	4, 200	9	1	2	4, 332	2, 280	10, 731
Georgia	2	2, 500	3	7	4	3, 000	2, 000	9, 600
Illinois	45	253, 475	284	196	53	214, 024	241, 060	597, 077
Indiana	10	15, 757	22	18	7	14, 848	13, 644	39, 215
Iowa	19	102, 500	73	25	10	47, 438	54, 927	135, 616
Kansas	2	10, 270	12	4	....	7, 027	10, 328	21, 440
Kentucky	4	50, 900	33	23	....	21, 040	54, 150	98, 800
Louisiana	6	11, 000	16	....	3	10, 211	5, 520	24, 369
Maine	9	47, 400	44	30	....	24, 996	53, 833	97, 284
Maryland	18	92, 256	99	94	28	61, 993	59, 904	166, 988
Massachusetts	75	626, 278	581	762	33	524, 947	539, 481	1, 360, 577
Michigan	8	158, 300	65	57	9	36, 258	54, 215	128, 788
Minnesota	6	50, 000	44	27	8	35, 241	33, 269	98, 941
Missouri	15	145, 500	159	58	9	87, 800	114, 100	282, 087
Nevada	1	500	....	....	....	....	100	900
New Hampshire	6	14, 000	11	8	2	8, 250	11, 525	25, 100
New Jersey	5	21, 200	35	11	21	26, 904	36, 650	69, 350
New York	156	2, 536, 000	2, 019	2, 178	205	1, 680, 629	2, 445, 294	5, 296, 691
North Carolina	1	1, 500	4	4	....	2, 000	1, 000	4, 500
Ohio	51	361, 510	314	267	46	238, 305	333, 107	851, 206
Pennsylvania	74	890, 775	867	829	148	585, 786	727, 166	1, 703, 206
Rhode Island	8	52, 900	45	27	1	29, 040	29, 100	88, 000
South Carolina	1	1, 000	2	....	....	1, 000	500	2, 500
Tennessee	5	56, 000	26	21	5	13, 850	47, 125	92, 200
Texas	2	1, 250	9	1	1	2, 350	1, 700	6, 000
Utah	1	3, 000	1	1	....	1, 500	1, 800	5, 700
Vermont	1	5, 000	7	4	1	3, 000	5, 000	9, 500
Virginia	1	10, 000	12	7	....	8, 580	4, 500	18, 000
Washington	1	1, 600	....	1	....	300	600	1, 500
West Virginia	1	300	2	....	....	550	350	1, 100
Wisconsin	15	34, 000	79	58	21	44, 482	40, 751	115, 336

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

BOOT AND SHOE CUT STOCK.

(See Table IV (B) for California, Delaware, Maine, Massachusetts, New Hampshire, and New York.)

16.—BOOT AND SHOE FINDINGS.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	135	$770, 800	758	652	88	$451, 075	$1, 188, 817	$2, 144, 945
California	4	10, 700	11	1	....	8, 080	30, 800	44, 750
Connecticut	1	1, 000	1	....	....	50	500	1, 200
Louisiana	9	57, 200	40	2	6	20, 270	98, 932	171, 080
Maine	4	21, 500	34	15	3	10, 597	15, 870	31, 174
Massachusetts	64	318, 600	338	398	33	234, 728	652, 865	1, 155, 923
Michigan	1	500	2	2	1	945	1, 200	5, 000
New Hampshire	5	67, 000	74	50	4	37, 600	32, 450	88, 500
New Jersey	3	12, 500	7	4	1	2, 457	13, 271	19, 530
New York	15	88, 850	101	43	21	50, 312	94, 257	204, 120
Ohio	5	28, 000	9	2	....	4, 366	63, 200	91, 000
Pennsylvania	20	121, 950	94	107	6	62, 088	140, 072	253, 668
Rhode Island	2	20, 000	22	11	12	7, 324	37, 250	54, 500
Vermont	2	23, 000	25	17	1	12, 258	8, 150	24, 500

17.—BOOT AND SHOE UPPERS.

The United States	81	$209, 264	245	174	18	$170, 425	$448, 104	$790, 842
California	5	6, 700	9	1	....	5, 536	15, 030	31, 980
Connecticut	1	1, 000	1	....	....	520	850	2, 500
Delaware	1	6, 000	3	2	....	2, 000	10, 000	18, 000
Kentucky	5	14, 050	23	11	....	18, 857	69, 600	102, 980
Maryland	11	7, 700	27	18	1	11, 755	17, 375	37, 675
Massachusetts	3	9, 380	5	20	....	7, 350	15, 800	27, 600
Michigan	3	7, 300	22	12	2	12, 150	20, 500	42, 200
Minnesota	1	10, 000	2	3	....	2, 650	25, 000	40, 600
Missouri	3	12, 000	13	....	....	7, 052	17, 400	29, 200
New Jersey	4	18, 100	11	6	2	10, 072	30, 940	51, 000
New York	22	49, 934	53	40	3	37, 244	109, 346	198, 797
Ohio	6	24, 400	29	24	4	17, 488	42, 350	72, 820
Oregon	2	10, 500	17	....	2	10, 250	6, 500	20, 000
Pennsylvania	10	26, 650	24	30	3	23, 830	53, 513	90, 975
Virginia	2	550	2	1	....	650	3, 800	7, 000
Wisconsin	2	5, 000	4	6	1	3, 021	10, 100	18, 115

18.—BOOTS AND SHOES, INCLUDING CUSTOM WORK AND REPAIRING.

(See also Table VII.)

The United States	17, 972	$54, 358, 301	104, 021	25, 946	3, 852	$50, 995, 144	$114, 966, 575	$196, 920, 481
Alabama	80	43, 445	118	2	2	37, 323	55, 327	142, 856
Arizona	3	6, 100	4	....	....	3, 100	10, 000	18, 000
Arkansas	30	13, 735	32	....	....	11, 790	18, 304	50, 057
California	535	1, 296, 685	2, 704	189	101	1, 303, 426	2, 351, 470	4, 581, 099
Colorado	44	84, 825	156	....	2	61, 796	123, 925	262, 518
Connecticut	128	689, 390	1, 130	390	20	574, 250	1, 394, 828	2, 372, 293
Dakota	21	31, 750	48	....	....	27, 600	36, 265	84, 490
Delaware	23	29, 950	41	2	....	13, 870	15, 210	45, 714
District of Columbia	73	49, 220	66	1	2	31, 111	42, 225	127, 107
Florida	2	650	....	....	....	....	575	1, 650
Georgia	153	157, 155	300	3	6	84, 450	202, 522	406, 536
Idaho	11	15, 975	23	1	1	13, 214	17, 025	46, 026
Illinois	1, 117	2, 453, 831	2, 938	364	141	1, 223, 162	2, 623, 354	5, 103, 147
Indiana	949	766, 218	1, 415	40	19	494, 435	975, 089	2, 143, 774
Iowa	563	499, 207	760	9	7	261, 483	555, 768	1, 212, 570
Kansas	212	122, 235	295	2	8	104, 085	161, 314	402, 670
Kentucky	342	466, 152	801	139	38	341, 129	582, 377	1, 240, 044
Louisiana	85	50, 700	281	....	6	120, 052	184, 659	392, 732
Maine	203	1, 485, 400	2, 872	1, 197	105	1, 400, 959	4, 031, 200	6, 120, 342
Maryland	862	977, 912	2, 334	510	99	984, 630	1, 748, 920	3, 683, 626
Massachusetts	1, 311	21, 275, 923	47, 548	13, 406	1, 297	25, 204, 331	60, 207, 152	96, 686, 110
Michigan	646	826, 567	1, 536	74	32	646, 164	1, 235, 946	2, 437, 556
Minnesota	271	681, 046	681	37	23	334, 637	768, 117	1, 422, 053
Mississippi	85	61, 795	167	4	1	49, 245	86, 643	192, 312
Missouri	560	1, 063, 615	1, 474	227	206	678, 324	1, 586, 222	2, 938, 857
Montana	17	12, 925	24	....	....	17, 336	19, 141	54, 048
Nebraska	102	92, 195	134	....	....	48, 895	77, 077	188, 332
Nevada	24	16, 840	22	1	....	17, 670	22, 410	61, 677
New Hampshire	261	1, 758, 290	3, 648	1, 036	70	1, 882, 951	4, 992, 400	7, 619, 921
New Jersey	398	1, 153, 390	2, 795	834	128	1, 422, 681	3, 069, 894	5, 262, 671

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

18.—BOOTS AND SHOES, INCLUDING CUSTOM WORK AND REPAIRING—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
New Mexico	6	$5, 300	6	....	....	$3, 650	$3, 500	$11, 430
New York	2, 831	8, 283, 244	12, 957	3, 847	704	6, 591, 833	13, 800, 951	24, 991, 983
North Carolina	95	71, 915	227	6	21	51, 262	114, 377	237, 849
Ohio	1, 729	2, 285, 927	4, 535	731	308	1, 826, 524	3, 684, 621	7, 055, 003
Oregon	86	75, 405	88	....	....	49, 717	111, 991	238, 887
Pennsylvania	2, 157	5, 399, 228	7, 930	2, 604	352	3, 757, 957	7, 016, 204	13, 246, 250
Rhode Island	115	57, 425	88	10	1	39, 164	80, 311	187, 559
South Carolina	43	24, 495	75	....	2	20, 112	31, 609	74, 752
Tennessee	197	113, 826	308	2	5	88, 835	150, 845	369, 952
Texas	163	100, 152	233	2	....	87, 223	140, 043	372, 810
Utah	59	104, 860	235	42	44	114, 149	173, 365	356, 547
Vermont	111	190, 575	335	41	2	107, 562	364, 590	565, 415
Virginia	289	153, 839	532	46	11	117, 869	260, 491	575, 180
Washington	20	15, 810	29	....	....	19, 342	28, 600	67, 210
West Virginia	146	94, 345	159	3	....	41, 508	89, 540	202, 488
Wisconsin	802	1, 191, 464	1, 923	144	88	674, 758	1, 704, 728	3, 025, 062
Wyoming	12	7, 370	14	....	....	9, 580	15, 450	41, 316

BOOTS AND SHOES, RUBBER.

(See Table IV (B) for Connecticut, Massachusetts, New Jersey, and Rhode Island.)

19.—BOXES, CIGAR.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	221	$1, 023, 777	1, 274	718	373	$748, 657	$1, 389, 700	$2, 903, 465
California	[illegible]	130, 635	149	35	10	72, 940	75, 165	206, 200
Connecticut	7	10, 700	16	4	1	5, 475	14, 250	33, 020
District of Columbia	2	1, 100	2	2	3	1, 450	2, 476	9, 164
Illinois	9	65, 300	49	50	26	39, 658	122, 290	196, 311
Indiana	4	7, 000	16	6	....	6, 331	7, 175	20, 500
Iowa	2	6, 000	5	6	....	3, 302	7, 580	14, 000
Kansas	1	7, 000	8	....	....	4, 000	12, 000	25, 000
Kentucky	3	5, 500	7	7	3	5, 500	14, 040	23, 600
Maryland	13	19, 325	22	19	9	15, 163	28, 883	58, 822
Massachusetts	9	23, 500	39	22	8	19, 802	33, 136	78, 515
Michigan	[illegible]	48, 200	47	39	35	30, 945	72, 772	134, 555
Minnesota	3	4, 500	6	3	....	2, 602	4, 750	9, 500
Missouri	6	57, 550	51	22	11	34, 100	47, 700	105, 600
New Jersey	4	3, 650	8	7	8	4, 140	9, 200	18, 166
New York	54	441, 045	599	296	166	373, 278	603, 337	1, 339, 668
Ohio	20	39, 150	71	66	41	47, 260	102, 136	197, 620
Pennsylvania	61	134, 522	135	93	45	63, 743	172, 916	332, 124
Rhode Island	1	1, 500	2	1	....	1, 800	3, 000	6, 000
Virginia	4	6, 600	16	14	5	6, 168	22, 500	37, 100
Wisconsin	3	11, 000	26	26	2	11, 000	34, 400	58, 000

20.—BOXES, FANCY AND PAPER.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	369	$2, 496, 496	2, 194	6, 336	648	$2, 373, 948	$3, 578, 827	$7, 665, 553
California	4	24, 500	18	42	9	20, 165	20, 450	50, 550
Connecticut	34	224, 600	206	734	32	265, 737	389, 788	840, 645
District of Columbia	1	100	1	....	....	78	180	520
Georgia	2	26, 500	7	30	8	5, 900	12, 500	24, 200
Illinois	13	68, 700	71	180	32	83, 550	119, 100	262, 292
Indiana	3	4, 000	4	18	....	5, 250	7, 050	16, 000
Iowa	2	1, 100	1	4	....	1, 140	1, 353	3, 518
Kansas	1	500	1	....	5	1, 872	1, 500	4, 000
Kentucky	1	6, 000	4	40	1	5, 500	5, 500	20, 000
Louisiana	4	14, 600	41	12	46	29, 483	59, 400	125, 928
Maine	7	54, 400	93	227	17	51, 185	30, 150	122, 500
Maryland	8	34, 020	28	169	10	32, 617	82, 883	140, 625
Massachusetts	60	296, 175	220	961	27	302, 856	459, 575	967, 218
Michigan	5	12, 900	15	41	5	15, 410	39, 750	73, 000
Minnesota	4	2, 600	3	4	7	2, 485	2, 600	8, 800
Missouri	6	21, 500	27	44	19	23, 300	45, 800	91, 200
New Hampshire	10	50, 580	84	30	1	27, 800	57, 000	117, 000
New Jersey	16	135, 200	104	422	69	147, 754	184, 650	477, 600
New York	113	959, 010	886	2, 354	173	916, 049	1, 508, 391	3, 033, 777
Ohio	13	44, 711	44	53	14	37, 081	47, 743	105, 087
Pennsylvania	47	438, 450	227	1, 228	56	281, 445	401, 378	894, 505
Rhode Island	6	44, 100	33	128	2	60, 290	57, 151	136, 365
Texas	2	250	7	1	4	1, 250	1, 450	4, 500
Vermont	1	2, 000	2	5	....	2, 155	4, 325	8, 813
Virginia	3	18, 000	52	87	102	48, 596	26, 210	107, 410
West Virginia	1	6, 000	1	10	....	2, 000	3, 950	8, 000
Wisconsin	2	6, 000	14	12	9	3, 000	9, 000	21, 500

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

21.—BOXES, WOODEN, PACKING.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	602	$5, 304, 212	6, 611	405	706	$2, 769, 135	$7, 674, 921	$12, 687, 068
California	14	206, 250	291	30	42	137, 100	315, 300	600, 700
Connecticut	15	63, 400	72	4	....	28, 242	126, 150	174, 216
Florida	4	4, 600	10	....	....	2, 400	1, 600	6, 700
Georgia	2	9, 000	[illegible]	....	....	2, 300	6, 600	16, 300
Illinois	22	575, 300	1, 010	18	117	459, 777	1, 328, 832	2, 008, 159
Indiana	4	43, 300	61	....	....	23, 020	50, 350	130, 700
Iowa	4	43, 500	55	3	17	18, 400	28, 900	64, 000
Kentucky	8	61, 022	65	....	5	30, 772	62, 572	121, 350
Louisiana	4	15, 200	15	12	[illegible]	7, 572	10, 220	25, 200
Maine	16	98, 150	143	7	26	41, 320	59, 025	141, 125
Maryland	15	142, 712	320	....	44	147, 302	302, 273	533, 150
Massachusetts	109	698, 780	909	38	31	367, 118	1, 068, 006	1, 768, 308
Michigan	23	221, 880	444	43	99	141, 259	301, 592	544, 045
Minnesota	1	1, 000	6	....	2	2, 500	3, 000	6, 000
Missouri	16	66, 100	128	....	5	58, 426	141, 730	251, 400
Nebraska	1	9, 000	1	3	....	1, 500	4, 000	12, 000
New Hampshire	29	98, 700	212	11	20	64, 760	100, 500	219, 700
New Jersey	15	232, 300	135	15	22	73, 324	214, 577	376, 990
New York	156	1, 742, 225	1, 487	121	117	684, 519	2, 309, 185	3, 610, 472
North Carolina	2	1, 200	4	....	....	400	800	1, 700
Ohio	35	138, 758	257	24	23	76, 434	129, 785	265, 262
Oregon	1	10, 000	12	....	....	7, 000	12, 000	22, 000
Pennsylvania	61	486, 270	502	28	75	220, 550	605, 455	977, 725
Rhode Island	6	69, 860	76	....	1	30, 034	89, 396	151, 000
Tennessee	3	23, 500	32	....	14	12, 995	24, 481	46, 000
Vermont	4	51, 700	81	....	15	27, 700	154, 880	196, 800
Virginia	15	134, 300	180	....	18	66, 570	155, 235	284, 966
Washington	1	10, 000	10	....	....	3, 500	3, 000	10, 000
Wisconsin	15	46, 265	85	48	7	32, 341	65, 477	121, 100

BRASS AND COPPER, ROLLED.

(See Table IV (B) for Connecticut, Maryland, Massachusetts, New Jersey, New York, and Pennsylvania.)

22.—BRASS CASTINGS.

(See also Bronze castings.)

The United States	396	$5, 740, 237	5, 573	263	401	$2, 729, 794	$5, 894, 452	$10, 808, 742
Arkansas	1	2, 500	1	....	....	160	550	1, 200
California	10	155, 200	191	2	6	121, 400	235, 520	384, 850
Colorado	1	500	3	....	....	2, 700	3, 000	7, 500
Connecticut	17	337, 600	484	172	12	289, 445	572, 722	1, 077, 700
District of Columbia	3	132, 038	61	....	....	22, 087	67, 152	96, 769
Georgia	1	5, 000	4	....	2	1, 560	1, 000	4, 000
Illinois	15	461, 500	550	....	3	249, 118	385, 085	784, 005
Indiana	7	24, 700	29	....	....	17, 149	53, 000	85, 410
Iowa	3	4, 400	9	....	....	4, 700	5, 900	16, 971
Kansas	1	3, 000	5	....	....	2, 000	2, 000	5, 000
Kentucky	6	69, 600	52	....	9	20, 020	80, 020	114, 276
Louisiana	2	3, 200	11	....	1	2, 400	650	5, 000
Maine	8	96, 000	29	....	....	15, 102	50, 905	89, 850
Maryland	10	19, 500	32	....	1	16, 279	33, 741	71, 101
Massachusetts	49	361, 300	404	2	16	191, 300	411, 853	756, 424
Michigan	3	19, 500	60	....	1	22, 150	19, 271	50, 101
Minnesota	3	17, 000	15	....	....	8, 506	32, 178	47, 250
Missouri	14	186, 100	149	....	8	70, 087	395, 275	570, 450
Nebraska	1	2, 000	6	....	....	2, 600	3, 500	7, 300
Nevada	1	150	....	....	....	....	300	500
New Hampshire	4	23, 500	25	....	....	12, 285	24, 825	44, 597
New Jersey	21	501, 350	560	4	10	261, 309	222, 249	641, 596
New York	102	1, 219, 721	1, 309	62	204	683, 243	1, 301, 247	2, 458, 445
Ohio	28	289, 777	356	....	35	164, 919	430, 162	806, 736
Oregon	1	3, 000	4	....	....	3, 750	5, 000	11, 000
Pennsylvania	63	1, 578, 901	1, 009	19	89	456, 748	1, 344, 931	2, 294, 684
Rhode Island	10	105, 900	63	....	....	33, 080	119,930	182, 163
Utah	1	500	1	....	....	85	250	550
Virginia	2	4, 500	7	....	2	2, 620	11, 000	18, 000
West Virginia	1	1, 500	2	....	....	1, 400	3, 300	5, 200
Wisconsin	7	110, 800	142	2	2	51, 592	78, 436	170, 114

BRASS WARE.

(See Table IV (B) for Connecticut, Iowa, Massachusetts, and New York.)

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

23.—BREAD AND OTHER BAKERY PRODUCTS.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	6, 396	$19, 155, 286	18, 925	2, 210	1, 353	$9, 411, 328	$42, 612, 027	$65, 824, 896
Alabama	11	26, 025	29	4	4	9, 908	42, 820	76, 300
Arizona	2	1, 200	2	....	....	1, 000	1, 550	3, 700
Arkansas	3	2, 650	4	....	....	1, 590	5, 300	8, 700
California	160	534, 655	529	16	49	372, 171	1, 611, 080	2, 416, 298
Colorado	16	97, 200	100	6	11	82, 800	355, 900	574, 552
Connecticut	91	327, 275	526	69	34	298, 741	1, 031, 093	1, 585, 987
Dakota	1	1, 500	3	....	....	2, 500	6, 000	10, 000
Delaware	20	128, 000	54	12	15	27, 220	108, 280	175, 565
District of Columbia	63	120, 340	164	7	8	73, 148	400, 608	606, 236
Florida	2	2, 000	7	....	....	3, 420	13, 900	20, 780
Georgia	26	118, 450	159	14	24	55, 742	343, 280	464, 162
Idaho	3	5, 800	4	....	....	2, 200	3, 450	7, 500
Illinois	267	993, 810	1, 103	221	69	577, 065	2, 648, 972	3, 857, 139
Indiana	155	360, 910	448	45	26	199, 949	779, 775	1, 291, 961
Iowa	97	353, 633	271	45	31	134, 662	541, 629	839, 712
Kansas	42	58, 925	75	3	3	31, 481	89, 295	157, 816
Kentucky	128	287, 325	274	35	14	101, 088	495, 144	795, 901
Louisiana	101	109, 920	319	8	17	121, 060	542, 150	983, 960
Maine	31	155, 200	160	10	4	71, 804	233, 870	377, 554
Maryland	341	864, 022	662	80	62	275, 759	1, 507, 877	2, 275, 227
Massachusetts	292	1, 226, 840	1, 567	305	93	844, 090	3, 122, 104	4, 942, 769
Michigan	113	433, 325	401	27	46	223, 095	1, 065, 907	1, 540, 465
Minnesota	46	133, 450	122	17	7	58, 345	342, 260	494, 755
Mississippi	8	13, 460	37	5	2	11, 360	16, 725	48, 150
Missouri	227	864, 520	773	90	73	405, 064	2, 159, 908	3, 250, 192
Montana	1	1, 400	2	....	....	1, 000	8, 000	12, 000
Nebraska	17	33, 400	48	6	4	21, 355	77, 630	136, 834
Nevada	4	3, 100	7	1	....	6, 052	22, 821	37, 800
New Hampshire	26	49, 935	76	9	....	36, 692	180, 086	294, 108
New Jersey	330	737, 700	752	45	95	384, 798	1, 818, 174	2, 798, 311
New York	1, 719	5, 030, 681	4, 943	482	245	2, 612, 982	13, 022, 040	19, 937, 953
North Carolina	1	1, 000	3	....	....	600	1, 500	2, 500
Ohio	497	1, 060, 131	1, 225	155	121	526, 678	2, 440, 001	3, 805, 506
Oregon	14	59, 150	47	3	7	30, 300	98, 500	165, 000
Pennsylvania	1, 265	3, 919, 053	2, 923	384	197	1, 315, 677	5, 263, 591	8, 448, 474
Rhode Island	51	270, 100	301	28	3	158, 389	561, 138	869, 188
South Carolina	20	69, 900	89	1	16	35, 946	158, 382	226, 045
Tennessee	18	120, 100	116	6	9	45, 390	214, 374	335, 917
Texas	26	56, 150	60	1	3	31, 415	147, 046	243, 418
Utah	10	28, 400	17	6	4	11, 912	63, 420	98, 407
Vermont	11	113, 400	71	3	1	30, 354	128, 530	226, 305
Virginia	51	131, 700	222	31	20	81, 661	442, 190	644, 560
Washington	2	10, 350	3	....	....	4, 000	5, 450	12, 900
West Virginia	5	15, 800	8	....	....	3, 825	19, 100	26, 906
Wisconsin	82	223, 401	219	30	36	87, 040	471, 177	697, 289

BRICK AND TILE.

(See Table VII; also Drain and sewer pipe; Terra-cotta ware.)

24.—BRIDGES.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	75	$4, 058, 649	4, 153	....	140	$1, 882, 179	$5, 669, 793	$8, 978, 122
California	8	99, 000	344	....	....	172, 970	374, 000	694, 000
Connecticut	2	51, 500	46	....	....	13, 900	32, 000	70, 706
Georgia	1	500	6	....	....	2, 000	500	5, 000
Illinois	3	348, 000	642	....	....	311, 763	1, 473, 000	1, 974, 000
Indiana	2	11, 000	30	....	....	16, 500	11, 000	35, 000
Iowa	8	685, 600	136	....	2	87, 808	242, 858	351, 476
Kansas	2	26, 800	29	....	....	11, 620	44, 000	67, 065
Kentucky	1	250, 000	110	....	15	70, 000	180, 000	300, 000
Maryland	2	202, 000	98	....	....	48, 972	79, 000	143, 000
Massachusetts	11	77, 500	225	....	....	100, 607	249, 757	424, 876
Michigan	1	300, 000	194	....	96	75, 000	269, 050	357, 023
Missouri	2	1, 440	11	....	....	4, 520	2, 940	12, 500
Nebraska	2	7, 500	34	....	....	25, 400	85, 000	123, 500
New Jersey	2	185, 709	175	....	....	52, 484	298, 448	415, 291
New York	4	314, 000	171	....	....	65, 500	319, 000	426, 000
Ohio	10	700, 500	955	....	14	364, 233	859, 748	1, 660, 563
Pennsylvania	7	720, 400	859	....	13	425, 290	1, 071, 936	1, 757, 932
Rhode Island	2	50, 000	28	....	....	12, 800	15, 993	58, 294
Virginia	2	5, 500	19	....	....	3, 400	15, 550	19, 800
Wisconsin	3	21, 700	41	....	....	17, 412	46, 013	82, 102

BRONZE CASTINGS.

(See Table IV (B) for New Jersey, New York, and Pennsylvania; also Brass castings.)

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

25.—BROOMS AND BRUSHES.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	980	$4, 186, 897	5, 798	1, 715	1, 260	$2, 424, 040	$5, 694, 855	$10, 560, 855
Alabama	3	2, 500	14			3, 870	7, 885	15, 055
Arkansas	2	1, 184	11	15	12	765	928	1, 978
California	24	78, 300	132	1	3	49, 151	87, 850	173, 300
Colorado	1	3, 800	3		1	1, 800	15, 000	30, 000
Connecticut	20	47, 940	59	12	6	26, 980	71, 530	143, 065
Dakota	3	780	6			840	1, 406	3, 610
Delaware	2	1, 800	5			1, 450	2, 675	4, 500
District of Columbia	1	500	3			1, 000	3, 000	6, 000
Illinois	88	307, 225	436	106	51	181, 578	357, 852	686, 166
Indiana	32	35, 925	104	25	23	33, 850	80, 239	158, 167
Iowa	40	30, 500	75	30	15	35, 527	56, 290	112, 958
Kansas	20	18, 625	53		9	13, 234	22, 871	50, 092
Kentucky	15	20, 175	60	9	2	25, 410	41, 000	87, 580
Louisiana	8	14, 750	67		3	23, 195	90, 532	137, 270
Maine	11	66, 100	120	7	14	38, 500	208, 025	292, 950
Maryland	31	84, 015	213	22	36	75, 458	159, 064	297, 511
Massachusetts	58	545, 500	535	254	13	290, 854	821, 342	1, 451, 660
Michigan	31	141, 050	102	87	102	88, 386	163, 699	305, 177
Minnesota	10	9, 600	22	2		10, 960	23, 372	46, 200
Mississippi	1	3, 500	4			1, 000	1, 500	3, 000
Missouri	48	113, 200	199	3	112	102, 159	178, 515	350, 165
Nebraska	5	5, 675	16			4, 480	4, 638	12, 850
New Hampshire	13	19, 015	21	4		5, 005	15, 165	29, 311
New Jersey	33	52, 750	102	33	11	51, 705	76, 930	176, 342
New York	215	1, 581, 271	1, 814	799	341	814, 349	2, 030, 919	3, 705, 127
Ohio	84	232, 087	514	165	232	161, 729	277, 021	583, 640
Oregon	2	5, 250	11			6, 000	10, 700	21, 800
Pennsylvania	122	626, 215	725	88	252	292, 556	678, 753	1, 293, 881
Rhode Island	10	23, 000	30	28	2	15, 008	31, 585	58, 700
Tennessee	11	12, 165	42	2	7	9, 475	29, 435	54, 925
Texas	7	3, 300	25	3		5, 575	7, 520	18, 300
Utah	1	7, 000	6		1	2, 500	5, 000	9, 000
Vermont	5	41, 000	47	14	6	12, 281	41, 300	66, 900
Virginia	4	18, 350	48		5	9, 458	33, 700	57, 800
West Virginia	3	9, 100	36			4, 640	22, 740	30, 750
Wisconsin	16	23, 750	78	6	1	23, 315	34, 874	85, 125

26.—BUTTONS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	124	$2, 013, 350	2, 128	3, 052	645	$1, 645, 130	$1, 792, 891	$4, 449, 542
Connecticut	26	512, 500	471	651	115	376, 332	498, 451	1, 110, 653
Illinois	3	29, 000	12	71	4	16, 642	27, 085	66, 700
Kentucky	1	2, 000	1	2		900	1, 400	3, 700
Massachusetts	28	590, 900	472	799	95	391, 974	411, 009	1, 085, 864
Minnesota	1	1, 000					200	600
New Jersey	25	211, 600	544	261	171	331, 130	297, 500	797, 205
New York	18	450, 000	255	1, 054	123	332, 799	366, 372	916, 262
Pennsylvania	18	159, 000	324	166	133	167, 613	146, 585	387, 554
Rhode Island	1	350					275	1, 150
Tennessee	1	1, 000	1	1	2	600	2, 000	5, 000
Vermont	2	56, 000	48	47	2	27, 140	42, 014	74, 854

CALCIUM LIGHTS.

(See Table IV (B) for California, New York, and Ohio.)

CARDBOARD.

(See Table IV (B) for Massachusetts, New Hampshire, Pennsylvania, and Rhode Island.)

CARD CUTTING AND DESIGNING.

(See Table IV (B) for New Jersey and Pennsylvania.)

27.—CARPENTERING.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	9, 184	$19, 541, 358	53, 547	74	517	$24, 582, 077	$51, 621, 120	$94, 152, 139
Alabama	51	56, 720	287			93, 770	165, 590	337, 450
Arizona	7	3, 500	43			24, 250	56, 750	93, 800
Arkansas	34	21, 195	171			56, 455	86, 945	199, 625
California	261	497, 850	1, 372	1	2	985, 664	1, 888, 508	3, 533, 131
Colorado	40	90, 400	261		1	243, 920	585, 800	1, 056, 400
Connecticut	250	555, 444	1, 929	1	6	838, 353	1, 832, 418	3, 101, 452
Dakota	9	8, 750	40			18, 500	79, 800	121, 200
Delaware	34	54, 200	179			61, 352	180, 280	313, 255
District of Columbia	58	48, 145	245		8	135, 626	247, 006	486, 702
Florida	9	18, 200	56		1	22, 707	25, 200	88, 400

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

27.—CARPENTERING—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Georgia	84	$140, 045	684		12	$219, 594	$421, 862	$814, 049
Idaho	17	36, 980	39			20, 750	55, 300	98, 175
Illinois	742	1, 220, 822	3, 650	1	69	1, 602, 128	3, 224, 708	5, 908, 100
Indiana	344	284, 790	1, 210		33	425, 249	1, 114, 488	2, 006, 094
Iowa	381	322, 263	1, 364		31	543, 381	1, 287, 218	2, 280, 490
Kansas	246	223, 020	891	1	7	389, 245	1, 056, 004	1, 799, 648
Kentucky	190	342, 975	796		12	322, 266	802, 962	1, 525, 994
Louisiana	40	67, 325	276		4	141, 494	232, 000	456, 500
Maine	70	137, 100	358		1	121, 351	189, 940	400, 020
Maryland	183	1, 176, 052	1, 567		11	769, 266	2, 140, 351	3, 626, 189
Massachusetts	930	2, 243, 222	6, 398	1	17	2, 895, 930	6, 213, 344	10, 973, 471
Michigan	162	427, 700	1, 303	10	10	481, 161	996, 904	1, 747, 738
Minnesota	138	234, 575	1, 008		2	436, 651	985, 797	1, 722, 877
Mississippi	41	23, 175	128		3	39, 642	91, 400	170, 316
Missouri	449	569, 050	2, 166		10	1, 172, 409	2, 677, 721	5, 027, 011
Montana	11	15, 800	24			19, 340	27, 050	61, 800
Nebraska	164	76, 105	463	2	2	178, 605	556, 467	968, 402
Nevada	6	2, 000	4			1, 250	6, 000	13, 600
New Hampshire	100	223, 228	445		2	182, 238	439, 657	855, 372
New Jersey	319	750, 865	2, 615	6	35	1, 227, 686	2, 135, 190	3, 995, 361
New Mexico	22	40, 250	132		4	90, 075	205, 250	336, 790
New York	1, 487	4, 845, 550	10, 455	2	90	5, 563, 901	10, 317, 052	19, 410, 276
North Carolina	27	70, 660	293	1	8	75, 010	101, 720	221, 970
Ohio	623	1, 053, 180	3, 014	42	57	1, 124, 499	2, 543, 753	4, 815, 589
Oregon	16	27, 500	123			88, 498	222, 903	341, 339
Pennsylvania	773	2, 314, 519	4, 664		13	2, 072, 580	4, 621, 380	8, 125, 571
Rhode Island	146	428, 123	1, 239		3	615, 459	1, 332, 443	2, 336, 517
South Carolina	32	40, 125	520		15	115, 913	158, 198	326, 590
Tennessee	104	131, 898	459			168, 227	325, 356	642, 770
Texas	107	84, 405	352			140, 556	331, 422	661, 370
Utah	33	26, 750	47			18, 761	30, 069	71, 868
Vermont	20	54, 625	101		2	38, 551	79, 323	158, 486
Virginia	171	145, 620	717	2	27	227, 395	403, 315	850, 444
Washington	16	16, 095	19			9, 500	53, 550	78, 980
West Virginia	40	62, 525	140		1	48, 193	113, 188	210, 450
Wisconsin	186	322, 437	1, 278	4	18	498, 148	946, 038	1, 721, 507
Wyoming	5	5, 600	22			16, 578	33, 500	59, 000

CARPETS, OTHER THAN RAG.

(See Report by Special Agent G. W. Bond, *post.*)

28.—CARPETS, RAG.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	396	$252, 604	573	88	63	$190, 792	$424, 943	$861, 710
California	2	1, 100					500	1, 200
Connecticut	3	3, 950	6	4		3, 499	2, 061	7, 660
District of Columbia	1	75					200	600
Illinois	19	4, 420	16	2	2	7, 297	12, 798	28, 469
Indiana	15	10, 525	10	8	3	6, 427	16, 200	31, 930
Iowa	11	2, 755	10	1		4, 351	5, 694	17, 283
Kansas	5	1, 380	4	4	1	1, 310	1, 853	5, 026
Kentucky	2	325	1			100	1, 500	2, 900
Maryland	18	23, 600	29	2	4	10, 571	23, 639	49, 908
Massachusetts	1	200	2			500	700	1, 500
Michigan	7	2, 100	7		1	1, 768	3, 050	8, 188
Minnesota	4	410	1		1	450	850	2, 650
Missouri	4	400	4			1, 150	1, 200	7, 100
Nebraska	4	375	3	1		900	3, 065	5, 500
New Jersey	45	26, 375	52	1		14, 841	33, 350	72, 268
New York	26	11, 475	27	4	5	9, 933	23, 003	44, 361
Ohio	75	12, 947	56	8	6	18, 841	33, 486	92, 202
Pennsylvania	143	142, 542	322	22	36	102, 054	243, 444	449, 825
Rhode Island	1	1, 400	1			250	800	1, 200
Utah	2	750	3	5	4	1, 600	2, 500	5, 650
Washington	1	100					175	500
Wisconsin	7	5, 400	19	26		4, 950	14, 875	25, 850

CARPETS, WOOD.

(See Table IV (B) for Massachusetts, New York, Ohio, and Pennsylvania.)

29.—CARRIAGE AND WAGON MATERIALS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	412	$7, 034, 718	7, 237	35	230	$2, 733, 004	$4, 781, 095	$10, 114, 352
Arkansas	1	3, 000	13			2, 000	500	3, 000
California	2	40, 000	14			13, 000	59, 000	85, 000
Connecticut	32	667, 099	439	29	20	244, 714	346, 288	824, 611
Delaware	10	130, 500	114		8	50, 250	65, 500	161, 000
Illinois	7	24, 700	37			10, 370	18, 100	38, 800

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

29.—CARRIAGE AND WAGON MATERIALS—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Indiana	44	$1, 249, 008	1, 761		44	$614, 128	$1, 306, 566	$2, 369, 723
Iowa	2	29, 000	27			13, 375	22, 700	40, 500
Kentucky	7	128, 140	209		18	69, 352	48, 865	153, 043
Maine	6	19, 400	22		1	4, 950	9, 100	20, 750
Maryland	4	35, 240	37			9, 700	15, 800	43, 500
Massachusetts	31	413, 550	360			164, 895	432, 151	737, 626
Michigan	17	109, 925	167			47, 782	80, 976	179, 031
Missouri	5	138, 000	217		3	97, 768	139, 690	280, 600
New Hampshire	10	69, 800	55			20, 185	74, 480	138, 660
New Jersey	26	341, 775	292		2	139, 219	192, 086	498, 306
New York	62	451, 750	422	1	8	139, 063	314, 536	619, 631
North Carolina	4	46, 100	95			27, 800	19, 700	57, 800
Ohio	63	2, 239, 265	1, 997	4	72	730, 565	1, 039, 737	2, 652, 823
Pennsylvania	47	485, 616	458		12	159, 453	325, 916	634, 777
Tennessee	[illegible]	52, 500	44		10	15, 000	33, 000	77, 000
Vermont	8	27, 350	30			7, 675	7, 250	20, 400
Virginia	4	23, 000	23			6, 150	10, 744	23, 050
West Virginia	4	25, 000	38		1	13, 350	10, 610	36, 701
Wisconsin	13	285, 000	366	1	31	132, 260	207, 800	418, 020

30.—CARRIAGES AND SLEDS, CHILDREN'S.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	67	$770, 000	1, 152	70	88	$462, 852	$868, 054	$1, 677, 776
Connecticut	3	16, 600	14			6, 624	7, 822	20, 246
Illinois	1	15, 000	7	6		3, 900	8, 000	15, 000
Kentucky	1	25, 000	25	5	5	13, 246	33, 653	55, 899
Maine	1	35, 000	45			15, 886	14, 000	35, 307
Maryland	3	15, 600	31	2	3	10, 740	33, 500	53, 080
Massachusetts	11	109, 500	182	9	10	69, 725	140, 684	245, 200
Michigan	3	13, 000	22	1	7	10, 450	11, 890	31, 900
Minnesota	1	800	3			400	150	1, 200
Missouri	1	250					250	810
New Jersey	1	25, 000	7	1	1	5, 000	8, 000	17, 000
New York	19	287, 450	439	18	11	192, 228	358, 340	703, 469
Ohio	5	46, 000	105	13	32	33, 165	63, 717	143, 942
Pennsylvania	10	76, 800	101	4	4	46, 051	111, 055	196, 872
Vermont	6	102, 000	168	10	12	53, 437	76, 083	151, 851
Wisconsin	1	2, 000	3	1	3	2, 000	1, 000	6, 000

31.—CARRIAGES AND WAGONS.

(See also Wheelwrighting.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	3, 841	$37, 973, 493	43, 630	273	1, 491	$18, 988, 615	$30, 597, 086	$64, 951, 617
Alabama	22	69, 600	157	1	2	61, 593	82, 347	200, 100
Arkansas	14	56, 450	100			40, 855	71, 250	145, 075
California	87	594, 523	600	1	2	379, 629	460, 095	1, 163, 618
Colorado	10	281, 000	133		2	112, 000	209, 000	475, 000
Connecticut	124	1, 367, 900	1, 621	14	13	853, 602	1, 191, 016	2, 605, 591
Dakota	4	11, 500	15			8, 200	9, 500	25, 300
Delaware	15	452, 270	397	1	12	137, 256	272, 098	500, 567
District of Columbia	25	173, 792	149		5	69, 496	53, 277	183, 205
Florida	2	3, 000	14			3, 748	5, 400	13, 500
Georgia	59	275, 300	515	1	12	184, 159	246, 470	582, 581
Idaho	1	2, 500	2			1, 800	6, 000	10, 000
Illinois	215	3, 466, 830	3, 017	37	177	1, 429, 705	2, 331, 111	5, 003, 053
Indiana	195	2, 732, 417	2, 790	5	111	1, 133, 233	1, 605, 103	3, 998, 520
Iowa	208	1, 505, 645	1, 372		16	610, 017	1, 042, 758	2, 212, 197
Kansas	23	247, 500	587			217, 364	357, 920	745, 800
Kentucky	95	726, 950	898	2	24	376, 422	716, 940	1, 474, 475
Louisiana	12	46, 200	118		6	60, 546	52, 200	156, 700
Maine	46	274, 100	322			142, 044	201, 857	460, 609
Maryland	81	355, 599	559		8	209, 972	238, 250	595, 860
Massachusetts	215	2, 027, 250	2, 619	28		1, 273, 986	1, 952, 237	4, 048, 141
Michigan	208	1, 739, 991	1, 934	2	52	769, 814	1, 272, 623	2, 741, 143
Minnesota	51	423, 800	475			218, 190	306, 620	728, 017
Mississippi	20	129, 500	150		6	57, 812	75, 520	191, 500
Missouri	119	1, 054, 050	1, 557	8	66	699, 892	1, 183, 478	2, 483, 738
Montana	2	20, 000	20			15, 000	13, 000	42, 000
Nebraska	5	68, 000	71			33, 200	80, 200	134, 000
Nevada	1	25, 000	13			14, 850	15, 000	35, 000
New Hampshire	30	618, 857	436	2		196, 337	253, 275	559, 932
New Jersey	129	1, 024, 740	1, 298	15	28	585, 752	755, 429	1, 808, 593
New Mexico	1	20, 000	12			9, 500	30, 000	48, 000
New York	667	5, 487, 158	6, 218	37	173	2, 882, 672	4, 031, 422	8, 888, 479
North Carolina	47	202, 650	376		4	107, 731	139, 300	334, 900
Ohio	325	4, 234, 481	6, 387	92	601	2, 610, 268	5, 416, 656	10, 043, 404
Oregon	9	48, 800	49			30, 100	46, 650	105, 000
Pennsylvania	391	3, 627, 023	3, 875	5	54	1, 584, 035	2, 059, 819	4, 760, 723

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFED INDUSTRY, ETC.: 1880.

31.—CARRIAGES AND WAGONS—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Rhode Island	51	$181, 505	192		1	$95, 021	$130, 260	$301, 259
South Carolina	10	86, 200	131			40, 570	59, 966	141, 852
Tennessee	51	715, 050	942	2	11	219, 998	580, 300	1, 253, 721
Texas	34	150, 700	205		6	92, 014	139, 000	301, 800
Utah	5	11, 400	25		1	14, 980	13, 515	36, 600
Vermont	21	141, 800	157			57, 040	62, 850	174, 885
Virginia	43	258, 700	404		11	128, 769	243, 400	508, 400
Washington	3	7, 700	12			6, 820	7, 500	20, 500
West Virginia	8	251, 000	217		1	69, 160	166, 486	341, 025
Wisconsin	156	2, 771, 212	2, 481	20	86	1, 135, 443	2, 403, 688	4, 350, 454
Wyoming	1	3, 850	8			8, 020	6, 300	16, 800

32.—CARS, RAILROAD, STREET, AND REPAIRS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	130	$9, 272, 680	13, 885	13	334	$5, 507, 753	$19, 780, 271	$27, 997, 591
California	1	2, 000	25			1, 500	25, 000	30, 000
Delaware	2	589, 100	760		100	319, 915	775, 900	1, 185, 688
District of Columbia	1	30, 000	25			17, 450	10, 000	29, 097
Georgia	1	10, 000	12			3, 200	6, 000	11, 000
Illinois	7	771, 500	1, 057		29	476, 742	1, 875, 291	2, 543, 682
Indiana	5	450, 000	2, 483		25	791, 267	3, 792, 600	4, 960, 500
Kentucky	2	6, 000	37			17, 500	14, 775	39, 500
Louisiana	1	3, 000	15			3, 000	6, 000	10, 000
Maryland	1	5, 000	21			12, 480	10, 000	24, 728
Massachusetts	12	852, 250	759	10		332, 553	1, 024, 960	1, 480, 611
Michigan	3	736, 896	778		16	405, 448	906, 211	1, 466, 256
Missouri	8	424, 200	926		50	411, 591	1, 405, 460	1, 931, 609
New Hampshire	1	10, 000	200			55, 000	125, 000	201, 659
New York	26	980, 522	1, 221	1	39	556, 590	1, 470, 232	2, 304, 680
Ohio	10	1, 264, 000	1, 512		27	675, 806	2, 133, 288	3, 429, 996
Pennsylvania	43	2, 946, 912	3, 850	2	48	1, 352, 299	6, 032, 114	8, 082, 272
South Carolina	2	1, 300	[illegible]			3, 912	3, 940	9, 813
Tennessee	3	175, 000	190			69, 500	161, 500	251, 000
Texas	1	15, 000	5			2, 000	2, 000	5, 500

CELLULOID AND CELLULOID GOODS.

(See Table IV (B) for New Jersey and New York.)

33.—CEMENT.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	36	$1, 827, 200	1, 040	4	55	$342, 106	$526, 420	$1, 133, 436
California	2	31, 000	13			3, 000	3, 700	11, 000
Georgia	1	3, 000	10			1, 800	800	8, 000
Illinois	2	340, 000	132		13	40, 000	30, 000	93, 000
Kansas	1	1, 000	9			2, 300	2, 000	5, 000
Kentucky	2	375, 000	147			25, 000	111, 000	145, 000
Maryland	1	50, 000	38	1	1	12, 320	2, 610	22, 328
Massachusetts	4	20, 400	10			6, 250	22, 650	60, 400
Michigan	1	75, 000	20			5, 000	9, 000	13, 000
Missouri	1	1, 000	3			400	200	1, 100
New Jersey	4	215, 300	76			34, 045	79, 650	140, 700
New York	10	193, 500	377		10	134, 701	164, 300	387, 958
Ohio	2	17, 000	22	3	4	9, 040	8, 500	21, 250
Pennsylvania	2	135, 000	104		27	50, 850	76, 200	147, 200
Texas	1	5, 000	3			400	1, 000	2, 000
Virginia	1	15, 000	6			1, 000	1, 810	5, 500
Wisconsin	1	350, 000	70			16, 000	13, 000	70, 000

34.—CHARCOAL.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	175	$457, 484	1, 393	2	6	$390, 697	$320, 735	$975, 540
Colorado	25	17, 864	75			23, 930	27, 096	81, 873
Connecticut	15	2, 805	32		2	6, 940	7, 885	23, 005
Massachusetts	1	800	1			450	1, 000	2, 000
Michigan	59	153, 425	692	2	2	195, 207	123, 457	417, 264
Missouri	11	2, 860	66			14, 030	3, 997	28, 638
New Hampshire	7	37, 300	89			23, 525	33, 100	87, 700
New Jersey	23	19, 075	50			10, 625	11, 750	31, 105
New York	3	6, 500	8			975	4, 700	7, 450
Pennsylvania	5	3, 900	14		2	2, 200	1, 600	9. 900
Rhode Island	2	55	2			250	750	1, 600
Utah	4	16, 000	53			18, 000	27, 960	60, 280
Vermont	9	145, 000	216			63, 400	23, 500	121, 500
Wisconsin	11	51, 900	95			31, 165	53, 940	103, 225

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

CHEESE AND BUTTER (FACTORY).

(See Table VII.)

CHOCOLATE.

(See Table IV (B) for Massachusetts and New York.)

CIGAR-MOLDS.

(See Table IV (B) for New Jersey, New York, and Ohio.)

CLEANSING AND POLISHING PREPARATIONS.

(See Table IV (B) for Connecticut, Illinois, Maryland, Massachusetts, New York, Ohio, and Pennsylvania.)

CLOCK CASES AND MATERIALS.

(See Table IV (B) for Connecticut; also Watch and clock materials.)

CLOCKS.

(See Table IV (B) for Connecticut, Massachusetts, New Hampshire, New Jersey, and New York; also Report by Special Agent C. H. Fitch, *post.*)

CLOTH FINISHING.

(See Table IV (B) for Connecticut, Maine, Maryland, Massachusetts, New York, Ohio, and Pennsylvania.)

CLOTHING, HORSE.

(See Table IV (B) for Massachusetts and Pennsylvania.)

35.—CLOTHING, MEN'S.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	6, 166	$79, 861, 696	77, 255	80, 994	2, 564	$45, 940, 353	$131, 363, 282	$209, 548, 460
Alabama	4	3, 600	13	5		9, 555	15, 400	35, 000
Arkansas	7	7, 800	19	3		11, 000	12, 700	35, 500
California	140	1, 177, 604	1, 155	623	21	959, 534	2, 318, 655	3, 992, 209
Colorado	9	6, 900	14	16		21, 225	34, 850	76, 350
Connecticut	121	763, 002	803	735	67	546, 624	1, 161, 112	2, 210, 150
Dakota	10	14, 300	26	8		15, 009	21, 337	53, 600
Delaware	10	77, 150	56	43	1	27, 549	51, 900	97, 900
District of Columbia	35	104, 550	157	68	2	98, 778	178, 302	376, 065
Georgia	9	27, 550	26	81		23, 890	34, 650	76, 350
Illinois	330	7, 135, 533	4, 842	4, 499	385	3, 929, 964	12, 809, 297	19, 356, 849
Indiana	228	810, 640	876	807	17	610, 114	1, 398, 380	2, 504, 816
Iowa	167	665, 363	512	377	3	353, 100	830, 510	1, 508, 398
Kansas	46	76, 300	149	40		82, 818	124, 175	275, 349
Kentucky	69	767, 700	876	825	40	351, 616	820, 611	1, 506, 668
Louisiana	34	190, 375	276	628	30	175, 971	743, 907	1, 079, 559
Maine	79	443, 475	254	1, 263	16	262, 112	637, 546	1, 130, 381
Maryland	220	3, 894, 943	5, 265	5, 970	59	1, 851, 938	6, 089, 052	9, 579, 066
Massachusetts	347	5, 172, 043	2, 740	8, 313	214	3, 832, 244	10, 846, 464	17, 902, 662
Michigan	136	1, 407, 625	658	1, 064	4	631, 163	1, 851, 037	3, 029, 478
Minnesota	115	467, 875	539	536	14	406, 361	910, 137	1, 662, 855
Mississippi	4	2, 110	11			4, 200	4, 950	13, 300
Missouri	170	1, 450, 254	1, 368	1, 681	13	882, 726	2, 104, 997	3, 822, 477
Montana	2	2, 300	4			4, 500	6, 000	13, 000
Nebraska	28	55, 950	78	20	1	51, 731	85, 780	181, 858
Nevada	3	1, 900	1			500	2, 100	4, 100
New Hampshire	61	183, 750	125	456		132, 081	494, 681	731, 389
New Jersey	180	1, 096, 709	1, 191	1, 974	74	988, 216	2, 870, 279	4, 737, 525
New Mexico	1	500	2			2, 100	1, 000	3, 600
New York	1, 583	30, 517, 107	36, 635	25, 822	651	18, 324, 466	52, 712, 947	81, 133, 611
North Carolina	3	1, 560	3	6		1, 016	3, 500	7, 500
Ohio	647	8, 651, 094	6, 026	7, 659	733	4, 136, 382	12, 043, 020	20, 008, 398
Oregon	22	45, 230	45	13		29, 151	57, 900	115, 404
Pennsylvania	876	10, 816, 742	8, 791	13, 328	91	5, 127, 682	15, 332, 253	23, 821, 887
Rhode Island	58	899, 277	455	586	37	423, 717	1, 138, 144	1, 980, 330
South Carolina	8	40, 300	37	5	4	12, 200	25, 900	49, 200
Tennessee	14	49, 200	111	242	10	87, 600	123, 300	277, 275
Texas	30	45, 970	103	11	4	42, 639	70, 776	153, 831
Utah	8	12, 610	20	33		20, 750	31, 894	61, 544
Vermont	23	53, 550	33	103		40, 440	89, 013	161, 059
Virginia	57	221, 202	258	481	2	147, 149	272, 716	584, 077
Washington	1	500					500	700
West Virginia	47	119, 150	218	33	15	71, 790	153, 950	312, 784
Wisconsin	212	2, 380, 403	2, 475	2, 637	56	1, 208, 752	2, 847, 660	4, 883, 797

Table III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

36.—CLOTHING, WOMEN'S.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	562	$8, 207, 273	2, 594	22, 253	345	$6, 661, 005	$19, 559, 227	$32, 004, 794
Arkansas	1	5, 000	2	10	....	2, 000	5, 000	10, 000
California	29	425, 270	35	633	7	221, 267	660, 232	1, 152, 600
Colorado	3	18, 300	....	130	5	60, 200	92, 150	176, 500
Connecticut	10	2, 500	25	15	....	6, 960	42, 240	54, 960
District of Columbia	1	4, 000	1	50	....	14, 000	12, 000	30, 000
Illinois	19	353, 500	72	1, 488	23	334, 885	1, 017, 720	1, 585, 990
Indiana	2	37, 000	3	87	....	20, 500	65, 000	109, 000
Iowa	1	2, 000	....	12	....	2, 250	8, 000	12, 500
Kentucky	3	45, 000	2	220	25	53, 300	275, 600	388, 900
Louisiana	6	83, 000	2	273	....	43, 875	113, 353	189, 278
Maine	2	4, 500	....	19	....	3, 300	5, 000	15, 500
Maryland	27	136, 250	22	482	23	84, 998	265, 192	469, 718
Massachusetts	34	389, 100	233	1, 978	17	470, 195	1, 155, 652	2, 020, 038
Michigan	4	14, 800	....	60	....	13, 780	14, 300	36, 100
Minnesota	9	31, 200	1	80	....	24, 100	93, 350	147, 900
Missouri	15	172, 111	75	514	30	141, 174	316, 143	586, 899
Nebraska	1	12, 000	....	12	2	3, 800	30, 000	40, 000
New Hampshire	1	1, 000	....	4	....	250	1, 200	1, 800
New Jersey	5	22, 200	11	41	1	13, 325	47, 800	79, 300
New York	277	5, 141, 290	1, 649	11, 892	64	4, 196, 913	12, 577, 958	20, 314, 307
Ohio	25	249, 902	52	1, 153	49	275, 875	756, 902	1, 280, 654
Pennsylvania	75	941, 950	351	2, 878	99	618, 603	1, 776, 610	2, 977, 810
Rhode Island	7	21, 400	6	59	....	18, 555	94, 825	137, 880
Tennessee	1	30, 000	18	....	....	7, 000	24, 000	40, 000
Wisconsin	4	64, 000	34	163	....	29, 900	109, 000	147, 100

COAL-TAR.

(See Table IV (B) for Georgia, New Jersey, and Pennsylvania.)

37.—COFFEE AND SPICES, ROASTED AND GROUND.

The United States	300	$6, 366, 392	2, 125	438	153	$1, 370, 699	$18, 201, 302	$22, 924, 894
California	28	504, 896	230	6	10	113, 032	1, 123, 153	1, 424, 878
Colorado	1	30, 000	3	5	....	4, 500	17, 500	27, 000
Connecticut	9	145, 000	45	12	2	29, 800	302, 000	383, 500
Delaware	1	3, 000	....	....	1	500	5, 000	7, 000
District of Columbia	3	17, 600	14	....	....	6, 356	84, 680	100, 020
Georgia	1	17, 000	8	3	6	5, 200	21, 000	43, 000
Illinois	15	530, 900	209	44	51	159, 996	2, 477, 021	3, 008, 870
Indiana	9	174, 500	62	11	3	26, 608	439, 450	529, 100
Iowa	8	38, 000	27	5	1	15, 428	95, 063	135, 000
Kansas	2	2, 450	6	....	....	3, 125	8, 159	13, 899
Kentucky	4	59, 500	25	....	8	22, 892	217, 500	296, 953
Louisiana	3	1, 300	3	....	1	1, 524	9, 510	11, 876
Maine	7	33, 500	21	9	....	16, 611	169, 625	216, 500
Maryland	13	124, 750	46	23	....	24, 503	221, 108	299, 874
Massachusetts	21	368, 200	119	38	1	85, 039	1, 438, 971	1, 680, 229
Michigan	5	72, 450	33	6	1	19, 650	159, 000	213, 000
Minnesota	6	113, 500	16	6	9	13, 725	128, 450	180, 500
Missouri	7	240, 000	95	2	4	44, 090	416, 500	598, 000
Nebraska	1	6, 000	2	1	1	1, 600	20, 000	30, 000
Nevada	1	1, 000	2	....	....	100	700	1, 000
New Jersey	7	116, 000	33	3	....	19, 079	240, 060	319, 888
New York	58	2, 065, 725	544	74	22	380, 259	6, 073, 482	7, 652, 672
Ohio	27	416, 000	208	41	11	135, 292	1, 118, 327	1, 517, 114
Oregon	2	17, 000	1	3	....	1, 000	24, 000	31, 000
Pennsylvania	32	885, 000	171	121	5	118, 383	2, 240, 980	2, 652, 830
Rhode Island	5	42, 000	19	....	....	10, 676	121, 536	156, 194
Tennessee	2	19, 000	6	....	....	2, 625	132, 450	142, 476
Texas	2	2, 500	3	....	....	1, 240	6, 000	9, 050
Vermont	2	5, 000	5	....	....	1, 400	40, 000	46, 500
Virginia	6	49, 500	39	1	1	14, 460	144, 000	244, 800
Washington	1	1, 500	....	....	....	....	3, 200	5, 000
West Virginia	1	5, 000	3	5	....	1, 456	7, 835	11, 523
Wisconsin	10	258, 621	127	19	15	90, 550	695, 042	935, 640

38.—COFFINS, BURIAL CASES, AND UNDERTAKERS' GOODS.

The United States	769	$5, 735, 392	3, 762	481	172	$1, 895, 805	$3, 776, 222	$8, 157, 760
Alabama	3	8, 500	4	....	....	1, 268	7, 900	12, 300
Arkansas	1	800	1	....	....	700	1, 550	3, 000
California	18	101, 150	63	....	....	45, 153	65, 225	189, 560
Connecticut	17	243, 017	150	42	3	82, 199	162, 627	390, 339
Delaware	10	22, 600	15	....	....	6, 850	13, 050	29, 500

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

38.—COFFINS, BURIAL CASES, AND UNDERTAKERS' GOODS—Continued.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
District of Columbia	14	$61, 425	32			$19, 631	$41, 440	$92, 640
Georgia	4	24, 500	46			14, 101	26, 128	50, 153
Illinois	39	306, 675	179	13	8	99, 477	251, 295	470, 985
Indiana	41	556, 100	349	30	15	167, 844	222, 975	585, 406
Iowa	15	45, 900	36	1		13, 564	22, 500	60, 050
Kansas	5	17, 300	6			3, 082	4, 000	10, 300
Kentucky	17	119, 900	77	3		30, 745	46, 600	134, 775
Louisiana	7	2, 900	9			2, 911	4, 122	13, 866
Maine	34	72, 600	59	2		26, 460	39, 952	101, 553
Maryland	63	101, 975	81		1	34, 119	79, 553	200, 173
Massachusetts	36	369, 300	219	33	4	138, 981	269, 402	494, 435
Michigan	13	100, 600	120	1	5	50, 698	72, 279	184, 308
Minnesota	2	3, 100	3			1, 480	3, 000	7, 500
Mississippi	2	3, 200	5			3, 400	10, 300	15, 950
Missouri	19	48, 600	31	4		14, 793	127, 140	186, 017
Nebraska	1	2, 500	1			300	2, 000	3, 000
Nevada	3	8, 500	3			3, 885	2, 245	17, 713
New Hampshire	10	21, 450	14	1	1	6, 016	11, 500	25, 080
New Jersey	34	151, 770	74	1	7	47, 583	67, 015	166, 470
New York	115	1, 360, 085	679	166	10	399, 309	953, 199	1, 942, 577
North Carolina	6	7, 500	7		1	1, 764	3, 970	9, 600
Ohio	37	1, 043, 650	738	141	107	376, 843	667, 880	1, 489, 926
Oregon	5	18, 425	3			1, 200	7, 450	12, 950
Pennsylvania	105	681, 425	547	38	5	229, 036	425, 267	903, 074
Rhode Island	12	48, 000	48	4	1	24, 208	56, 423	113, 293
South Carolina	1	1, 200	2			350	1, 500	2, 500
Tennessee	27	40, 485	36			10, 640	31, 600	75, 900
Texas	3	7, 000	3			2, 000	2, 500	6, 000
Vermont	12	41, 200	36			9, 800	43, 750	71, 920
Virginia	23	18, 960	24			7, 249	13, 485	35, 750
Washington	2	4, 000	3			500	1, 800	4, 000
West Virginia	7	9, 800	10			2, 175	3, 650	8, 700
Wisconsin	6	59, 300	49	1	4	15, 491	9, 950	36, 437

COKE.

(See Report by Special Agent J. D. Weeks, *post.*)

COLLARS AND CUFFS, PAPER.

(See Table IV (B) for Massachusetts, New York, Pennsylvania, and Rhode Island.)

COMBS.

(See Table IV (B) for Connecticut, Massachusetts, Michigan, New Jersey, New York, Ohio, and Pennsylvania.)

39.—CONFECTIONERY.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	1, 450	$8, 486, 874	6, 157	2, 827	817	$3, 242, 852	$17, 125, 775	$25, 637, 033
Alabama	5	12, 200	27	1	1	10, 045	57, 550	98, 500
Arizona	1	300	1			750	1, 500	3, 650
Arkansas	3	1, 900	4			1, 600	6, 300	11, 800
California	48	241, 400	130	38	18	83, 723	472, 876	721, 797
Colorado	6	7, 900	23	1	4	17, 250	20, 700	49, 550
Connecticut	28	75, 150	81	32	15	45, 737	174, 345	308, 203
Dakota	1	500	1			100	1, 500	2, 000
Delaware	3	49, 000	16	2		5, 600	18, 000	35, 000
District of Columbia	27	85, 575	80	24	2	40, 131	122, 263	221, 902
Florida	2	2, 500	2	2	2	1, 944	1, 800	5, 700
Georgia	14	130, 700	82	24	4	28, 831	263, 165	336, 325
Illinois	44	482, 250	373	173	139	242, 908	1, 589, 850	2, 208, 792
Indiana	29	132, 400	105	29	20	52, 302	286, 935	432, 080
Iowa	18	96, 850	49	19	10	27, 334	137, 441	225, 850
Kansas	12	26, 450	40	3	4	20, 613	58, 300	138, 750
Kentucky	26	188, 925	110	19	5	46, 414	181, 999	318, 540
Louisiana	21	132, 800	86	11	17	33, 754	274, 571	393, 040
Maine	24	83, 300	71	38		23, 311	92, 586	166, 225
Maryland	64	390, 665	253	93	15	119, 728	815, 692	1, 164, 755
Massachusetts	76	490, 175	443	345	7	288, 868	1, 529, 340	2, 281, 850
Michigan	21	308, 475	187	94	10	103, 361	624, 750	802, 273
Minnesota	14	66, 850	46	6	1	24, 730	120, 400	176, 350
Mississippi	5	3, 900	22	1	2	8, 249	14, 350	34, 500
Missouri	46	319, 260	234	190	25	174, 574	835, 540	1, 247, 235
Montana	2	1, 200	2			650	1, 700	3, 600
Nebraska	4	2, 400	4			1, 200	4, 300	8, 800
New Hampshire	8	22, 300	27	10	5	15, 070	57, 854	98, 500
New Jersey	57	195, 550	223	44	35	112, 252	592, 942	883, 325
New York	392	2, 279, 658	1, 566	829	176	835, 204	4, 304, 823	6, 686, 389
North Carolina	5	13, 750	34	7	2	4, 502	17, 608	29, 345

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

39.—CONFECTIONERY—Continued.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Average number of hands employed. Females above 15 years.	Average number of hands employed. Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Ohio	64	$377, 875	339	118	40	$156, 449	$682, 802	$1, 248, 288
Oregon	4	26, 700	13	1	1	10, 050	33, 500	50, 700
Pennsylvania	283	1, 718, 690	1, 036	531	204	512, 141	2, 358, 774	3, 564, 934
Rhode Island	12	30, 100	33	12	4	20, 209	60, 288	114, 450
South Carolina	5	3, 000	7		3	2, 830	15, 250	23, 240
Tennessee	10	89, 500	87	76	12	35, 450	266, 500	361, 225
Texas	16	85, 300	55	5	4	31, 830	141, 485	241, 350
Utah	4	17, 000	9	2	2	6, 475	32, 888	51, 180
Vermont	4	40, 000	18	6		8, 850	61, 700	95, 000
Virginia	25	91, 372	100	7	7	35, 233	144, 246	221, 330
Washington	2	1, 750	2			600	8, 700	13, 800
West Virginia	6	12, 050	19	2		6, 202	52, 500	68, 464
Wisconsin	9	149, 254	117	32	21	45, 798	386, 162	488, 446

40.—COOPERAGE.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Average number of hands employed. Females above 15 years.	Average number of hands employed. Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	3, 898	$12, 178, 726	24, 435	42	1, 496	$8, 992, 603	$18, 441, 064	$33, 714, 770
Alabama	5	1, 780	10			3, 350	1, 875	8, 547
Arkansas	5	8, 800	27			13, 450	7, 600	29, 000
California	49	485, 375	316		20	213, 656	354, 170	721, 034
Connecticut	13	24, 100	50			18, 773	29, 951	60, 850
Delaware	2	19, 000	8			2, 500	6, 500	12, 000
District of Columbia	3	6, 700	28			11, 300	10, 770	25, 770
Georgia	7	11, 950	29			9, 880	43, 100	60, 172
Illinois	372	865, 720	2, 297	1	48	877, 471	1, 737, 539	3, 233, 305
Indiana	265	970, 560	2, 447		140	843, 942	1, 943, 638	3, 342, 552
Iowa	112	194, 539	515		4	207, 573	312, 066	660, 213
Kansas	16	35, 550	137			30, 527	77, 415	138, 566
Kentucky	113	410, 815	947		13	394, 796	573, 496	1, 243, 930
Louisiana	124	129, 395	423		1	151, 830	155, 486	419, 074
Maine	118	189, 913	435			105, 614	193, 234	385, 304
Maryland	72	250, 090	454		7	164, 122	384, 800	657, 424
Massachusetts	86	386, 734	596		11	231, 089	430, 137	784, 329
Michigan	265	558, 569	1, 280		56	409, 186	827, 671	1, 584, 469
Minnesota	72	301, 650	680		41	322, 559	529, 299	1, 007, 643
Mississippi	2	150	3			1, 250	750	2, 600
Missouri	182	609, 260	1, 227		97	510, 654	1, 017, 617	1, 904, 822
Nebraska	5	23, 000	41			25, 500	48, 387	78, 600
New Hampshire	32	142, 050	248			83, 694	92, 698	226, 281
New Jersey	27	190, 300	338		13	123, 788	405, 421	697, 374
New York	740	2, 752, 727	4, 479	35	360	1, 676, 719	3, 913, 531	6, 765, 719
North Carolina	55	22, 620	177			32, 736	32, 450	85, 655
Ohio	412	1, 371, 100	2, 768	2	341	969, 610	1, 852, 907	3, 486, 032
Oregon	12	42, 100	62		1	17, 352	32, 200	92, 712
Pennsylvania	249	1, 385, 335	1, 845	2	174	671, 464	2, 126, 784	3, 256, 552
Rhode Island	3	20, 732	27		2	14, 884	27, 150	60, 560
South Carolina	12	7, 325	26	1		5, 489	5, 400	15, 725
Tennessee	52	36, 350	172			44, 284	55, 240	153, 275
Texas	14	25, 650	53		1	41, 525	94, 650	172, 800
Utah	3	575	3			541	480	1, 566
Vermont	73	112, 925	177	1	8	36, 905	47, 109	134, 996
Virginia	75	77, 751	463		15	73, 430	146, 021	279, 964
Washington	4	11, 500	77		3	32, 385	13, 450	56, 000
West Virginia	49	66, 876	278		52	100, 767	152, 806	306, 147
Wisconsin	198	429, 160	1, 292		88	518, 008	757, 266	1, 563, 208

41.—COPPERSMITHING.

(See also Tinware, copperware, and sheet-iron ware.)

States and Territories.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Average number of hands employed. Females above 15 years.	Average number of hands employed. Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	98	$915, 102	852	2	14	$520, 302	$1, 227, 947	$2, 087, 773
Delaware	1	8, 000	7			2, 000	9, 000	14, 800
Georgia	1	500	1			200	900	1, 600
Illinois	3	3, 100	10			4, 460	4, 820	14, 200
Indiana	1	5, 000	8			2, 500	16, 000	20, 000
Kentucky	3	16, 550	17			7, 200	51, 700	74, 600
Maryland	8	20, 200	21			11, 900	15, 600	32, 250
Massachusetts	9	109, 200	145		5	87, 950	122, 800	262, 100
Missouri	4	4, 500	11		1	6, 800	14, 000	27, 500
New Jersey	1	30, 000	27		3	20, 000	100, 000	175, 000
New York	40	471, 202	412		1	279, 392	645, 268	1, 021, 372
North Carolina	3	12, 650	18			6, 000	9, 200	22, 400
Ohio	5	34, 000	50		2	25, 054	57, 740	102, 536
Oregon	1	4, 000	1			100	500	900
Pennsylvania	11	148, 950	95	2	1	51, 654	148, 849	255, 423
South Carolina	1	3, 000	2		1	1, 000	3, 000	5, 000
Virginia	1	1, 400	3			1, 300	1, 200	5, 200
Wisconsin	5	42, 850	24			12, 792	27, 370	52, 892

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

42.—CORDAGE AND TWINE.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	165	$7, 140, 475	2, 926	1, 480	1, 029	$1, 558, 676	$9, 330, 261	$12, 492, 171
California	3	500, 700	145		18	57, 215	402, 115	545, 230
Connecticut	4	18, 000	13	4	4	4, 250	23, 488	32, 680
District of Columbia	1	500	3			1, 404	2, 000	5, 100
Illinois	2	8, 200	6		5	3, 241	19, 850	28, 500
Indiana	1	500	2			400	600	1, 500
Iowa	4	13, 800	30		4	9, 455	26, 604	42, 314
Kansas	1	2, 000	5		3	1, 600	5, 000	9, 000
Kentucky	9	137, 900	155		62	72, 923	213, 120	354, 750
Louisiana	2	6, 000	7		7	4, 095	12, 000	24, 000
Maine	3	80, 800	39	3		10, 450	70, 030	129, 500
Maryland	4	18, 500	21		6	7, 145	22, 442	32, 455
Massachusetts	29	1, 533, 450	893	136	60	344, 607	2, 195, 311	2, 995, 395
Michigan	1	1, 000	2			700	800	4, 000
Missouri	15	14, 075	42		40	18, 423	42, 250	80, 164
New Hampshire	1	15, 000	4	3		1, 908	7, 320	13, 196
New Jersey	5	381, 400	114	67	43	71, 745	630, 943	756, 521
New York	37	3, 032, 100	939	1, 017	505	632, 748	4, 110, 112	5, 207, 135
Ohio	10	35, 100	53	7	25	23, 105	38, 950	76, 410
Pennsylvania	23	1, 289, 250	395	240	247	274, 282	1, 487, 026	2, 039, 721
Rhode Island	2	25, 000	24			7, 950	48, 000	70, 000
Utah	1	300					300	1, 000
Vermont	1	1, 500	3	3		1, 080	3, 000	7, 000
West Virginia	1	600	2			250	400	1, 000
Wisconsin	5	24, 800	29			9, 700	18, 600	35, 600

CORDIALS AND SIRUPS.

(See Table IV (B) for California, Louisiana, Massachusetts, and Missouri.)

43.—CORK CUTTING.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	46	$872, 384	382	270	140	$232, 846	$976, 274	$1, 566, 555
Connecticut	1	10, 000	2	3		1, 200	10, 000	14, 000
Illinois	[illegible]	45, 800	24	15	17	22, 103	125, 038	217, 220
Kentucky	1	12, 000	10	5	7	3, 500	18, 000	24, 000
Louisiana	1	30, 000	14			4, 000	20, 000	30, 000
Maryland	1	12, 000	5	4	5	3, 500	15, 000	30, 000
Massachusetts	5	38, 434	44	28	6	23, 249	68, 467	124, 434
Missouri	1	18, 000	2	5		5, 200	10, 000	18, 000
New Jersey	2	50, 200	43		20	15, 900	50, 400	77, 400
New York	20	176, 400	97	64	20	50, 430	186, 109	323, 001
Pennsylvania	11	479, 550	141	146	65	97, 764	473, 260	708, 500

44.—CORSETS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	113	$1, 611, 695	776	7, 487	539	$1, 745, 969	$3, 686, 821	$6, 494, 705
Arkansas	1	150		3		550	850	1, 600
California	4	4, 300		9	1	3, 000	3, 550	12, 200
Connecticut	22	906, 900	394	3, 844	136	827, 400	1, 949, 159	3, 322, 359
Illinois	2	15, 075	10	104		38, 334	100, 900	177, 384
Iowa	1	2, 000		3		1, 000	2, 000	4, 000
Maine	1	3, 500	2	12		3, 800	8, 250	15, 000
Maryland	2	18, 000	2	28	6	6, 640	14, 000	28, 000
Massachusetts	11	158, 400	114	1, 241	161	338, 562	557, 100	1, 018, 025
Michigan	7	88, 950	36	322	16	80, 610	204, 700	391, 300
Minnesota	2	5, 000		14		4, 425	7, 900	14, 750
Missouri	3	720	2	3		1, 450	2, 410	6, 460
Nebraska	1	300		3		700	2, 000	4, 000
New Hampshire	1	1, 000	[illegible]	8		2, 000	2, 000	5, 000
New Jersey	[illegible]	104, 100	53	340	74	115, 698	213, 880	371, 633
New York	27	211, 100	118	1, 235	116	228, 551	443, 561	791, 639
Ohio	4	12, 900	3	45	1	7, 395	10, 800	25, 000
Pennsylvania	10	62, 800	20	171	2	44, 018	129, 061	205, 505
Rhode Island	2	8, 000	6	39	10	13, 500	15, 200	39, 850
Tennessee	2	3, 500	5	3	3	3, 336	4, 500	11, 000
Wisconsin	1	5, 000	7	60	13	25, 000	15, 000	50, 000

COTTON COMPRESSING.

(See Table IV (B) for Georgia, Louisiana, Mississippi, South Carolina, Tennessee, and Texas.)

COTTON GOODS.

(See Mixed textiles; also Report by Special Agent E. Atkinson, *post.*)

COTTON TIES.

(See Table IV (B) for Georgia, Massachusetts, Rhode Island, South Carolina, and Tennessee.)

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

CRUCIBLES.

(See Table IV (B) for Massachusetts, New Jersey, and Pennsylvania.)

45.—CUTLERY AND EDGE TOOLS.

(See also Hardware; Tools.)

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	429	$9, 859, 885	9, 458	380	681	$4, 447, 349	$4, 682, 222	$11, 661, 370
California	11	104, 500	54		1	39, 623	37, 150	119, 339
Colorado	1	200	1			750	500	2, 000
Connecticut	54	1, 610, 000	2, 362	171	126	1, 232, 013	907, 147	2, 704, 708
Illinois	13	133, 700	143	8	27	71, 581	52, 170	185, 000
Indiana	5	3, 850	11			2, 456	4, 850	11, 121
Iowa	2	30, 000	21	2	18	8, 175	9, 647	28, 000
Kentucky	5	54, 600	73		1	31, 979	28, 600	75, 350
Louisiana	2	400	1			180	125	1, 350
Maine	14	68, 200	63			23, 188	33, 213	71, 687
Maryland	10	22, 550	23		1	9, 200	11, 156	30, 596
Massachusetts	63	2, 028, 722	1, 686	92	179	808, 788	872, 878	2, 133, 654
Michigan	9	39, 000	50		3	23, 002	26, 710	68, 212
Minnesota	2	2, 000	3			1, 800	400	5, 160
Missouri	5	5, 000	21			10, 196	8, 850	26, 650
New Hampshire	12	255, 600	257	6	6	100, 492	108, 364	270, 444
New Jersey	30	345, 311	591	3	90	306, 275	261, 038	723, 640
New York	87	1, 590, 742	1, 443	38	100	614, 403	799, 137	1, 680, 960
North Carolina	1	1, 000	[illegible]			2, 000	5, 000	10, 000
Ohio	28	916, 900	538	8	23	246, 487	321, 759	790, 000
Oregon	1	300	1			300	185	900
Pennsylvania	61	2, 585, 610	2, 024	46	106	882, 612	1, 148, 138	2, 614, 239
Rhode Island	4	25, 550	45			15, 889	16, 660	45, 360
Texas	1	1, 500	5	5		2, 560	2, 500	12, 000
Vermont	4	19, 950	20			7, 250	11, 835	24, 300
Wisconsin	4	14, 700	13	1		6, 150	14, 210	26, 700

46.—DENTISTRY, MECHANICAL.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	753	$773, 670	469	35	37	$269, 044	$455, 037	$1, 860, 647
Alabama	2	2, 500	1			200	700	4, 200
Arkansas	2	550	2			400	600	2, 400
California	39	19, 980	18			9, 470	14, 535	69, 725
Connecticut	17	21, 400	16		1	8, 248	14, 525	49, 075
District of Columbia	6	4, 975	6			2, 632	5, 600	19, 200
Georgia	2	1, 800					1, 800	5, 500
Illinois	82	65, 290	54	5	2	29, 163	41, 970	217, 539
Indiana	39	24, 980	20	6	1	10, 952	16, 787	70, 198
Iowa	24	17, 000	13		1	11, 647	7, 630	37, 930
Kansas	1	600	1			501	1, 071	2, 720
Kentucky	10	32, 500	8			6, 075	14, 700	49, 500
Louisiana	3	9, 200	6		3	5, 350	8, 250	20, 150
Maine	5	3, 900	1			180	1, 920	6, 210
Maryland	14	12, 260	11	1	1	6, 323	4, 313	32, 788
Massachusetts	46	43, 325	31		1	18, 438	31, 052	125, 514
Michigan	30	41, 300	16	3	1	8, 996	20, 010	65, 467
Minnesota	18	16, 950	8		1	3, 982	9, 360	46, 830
Missouri	15	9, 660	7	3	1	5, 034	8, 450	39, 870
Nebraska	2	650					600	1, 600
New Hampshire	10	8, 900	8			3, 212	4, 530	19, 600
New Jersey	34	71, 800	33	6	10	18, 658	46, 234	155, 217
New York	156	169, 450	97		8	47, 044	78, 309	335, 220
Ohio	66	66, 850	35	2	1	26, 556	40, 159	179, 295
Oregon	3	3, 200					1, 000	4, 800
Pennsylvania	53	58, 200	30	2	3	16, 345	32, 230	114, 919
Rhode Island	25	27, 825	17	3		13, 268	12, 942	67, 050
South Carolina	7	2, 800					3, 785	9, 800
Tennessee	2	2, 500	1			240	1, 000	4, 000
Texas	2	700	1			300	800	3, 500
Utah	6	8, 100	4	2		2, 250	2, 850	18, 950
Vermont	15	10, 700	8	1		3, 500	6, 525	21, 230
Virginia	3	1, 600	1			180	1, 400	6, 000
Wisconsin	14	12, 225	15	1	2	9, 900	19, 400	54, 650

47.—DENTISTS' MATERIALS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	20	$840, 800	405	70	15	$237, 729	$247, 824	$860, 758
Delaware	1	20, 000	9			5, 000	10, 000	18, 000
Illinois	3	11, 000	18	5		11, 300	12, 000	46, 000
Missouri	1	200					300	1, 000
New Jersey	3	3, 800	2			600	950	2, 400
New York	6	85, 800	117	5	4	63, 304	60, 874	220, 858
Ohio	1	2, 000	1			750	3, 500	5, 000
Pennsylvania	4	715, 000	255	60	11	156, 175	159, 000	564, 000
West Virginia	1	3, 000	[illegible]			600	1, 200	3, 500

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

48.—DRAIN AND SEWER PIPE.

(See also Brick and tile; Terra-cotta ware.)

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	51	$489, 163	270	....	5	$114, 542	$176, 143	$480, 261
California	2	15, 800	6	....	....	2, 800	2, 800	13, 200
Connecticut	3	47, 063	22	....	....	8, 500	13, 000	26, 500
Indiana	8	12, 000	9	....	....	4, 500	4, 000	19, 000
Kentucky	2	26, 000	20	....	2	8, 500	11, 700	32, 500
Maine	2	16, 000	8	....	....	4, 600	3, 800	10, 450
Massachusetts	5	59, 300	20	....	....	8, 225	17, 050	38, 500
Minnesota	2	15, 000	7	....	....	3, 000	4, 300	10, 700
Missouri	2	50, 300	9	....	....	3, 350	16, 120	25, 500
New Hampshire	2	4, 500	4	....	....	1, 158	3, 794	7, 500
New York	12	105, 200	65	....	3	25, 403	57, 908	124, 866
Ohio	5	89, 500	57	....	....	22, 230	13, 700	93, 000
Pennsylvania	1	20, 000	16	....	....	10, 000	12, 000	30, 000
Rhode Island	1	5, 000	3	....	....	1, 400	1, 600	8, 000
Texas	2	8, 500	6	....	....	3, 600	4, 200	13, 000
Vermont	1	5, 000	4	....	....	1, 500	3, 000	6, 000
Wisconsin	1	10, 000	14	....	....	5, 776	7, 171	21, 545

49.—DRUGS AND CHEMICALS.

(See also Baking and yeast powders; Patent medicines and compounds.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	592	$28, 598, 458	8, 144	1, 138	263	$4, 157, 163	$24, 380, 566	$38, 173, 658
California	39	399, 625	150	2	3	91, 639	296, 601	623, 041
Colorado	3	10, 800	8	1	....	5, 900	15, 500	38, 500
Connecticut	9	227, 400	115	1	....	53, 340	219, 440	344, 164
District of Columbia	5	54, 000	25	....	1	10, 190	31, 836	63, 025
Georgia	1	10, 000	100	25	....	37, 000	50, 000	125, 000
Illinois	28	513, 800	230	66	16	132, 700	734, 828	1, 170, 216
Indiana	9	84, 700	48	26	....	26, 976	63, 692	129, 273
Iowa	6	11, 700	10	2	1	3, 200	14, 850	27, 350
Kansas	1	30, 000	8	3	5	1, 200	15, 000	22, 500
Kentucky	7	46, 500	23	....	13	9, 770	27, 250	61, 500
Louisiana	7	16, 700	13	....	....	4, 190	8, 850	22, 750
Maine	5	84, 400	30	2	....	10, 150	37, 950	64, 000
Maryland	18	655, 300	194	47	....	80, 394	531, 485	881, 125
Massachusetts	38	1, 120, 350	384	24	5	185, 274	1, 035, 694	1, 676, 630
Michigan	38	216, 150	192	21	16	66, 609	115, 761	447, 611
Minnesota	8	28, 550	12	....	....	4, 6 0	19, 750	40, 800
Missouri	21	722, 450	236	64	32	130, 475	680, 545	1, 220, 211
Nebraska	2	20, 500	12	....	....	6, 300	16, 000	162, 200
Nevada	2	124, 000	22	....	....	22, 230	35, 175	207, 160
New Hampshire	6	17, 200	13	....	....	2, 178	26, 293	37, 991
New Jersey	41	3, 830, 750	1, 215	27	30	598, 743	3, 528, 204	4, 993, 965
New York	112	6, 779, 899	1, 652	392	46	993, 556	6, 978, 755	9, 091, 259
Ohio	46	839, 500	366	6	10	119, 219	618, 145	1, 082, 420
Oregon	2	30, 800	5	....	....	2, 800	8, 000	18, 000
Pennsylvania	75	11, 680, 812	2, 362	340	76	1, 300, 238	8, 245, 297	13, 092, 863
Rhode Island	13	472, 500	239	70	....	142, 099	584, 436	847, 378
Texas	1	2, 000	7	....	2	5, 552	6, 000	13, 827
Utah	1	1, 200	....	2	....	200	1, 000	1, 800
Vermont	3	135, 000	44	....	....	10, 800	9, 800	28, 805
Virginia	20	281, 000	344	2	5	63, 535	280, 740	438, 030
Washington	1	800	....	....	....	....	600	1, 500
West Virginia	10	87, 100	54	....	1	21, 745	66, 210	180, 196
Wisconsin	14	62, 972	31	15	1	14, 361	76, 879	118, 568

50.—DYEING AND CLEANING.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	303	$851, 110	893	499	75	$511, 886	$581, 886	$1, 613, 943
California	13	32, 925	29	15	1	21, 871	17, 719	59, 666
Colorado	2	1, 450	2	....	....	500	1, 025	3, 200
Connecticut	12	29, 100	30	20	....	17, 328	11, 160	43, 626
District of Columbia	2	11, 000	7	3	....	4, 072	1, 800	10, 350
Georgia	4	7, 850	9	4	....	3, 914	2, 824	11, 500
Illinois	21	82, 000	81	15	7	50, 283	47, 768	149, 006
Indiana	8	5, 500	19	24	....	13, 350	11, 700	37, 600
Iowa	2	1, 600	2	2	....	1, 300	1, 150	3, 590
Kansas	1	400	1	1	....	546	300	1, 000
Kentucky	4	11, 550	4	3	....	2, 300	1, 750	9, 970
Louisiana	12	6, 925	13	3	1	5, 080	3, 890	22, 850
Maine	2	2, 500	3	2	....	1, 100	1, 100	6, 000
Maryland	28	55, 885	47	19	....	25, 431	31, 160	89, 162
Massachusetts	37	159, 000	197	208	5	132, 046	78, 069	309, 529
Michigan	6	16, 200	10	14	....	9, 228	5, 700	22, 100

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

50.—DYEING AND CLEANING—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Minnesota	5	$12, 150	4	1	....	$2, 550	$2, 350	$10, 450
Missouri	5	16, 450	17	6	1	6, 950	2, 650	23, 900
Nebraska	1	200	1	....	....	350	200	1, 000
New Hampshire	1	1, 000	1	....	....	150	200	1, 200
New Jersey	13	118, 350	131	28	42	65, 700	83, 275	178, 200
New York	66	131, 025	128	72	3	74, 448	210, 010	385, 171
Ohio	20	59, 850	36	20	3	25, 022	13, 658	71, 507
Pennsylvania	24	56, 350	71	17	3	26, 674	31, 440	89, 570
Rhode Island	4	16, 000	18	8	....	9, 708	6, 738	25, 806
Vermont	1	700	1	....	....	100	250	900
Virginia	6	5, 350	13	7	1	5, 100	10, 600	24, 600
Wisconsin	3	9, 800	18	7	8	6, 785	3, 400	22, 580

DYEING AND FINISHING TEXTILES.

(See Table VII.)

51.—DYESTUFFS AND EXTRACTS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	41	$2, 363, 700	976	10	6	$512, 097	$3, 918, 741	$5, 253, 038
Connecticut	4	307, 000	232	....	....	144, 900	1, 294, 140	1, 560, 900
Delaware	2	17, 000	19	....	....	4, 000	7, 100	15, 400
Maine	2	115, 000	18	....	....	6, 385	23, 600	99, 900
Maryland	2	3, 500	4	....	....	900	5, 100	9, 000
Massachusetts	5	293, 000	178	....	....	95, 834	557, 221	812, 040
New Jersey	6	119, 000	75	....	....	26, 383	200, 814	249, 352
New York	10	933, 200	303	10	6	164, 315	1, 399, 176	1, 831, 762
Pennsylvania	6	432, 000	107	....	....	50, 185	269, 090	452, 979
Rhode Island	4	144, 000	40	....	....	19, 195	162, 500	221, 705

ELECTRIC LIGHTS.

(See Table IV (B) for California, New Jersey, and Ohio.)

52.—ELECTRICAL APPARATUS AND SUPPLIES.

(See also Telegraph and telephone apparatus.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	36	$873, 300	335	35	8	$224, 758	$360, 579	$1, 074, 388
California	3	82, 100	22	....	....	20, 600	17, 162	52, 149
Connecticut	2	230, 000	28	....	....	18, 500	40, 000	100, 000
Illinois	3	271, 200	127	25	....	100, 603	143, 587	543, 000
Indiana	2	1, 400	....	....	....	....	800	3, 200
Kentucky	1	1, 500	2	....	....	750	1, 600	4, 300
Maryland	1	200	1	....	....	40	225	700
Massachusetts	10	165, 500	90	1	1	51, 008	50, 506	131, 289
Michigan	1	3, 000	1	....	....	150	500	1, 400
New Hampshire	1	2, 000	5	....	....	1, 875	1, 000	4, 500
New York	3	17, 500	11	1	....	8, 450	17, 150	38, 900
Ohio	6	83, 900	32	8	6	15, 310	80, 900	174, 180
Pennsylvania	3	15, 000	16	....	1	7, 472	7, 149	20, 770

53.—ELECTROPLATING.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	221	$865, 898	1, 257	89	95	$620, 848	$663, 588	$1, 975, 700
California	11	21, 750	11	3	1	6, 542	13, 773	35, 935
Connecticut	6	183, 200	167	16	10	100, 400	116, 900	320, 100
District of Columbia	2	550	1	....	1	578	330	2, 028
Illinois	11	32, 300	42	2	6	22, 645	13, 020	71, 000
Indiana	3	1, 400	3	....	....	1, 218	1, 150	4, 550
Kentucky	1	2, 000	4	....	....	1, 600	700	4, 400
Maine	3	2, 100	8	....	....	2, 550	6, 496	10, 982
Maryland	5	17, 525	29	....	2	10, 166	7, 350	36, 600
Massachusetts	33	141, 350	135	6	3	61, 166	86, 590	253, 600
Michigan	5	2, 750	16	1	....	5, 263	5, 295	14, 300
Minnesota	1	200	1	....	....	50	100	800
Missouri	9	17, 900	30	1	2	13, 225	9, 920	45, 200
New Hampshire	2	3, 000	3	....	....	1, 550	2, 400	5, 700
New Jersey	2	3, 000	7	....	....	2, 800	3, 500	11, 000
New York	78	228, 600	511	52	52	264, 169	185, 927	696, 932
Ohio	12	38, 610	107	2	5	37, 037	26, 865	102, 090
Pennsylvania	24	102, 463	120	5	11	52, 427	43, 175	145, 094
Rhode Island	10	65, 600	58	1	2	36, 162	136, 372	208, 164
Tennessee	1	100	....	....	....	....	275	875
Vermont	1	1, 000	2	....	....	600	3, 000	4, 200
Wisconsin	1	500	2	....	....	700	450	2, 150

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

54.—EMERY WHEELS.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	11	$397, 900	111		1	$58, 253	$109, 952	$322, 022
Connecticut	1	10, 000	4			1, 200	3, 500	10, 000
Maine	1	500	1			350	150	1, 000
Massachusetts	3	113, 000	32			15, 719	36, 644	106, 398
Michigan	1	20, 000	30			15, 000	35, 000	70, 000
New Hampshire	1	6, 400	3			1, 600	1, 324	6, 639
New York	1	10, 000	3		1	1, 920	15, 000	40, 000
Pennsylvania	2	230, 000	35			21, 928	16, 973	80, 485
Vermont	1	8, 000	3			536	1, 361	7, 500

ENAMELED GOODS.

(See Table IV (B) for Massachusetts and Ohio.)

ENAMELING.

(See Table IV (B) for Massachusetts, New York, and Rhode Island.)

ENGRAVERS' MATERIALS.

(See Table IV (B) for Massachusetts, New York, and Pennsylvania.)

55.—ENGRAVING AND DIE-SINKING.

The United States	246	$416, 840	698	62	92	$419, 646	$262, 828	$1, 180, 165
California	13	4, 320	5			3, 288	2, 430	20, 340
Connecticut	4	7, 300	17		3	7, 200	4, 350	18, 300
District of Columbia	3	3, 900	5		1	1, 965	3, 900	12, 375
Illinois	6	18, 100	22	3		17, 397	13, 650	49, 750
Iowa	1	2, 500	2			1, 200	1, 000	4, 000
Maine	2	750	2			1, 150	300	2, 700
Maryland	7	1, 925	6			3, 300	1, 450	14, 059
Massachusetts	25	56, 650	143	33	5	87, 950	71, 402	235, 731
Michigan	2	1, 900	1			780	700	3, 600
Minnesota	1	4, 000	2			1, 100	1, 500	5, 660
Missouri	8	9, 975	16		1	7, 585	11, 250	31, 800
New Jersey	15	80, 075	70	7	9	49, 984	17, 422	101, 928
New York	103	152, 180	263	5	48	151, 808	99, 136	476, 386
Ohio	15	12, 150	27	8	10	17, 774	7, 494	41, 721
Pennsylvania	16	41, 715	53	1	5	29, 224	18, 921	77, 746
Rhode Island	24	17, 900	52	5	10	34, 941	6, 423	76, 764
Wisconsin	1	1, 500	12			3, 000	1, 500	7, 365

56.—ENGRAVING, STEEL.

The United States	55	$2, 387, 050	1, 118	661	137	$1, 951, 745	$648, 994	$2, 998, 616
Connecticut	1	2, 500	1	1		807	534	1, 967
District of Columbia	2	1, 217, 000	452	456	4	696, 698	135, 811	879, 166
Maine	1	800	2			750	300	1, 200
Massachusetts	5	7, 600	11	3	2	6, 950	3, 040	18, 700
Missouri	10	72, 100	47	2	3	25, 050	62, 500	120, 900
New Jersey	1	500, 000	100		50	30, 000	35, 000	70, 000
New York	26	535, 700	460	189	60	1, 158, 960	385, 514	1, 808, 850
Ohio	3	1, 300	3			1, 600	1, 100	5, 600
Pennsylvania	6	50, 050	42	10	18	30, 930	25, 195	92, 233

57.—ENGRAVING, WOOD.

The United States	167	$183, 733	468	20	21	$333, 590	$68, 605	$734, 728
California	8	995	2			425	3, 340	17, 100
Connecticut	3	45, 700	31	10		23, 219	4, 611	37, 714
District of Columbia	1	100	1			1, 600	300	3, 000
Illinois	16	35, 825	66	3	8	51, 785	12, 970	116, 775
Indiana	2	825	3			1, 850	400	4, 500
Iowa	1	100	1			160	150	1, 250
Kansas	1	1, 000	2			1, 950	500	2, 933
Maine	2	5, 300	8			5, 000	3, 100	10, 000
Maryland	4	1, 250	4			1, 800	905	6, 900
Massachusetts	14	22, 235	67		2	41, 650	4, 725	89, 950
Minnesota	1	200					200	1, 800
Missouri	3	12, 200	22		2	11, 350	1, 370	21, 070
New York	76	33, 228	164	4	6	132, 817	17, 834	283, 747
Ohio	6	3, 300	15		1	7, 150	1, 625	19, 500
Pennsylvania	20	17, 725	72	3	2	46, 088	12, 965	95, 559
Rhode Island	6	1, 750	2			2, 146	2, 660	13, 130
Virginia	1	500	3			2, 000	200	4, 000
Wisconsin	2	1, 500	5			2, 660	750	5, 800

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

ENVELOPES.

(See Table IV (B) for Connecticut, Illinois, Massachusetts, New York, and Ohio.)

58.—EXPLOSIVES AND FIREWORKS.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	39	$579, 750	313	217	205	$216, 069	$840, 877	$1, 391, 132
California	3	80, 000	14	6		12, 280	45, 000	80, 500
Connecticut	3	62, 000	35	35	18	34, 938	138, 100	222, 600
Illinois	2	45, 000	14	8	15	7, 000	11, 500	30, 000
Maryland	1	1, 500			15	300	1, 500	2, 900
Massachusetts	4	17, 500	18	12	11	11, 466	26, 313	56, 174
Michigan	1	4, 000	2	1	2	1, 400	4, 275	7, 161
Minnesota	1	500					2, 000	3, 000
Missouri	1	900			2	200	2, 000	4, 000
New Jersey	2	65, 000	39	40	30	34, 000	37, 400	88, 000
New York	10	117, 500	103	36	58	51, 599	101, 048	235, 447
Ohio	4	160, 350	71	28	23	42, 100	463, 341	608, 368
Oregon	1	500	1			100	500	2, 000
Pennsylvania	6	25, 000	16	51	31	20, 686	7, 900	50, 982

59.—FANCY ARTICLES.

The United States	151	$1, 359, 450	1, 676	654	463	$1, 036, 672	$1, 065, 335	$2, 817, 230
California	2	5, 600	5		1	2, 890	3, 480	11, 200
Connecticut	7	27, 600	26	10	3	17, 309	34, 550	74, 300
Illinois	1	1, 500	3	3		2, 000	5, 000	10, 000
Kansas	2	6, 000	10		7	5, 568	10, 100	19, 500
Maine	3	9, 100	10	16	1	5, 150	2, 950	12, 700
Maryland	1	10, 000	13		7	6, 000	1, 250	10, 000
Massachusetts	21	190, 850	302	108	48	128, 393	140, 844	341, 393
Michigan	1	500	2			3, 120	6, 500	13, 000
New Hampshire	1	5, 000	7	3		4, 000	3, 400	11, 000
New Jersey	16	191, 500	342	44	172	294, 619	172, 533	569, 800
New York	66	695, 100	736	374	99	436, 041	452, 384	1, 264, 944
Ohio	6	28, 500	40	49	109	39, 410	61, 248	138, 605
Pennsylvania	19	154, 700	129	39	14	76, 305	130, 012	255, 406
Rhode Island	4	21, 500	25	6	2	11, 367	35, 084	70, 382
Vermont	1	12, 000	26	2		4, 500	6, 000	15, 000

FELT GOODS.

(See Report by Special Agent G. W. Bond, *post.*)

60.—FERTILIZERS.

The United States	364	$17, 913, 660	8, 377	75	146	$2, 648, 422	$15, 595, 078	$23, 650, 795
California	3	145, 000	35			21, 588	66, 600	106, 160
Colorado	1	500	2			900	600	2, 500
Connecticut	17	365, 000	179	1		78, 222	306, 225	446, 450
Delaware	17	753, 000	270			91, 558	442, 316	657, 250
District of Columbia	3	95, 000	87			29, 600	156, 250	207, 250
Georgia	3	240, 000	64		3	22, 877	203, 000	246, 500
Illinois	6	467, 000	220			110, 760	500, 957	729, 400
Indiana	10	157, 000	168			64, 099	724, 525	980, 725
Iowa	2	21, 500	22			7, 650	6, 306	21, 312
Kansas	1	15, 000	8			500	2, 000	5, 000
Kentucky	2	2, 500	10			3, 950	2, 400	9, 200
Louisiana	2	99, 000	64	14		25, 796	89, 258	192, 734
Maine	13	184, 625	119			30, 410	198, 600	283, 650
Maryland	48	4, 271, 870	1, 000		13	354, 192	3, 813, 758	5, 770, 198
Massachusetts	21	1, 738, 150	570	2		225, 813	1, 384, 875	2, 164, 680
Michigan	1	50, 000	35			10, 694	10, 136	27. 081
Minnesota	1	50, 000	18			8, 424	89, 500	100, 000
Missouri	2	108, 000	64		2	36, 720	210, 000	380, 000
Nebraska	2	7, 000	13		1	2, 820	2, 500	7, 000
New Jersey	21	1, 045, 500	782	40	21	338, 045	1, 853, 700	2, 423, 805
New York	75	2, 328, 400	900	5	5	287, 859	2, 242, 511	3, 150, 312
North Carolina	1	350, 000	100		25	40, 000	150, 000	300, 000
Ohio	14	593, 900	214		1	67, 530	325, 120	531, 540
Pennsylvania	45	831, 515	373		3	137, 955	981, 987	1, 433, 245
South Carolina	28	3, 493, 300	2, 679	10	70	576, 580	1, 297, 204	2, 691, 053
Tennessee	2	6, 500	3			1, 050	7, 150	11, 000
Texas	1	25, 000	25			10, 000	80, 000	100, 000
Vermont	1	1, 000	2			500	800	1, 650
Virginia	17	415, 400	293	3		46, 970	424, 000	624, 300
West Virginia	2	13, 000	23		2	3, 760	11, 800	17, 800
Wisconsin	2	40, 600	35			11. 600	11, 000	29, 000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

61.—FILES.

(See also Saws.)

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	179	$1, 666, 550	2, 191	49	268	$957, 412	$787, 569	$2, 486, 533
California	2	6, 000	5	....	....	4, 200	1, 550	9, 100
Connecticut	10	23, 150	41	....	6	20, 805	11, 595	49, 675
District of Columbia	2	700	1	....	....	624	850	2, 150
Illinois	7	33, 800	66	....	8	28, 535	17, 800	68, 600
Indiana	6	3, 850	17	....	1	7, 125	2, 250	14, 350
Iowa	2	900	5	....	....	2, 400	600	4, 950
Kentucky	1	6, 000	7	....	....	3, 150	1, 800	6, 000
Maine	7	11, 400	37	....	1	13, 750	9, 125	28, 275
Maryland	5	32, 150	28	....	16	15, 746	9, 890	33, 330
Massachusetts	22	98, 050	161	5	10	61, 876	30, 195	162, 305
Michigan	7	20, 750	60	....	14	23, 278	29, 440	68, 900
Minnesota	1	1, 000	5	....	....	3, 500	500	4, 500
Missouri	6	38, 900	35	....	....	17, 142	7, 870	34, 300
New Hampshire	4	9, 000	20	....	1	9, 660	5, 695	22, 356
New Jersey	9	72, 600	202	8	52	102, 350	83, 262	214, 551
New York	37	234, 400	397	6	34	163, 553	103, 377	412, 554
Ohio	11	33, 850	87	....	18	40, 630	26, 675	94, 700
Pennsylvania	26	488, 500	508	19	80	223, 593	216, 545	580, 443
Rhode Island	9	540, 600	484	11	25	206, 220	226, 525	659, 178
Vermont	1	3, 800	8	....	2	3, 900	800	5, 800
West Virginia	1	350	1	....	....	200	90	700
Wisconsin	3	6, 800	16	....	....	5, 175	1, 135	9, 816

FIRE-ARMS.

(See Table IV (B) for Connecticut, Illinois, Massachusetts, New York, Pennsylvania, and Rhode Island; also Report by Special Agent C. H. Fitch, *post.*)

FIRE EXTINGUISHERS, CHEMICAL.

(See Table IV (B) for Illinois and Maryland.)

FLAGS AND BANNERS.

(See Table IV (B) for California, Louisiana, Maryland, New York, and Ohio.)

62.—FLAVORING EXTRACTS.

The United States	58	$404, 615	238	104	32	$129, 343	$796, 049	$1, 195, 637
California	7	20, 500	16	7	1	8, 664	38, 100	59, 300
Colorado	1	2, 000	3	....	....	180	500	1, 300
Connecticut	2	8, 500	7	....	5	1, 750	4, 500	12, 000
Illinois	4	71, 200	65	40	5	36, 730	334, 500	461, 500
Indiana	1	500	1	....	....	300	800	1, 200
Maine	2	2, 400	6	....	2	1, 300	6, 500	10, 800
Maryland	5	8, 200	15	4	....	5, 274	16, 360	31, 100
Massachusetts	14	101, 765	39	44	2	33, 116	231, 991	359, 400
Michigan	1	25, 000	8	1	11	7, 000	30, 000	50, 000
Minnesota	1	6, 000	3	1	....	2, 500	14, 000	20, 000
Missouri	1	2, 000	2	....	....	1, 500	3, 000	7, 000
New York	11	122, 350	30	6	2	17, 905	77, 048	120, 237
Ohio	4	10, 800	10	1	2	3, 980	9, 300	17, 800
Pennsylvania	2	22, 800	30	....	2	8, 524	28, 080	41, 000
Texas	1	500	1	....	....	200	800	1, 300
Wisconsin	1	100	2	....	....	420	570	1, 700

63.—FLAX, DRESSED.

The United States	79	$620, 455	786	57	176	$268, 420	$818, 243	$1, 310, 231
Illinois	15	111, 755	189	19	11	61, 124	50, 130	138, 593
Indiana	21	158, 500	216	30	47	87, 050	242, 110	420, 100
Kansas	1	1, 800	2	....	....	1, 300	750	3, 000
Kentucky	8	163, 000	130	....	70	61, 700	419, 000	536, 700
New Jersey	1	500	2	....	....	400	950	2, 100
New York	12	58, 750	90	....	....	12, 753	46, 050	67, 150
Ohio	15	86, 350	106	1	26	21, 750	35, 907	76, 834
Pennsylvania	2	24, 000	10	7	22	8, 379	10, 446	34, 054
Wisconsin	4	15, 800	41	....	....	13, 964	12, 900	31, 700

FLOURING- AND GRIST-MILL PRODUCTS.

(See Table VII.)

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

64.—FOOD PREPARATIONS.

(See also Baking and yeast powders; Bread and other bakery products; Cheese and butter (factory); Chocolate; Coffee and spices, roasted and ground; Confectionery; Flavoring extracts; Flouring- and grist-mill products; Fruits and vegetables, canned and preserved; Glucose; Lard, refined; Oleomargarine; Pickles, preserves, and sauces; Rice cleaning and polishing; Slaughtering and meat-packing; Sugar and molasses, beet; Sugar and molasses, refined.)

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	109	$1, 293, 905	863	312	158	$318, 253	$1, 604, 660	$2, 493, 224
California	9	54, 275	36	1	4	22, 698	84, 292	169, 875
Connecticut	2	28, 000	11	9		10, 000	67, 000	135, 000
Illinois	6	90, 400	30	12	8	16, 160	58, 700	120, 900
Louisiana	4	16, 000	12	1	3	5, 328	19, 600	47, 880
Maine	1		150	100	50	8, 000	61, 000	75, 000
Maryland	3	4, 650	12	2	1	2, 415	16, 000	26, 000
Massachusetts	13	115, 180	107	19		27, 866	205, 339	288, 496
Michigan	1	3, 000	8			1, 800	2, 000	5, 500
Missouri	4	17, 100	13			4, 800	11, 375	30, 840
New Jersey	3	2, 500	6			1, 594	11, 200	15, 500
New York	31	452, 250	209	43	21	117, 616	629, 513	899, 722
Ohio	17	75, 650	143	39	55	27, 439	133, 331	190, 508
Pennsylvania	10	376, 500	100	83	10	61, 127	226, 722	371, 003
Virginia	1	15, 000	16	3	1	5, 300	36, 000	52, 000
West Virginia	1	4, 000	4			1, 560	7, 088	10, 000
Wisconsin	3	40, 000	6		5	4, 550	35, 500	55, 000

65.—FOUNDERY AND MACHINE-SHOP PRODUCTS.

(See also Iron work, architectural and ornamental; Steam fittings and heating apparatus.)

The United States	4, 958	$154, 519, 484	140, 459	675	4, 217	$65, 982, 133	$103, 345, 083	$214, 378, 468
Alabama	18	297, 358	241		14	101, 869	107, 605	293, 691
Arkansas	12	67, 650	109			43, 725	52, 400	152, 500
California	105	3, 040, 189	2, 346		88	1, 528, 523	2, 403, 229	4, 797, 232
Colorado	17	242, 000	332		10	226, 020	564, 330	1, 037, 522
Connecticut	146	4, 878, 826	4, 620	47	114	2, 313, 379	2, 812, 902	6, 339, 599
Dakota	4	23, 838	22			15, 103	11, 000	32, 800
Delaware	17	788, 100	752		49	266, 618	330, 732	704, 225
District of Columbia	10	236, 000	198		9	75, 102	155, 098	358, 166
Florida	1	2, 500	8			3, 300	1, 100	6, 000
Georgia	39	916, 510	868	7	37	343, 072	612, 483	1, 299, 491
Idaho	1	4, 000	4			1, 500	6, 000	12, 000
Illinois	299	7, 568, 359	7, 377	6	251	3, 644, 339	7, 107, 553	13, 515, 791
Indiana	120	3, 993, 578	3, 798	4	128	1, 672, 520	3, 915, 164	6, 833, 648
Iowa	102	1, 032, 550	1, 076	2	28	471, 574	747, 559	1, 594, 349
Kansas	25	463, 300	563		6	304, 874	386, 208	889, 294
Kentucky	50	2, 283, 350	1, 992		39	763, 392	1, 690, 171	3, 013, 079
Louisiana	31	910, 625	916	30	31	489, 896	777, 000	1, 554, 485
Maine	76	1, 793, 720	1, 652	4	8	681, 865	1, 131, 447	2, 232, 675
Maryland	91	2, 684, 358	3, 116		34	1, 509, 997	2, 103, 112	4, 454, 317
Massachusetts	549	16, 466, 535	16, 367	197	224	8, 131, 740	11, 236, 199	23, 935, 604
Michigan	220	5, 558, 197	3, 623		118	1, 558, 560	2, 469, 754	5, 271, 142
Minnesota	61	927, 550	846		1	422, 940	860, 340	1, 606, 518
Mississippi	17	130, 500	140		7	59, 468	70, 426	172, 200
Missouri	97	4, 027, 163	3, 902		42	2, 093, 224	3, 147, 187	6, 798, 832
Montana	5	87, 000	19			16, 303	38, 900	65, 650
Nebraska	12	73, 600	106			52, 843	54, 548	142, 000
Nevada	5	237, 225	109			129, 309	109, 922	320, 955
New Hampshire	71	1, 260, 635	1, 416	21	52	567, 825	1, 010, 495	2, 024. 656
New Jersey	188	7, 431, 421	7, 746	102	357	3, 432, 453	6, 138, 852	11, 282, 748
New York	883	34, 046, 914	30, 186	34	1, 041	14, 828, 342	20, 214, 369	44, 714, 915
North Carolina	29	189, 200	260		4	77, 878	105, 340	238, 550
Ohio	419	12, 770, 649	11, 857	9	378	5, 175, 596	8, 407, 972	18, 242, 325
Oregon	16	260, 500	173		8	129, 022	121, 911	352, 300
Pennsylvania	748	28. 982, 140	22, 907	79	898	10, 293, 821	17, 636, 353	35, 029, 673
Rhode Island	94	4, 823, 867	4, 411	109	75	2, 072, 143	2, 687, 484	6, 281, 707
South Carolina	18	179, 850	283		31	99, 419	137, 389	289, 502
Tennessee	50	551, 950	738	2	26	269, 27[illegible]	610, 824	1, 191, 531
Texas	30	365, 350	349		11	149, 212	228, 151	532, 778
Utah	11	95, 000	72	9	2	46, 311	50, 110	131, 670
Vermont	45	1, 137, 675	578	6	4	243, 426	326, 770	783, 828
Virginia	56	767, 400	1, 401	1	80	396, 997	663, 167	1, 361, 231
Washington	6	31, 800	33			21, 600	24, 500	54, 775
West Virginia	35	388, 300	405		1	158, 474	168, 421	466, 862
Wisconsin	129	2, 502, 252	2, 542	6	61	1, 168, 257	1, 910, 106	3, 965, 652

FOUNDERY SUPPLIES.

(See Table IV (B) for California, Massachusetts, New Jersey, New York, Ohio, Pennsylvania, and Rhode Island.)

FRUIT-JAR TRIMMINGS.

(See Table IV (B) for New Jersey.)

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

66.—FRUITS AND VEGETABLES, CANNED AND PRESERVED.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	411	$8, 247, 488	10, 638	15, 463	5, 804	$2, 679, 960	$12, 051, 293	$17, 599, 576
California	12	1, 152, 000	585	507	81	291, 413	832, 952	1, 389, 798
Colorado	1	10, 000	8	2	5	8, 000	60, 000	100, 000
Connecticut	2	55. 000	25	55	15	9, 590	52, 700	72, 400
Delaware	33	396, 379	428	643	188	99, 621	453, 503	634, 940
District of Columbia	2	4, 000	7	8	....	1, 120	2, 132	6, 000
Illinois	12	151, 200	175	187	335	86, 602	504, 315	730, 843
Indiana	6	58, 450	147	93	97	29, 980	156, 325	248, 550
Iowa	5	66, 000	41	70	7	17, 648	53, 300	92, 500
Kansas	4	45, 700	22	106	25	20, 600	24, 500	58, 000
Kentucky	2	1, 800	....	....	....	....	1, 400	6, 000
Louisiana	1	40, 000	20	....	30	12, 000	70, 000	115, 000
Maine	18	926, 535	2, 349	1, 448	1, 093	216, 400	823, 005	1, 402, 100
Maryland	114	2, 412, 692	4, 025	8, 220	2, 753	990, 758	4, 506, 332	6, 245, 297
Massachusetts	13	316, 400	131	245	49	98, 597	542, 600	762, 988
Michigan	12	61, 100	113	138	34	23, 377	76, 568	129, 315
Missouri	4	44, 000	61	8	1	15, 614	79, 902	155, 250
New Jersey	32	767, 806	612	1, 208	225	212, 678	965, 637	1, 417, 086
New York	88	1, 102, 421	1, 271	1, 510	573	346, 050	1, 619, 484	2, 379, 816
North Carolina	2	650	3	1	1	275	500	1, 700
Ohio	20	302, 880	283	631	174	102, 935	651, 662	885, 105
Oregon	2	19, 150	25	3	10	3, 000	8, 150	12, 688
Pennsylvania	14	267, 925	91	171	39	67, 202	469, 326	606, 000
Virginia	10	43, 700	210	207	69	25, 700	95, 700	145, 500
Washington	1	700	....	2	....	300	100	500
West Virginia	1	1, 000	6	....	....	500	1, 200	2, 200

FUEL, ARTIFICIAL.

(See Table IV (B) for New York.)

67.—FURNISHING GOODS, MEN'S.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	161	$3, 724, 664	1, 274	9, 565	335	$2, 644, 155	$6, 503, 164	$11, 506, 857
California	12	362, 350	121	189	....	126, 265	509, 540	744, 245
Illinois	13	586, 100	144	1, 119	47	392, 700	1, 143, 275	1, 835, 597
Maine	1	2, 000	3	3	1	1, 500	2, 000	4, 000
Maryland	2	4, 200	2	19	....	5, 500	17, 000	32, 000
Massachusetts	22	96, 124	48	277	9	73, 826	306, 599	524, 165
Minnesota	2	150, 000	74	436	10	138, 350	318, 090	499, 250
New Hampshire	1	50	1	....	....	100	300	900
New Jersey	2	7, 000	4	68	4	7, 400	17, 500	62, 000
New York	73	2, 349, 900	780	7, 045	221	1, 790, 514	3, 770, 374	7, 147, 443
Ohio	5	21, 400	13	31	6	9, 950	68, 050	91, 400
Pennsylvania	22	124, 740	61	336	36	88, 260	318, 736	501, 007
South Carolina	1	8, 000	2	33	....	5, 000	4, 500	15, 000
Tennessee	1	5, 000	12	....	....	2, 500	10, 000	20, 000
Texas	1	800	2	....	....	400	200	1, 000
Wisconsin	3	7, 000	7	9	1	1, 890	17, 000	28, 850

68.—FURNITURE.

(See also Upholstering.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	4, 843	$38, 669, 764	45, 186	917	2, 626	$20, 383, 794	$31, 416, 768	$68, 037, 902
Alabama	14	42, 850	90	7	8	26, 450	36, 050	84, 100
Arkansas	18	42, 360	59	2	3	20, 800	31, 445	85, 305
California	89	1, 266, 800	956	21	22	505, 089	1, 003, 555	1, 857, 010
Colorado	8	71, 400	52	3	2	42, 300	48, 000	158, 850
Connecticut	53	506, 675	486	14	12	219, 385	310, 604	686, 168
Dakota	3	3, 300	2	....	....	250	800	3, 700
Delaware	6	43, 500	25	2	1	10, 000	13, 800	39, 800
District of Columbia	19	46, 125	72	....	....	39, 385	39, 005	113, 375
Florida	3	1, 675	3	....	....	650	1, 215	3, 200
Georgia	40	56, 865	190	3	10	45, 527	54, 364	186, 514
Idaho	2	800	1	....	....	80	300	1, 500
Illinois	335	3, 554, 130	5, 206	79	410	2, 497, 778	3, 607, 313	7, 644, 638
Indiana	251	2, 243, 250	2, 628	11	221	1, 044, 367	1, 997, 177	3, 909, 591
Iowa	169	744, 670	723	10	19	314, 752	626, 453	1, 293, 504
Kansas	75	282, 245	377	2	15	153, 432	232, 300	512, 089
Kentucky	50	542, 950	687	5	38	261, 550	430, 605	949, 810
Louisiana	37	39, 676	70	1	6	33, 501	37, 429	113, 418
Maine	68	310, 950	367	8	7	142, 500	282, 590	572, 275
Maryland	131	863, 727	1, 058	15	25	431, 352	836, 825	1, 663, 143
Massachusetts	243	2, 464, 675	3, 846	96	43	1, 781, 351	3, 017, 469	6, 041, 618

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

68.—FURNITURE—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Michigan	195	$2,442,286	3,015	31	208	$1,141,050	$1,541,559	$3,514,176
Minnesota	74	408,855	437	2	7	190,684	247,585	587,800
Mississippi	9	13,150	53	1		13,250	14,400	35,800
Missouri	157	1,178,682	1,387	11	76	642,476	1,219,165	2,380,563
Montana	11	23,150	18			9,750	8,600	28,000
Nebraska	30	49,700	43	2	1	15,992	52,508	96,388
Nevada	2	9,500	5			2,400	11,350	16,350
New Hampshire	36	333,235	573	3	33	202,064	314,650	741,238
New Jersey	77	340,350	323	3	20	149,834	193,660	480,798
New Mexico	1	3,500	4			3,600	7,000	18,000
New York	849	8,220,978	9,367	254	454	4,997,041	6,749,672	15,210,879
North Carolina	39	46,960	82	2	1	21,431	21,365	73,221
Ohio	412	4,417,076	4,929	176	566	2,080,243	2,694,602	6,865,027
Oregon	33	206,050	105	4	10	65,910	91,325	227,303
Pennsylvania	718	5,445,940	4,928	92	179	2,090,088	3,725,989	7,588,229
Rhode Island	27	283,950	388	16	5	208,509	501,401	840,437
South Carolina	7	3,625	5		2	1,395	2,805	9,350
Tennessee	85	511,250	643	7	149	231,772	427,637	954,100
Texas	41	76,480	98	4	3	35,400	61,225	152,150
Utah	25	55,350	70	4	5	32,465	30,705	94,900
Vermont	56	296,150	288		5	91,617	155,452	333,522
Virginia	118	225,700	317	11	14	102,564	157,770	401,282
Washington	13	51,500	39			19,065	27,625	88,780
West Virginia	37	82,800	166		2	55,486	50,957	154,068
Wisconsin	177	815,424	1,005	15	44	409,209	500,462	1,225,933

69.—FURNITURE, CHAIRS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	384	$6,276,364	7,832	1,301	1,442	$3,311,286	$4,443,438	$9,807,823
Alabama	2	775	3	1		415	400	2,200
California	6	4,400	25		2	7,420	7,375	20,100
District of Columbia	1	500	1			350	600	2,000
Georgia	3	6,700	16	8		5,690	5,600	31,900
Illinois	11	270,000	326	3	61	140,180	178,890	397,572
Indiana	37	395,850	587	86	99	232,005	246,462	632,746
Iowa	2	51,000	121	30	21	25,820	37,400	76,300
Kentucky	15	136,100	197	12	49	89,236	123,585	257,820
Maine	4	13,700	25	13	2	10,100	5,100	21,000
Maryland	4	151,250	66	31	2	48,000	130,500	280,000
Massachusetts	62	1,948,600	2,104	244	45	1,028,087	1,761,779	3,290,837
Michigan	10	371,650	393	51	118	100,731	143,692	279,792
Minnesota	3	1,325	5		1	2,000	2,650	6,300
Mississippi	3	485	4			420	475	1,900
Missouri	12	332,063	324	1	118	146,247	179,167	449,812
New Hampshire	6	200,500	157	15	7	53,500	67,940	159,300
New Jersey	8	28,575	91	15	12	34,300	25,575	74,450
New York	62	991,935	1,195	368	546	472,974	614,690	1,404,138
North Carolina	3	2,300	4	2		1,600	500	4,400
Ohio	37	497,026	782	219	155	321,918	274,472	821,702
Oregon	3	11,000	14			4,100	3,795	11,500
Pennsylvania	45	111,700	273	14	47	143,037	186,071	437,010
Rhode Island	1	2,500					3,174	9,464
Tennessee	7	10,900	16	1	4	3,350	4,650	13,750
Texas	4	1,925	2			250	988	2,690
Vermont	15	133,150	159		17	55,950	68,700	160,300
Virginia	7	3,375	7			750	1,530	5,400
Washington	1	1,000	2			1,000	400	2,200
Wisconsin	10	596,080	933	187	136	381,856	367,368	951,240

70.—FURS, DRESSED.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	192	$3,598,887	1,453	2,604	77	$1,389,284	$5,338,242	$8,238,712
California	6	102,250	17	101		31,429	158,600	224,400
Colorado	1	1,000	3	2		3,500	3,000	8,000
Connecticut	5	33,000	12	63		13,386	37,474	66,782
Illinois	16	168,800	60	105	2	56,908	241,600	398,850
Indiana	1	500		2		150	1,000	1,300
Iowa	3	6,600	4	2		1,400	4,600	11,100
Maryland	4	30,000	6	17		8,125	10,635	33,913
Massachusetts	15	65,147	49	73	2	37,516	409,177	508,270
Michigan	2	1,600	4	7		4,400	9,800	24,000
Minnesota	10	130,300	33	66	2	41,370	180,250	373,800
Missouri	2	35,000	7	26	3	5,800	29,530	47,000
Montana	1	1,500	2	1		800	2,500	5,000
Nebraska	1	1,500	1	2		1,500	1,000	3,000
New Jersey	4	35,200	37	13	7	18,785	47,315	96,495
New York	95	2,622,850	1,133	1,882	50	1,052,242	3,715,761	5,649,122

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

70.—FURS, DRESSED—Continued.

States and Territories	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Ohio	2	$52, 000	12	35		$21, 000	$87, 000	$123, 000
Oregon	1	5, 000	4	6		2, 640	3, 100	7, 000
Pennsylvania	16	238, 000	56	153	5	59, 233	292, 800	496, 700
Rhode Island	1	100		8		900	1, 500	3, 000
Texas	1	1, 000	2			1, 700	1, 800	4, 000
Virginia	1	2, 000	2	2		900	8, 500	15, 000
Wisconsin	4	65, 500	15	38	6	25, 600	91, 300	139, 000

GALVANIZING.

(See Table IV (B) for California, Louisiana, Michigan, New York, Pennsylvania, and Wisconsin.)

GAS AND LAMP FIXTURES.

(See Table IV (B) for Connecticut, Illinois, Massachusetts, New York, Ohio, Pennsylvania, and Rhode Island.)

71.—GAS MACHINES AND METERS.

The United States	34	$1, 147, 000	807	12	34	$397, 108	$636, 676	$1, 334, 091
Illinois	3	45, 500	42			19, 723	28, 884	64, 800
Maryland	5	62, 000	82	1	17	42, 748	118, 250	206, 620
Massachusetts	4	192, 000	81	2		47, 949	68, 289	176, 500
Michigan	1	75, 000	35			22, 000	20, 000	56, 000
New Jersey	1	40, 000	11		1	5, 000	20, 000	37, 500
New York	3	140, 000	119	2		63, 587	76, 655	177, 197
Ohio	6	121, 000	76		1	41, 998	77, 100	139, 670
Pennsylvania	11	471, 500	361	7	15	154, 103	227, 498	475, 804

GLASS.

(See Report by Special Agent J. D. Weeks, *post.*)

72.—GLASS, CUT, STAINED, AND ORNAMENTED.

The United States	170	$945, 180	1, 281	139	166	$706, 768	$1, 156, 806	$2, 535, 009
California	5	77, 450	36			22, 100	66, 900	103, 000
Connecticut	1	5, 000	5	5	10	1, 800	1, 500	3, 800
District of Columbia	1	500	2			750	300	1, 500
Illinois	6	39, 600	76	1	3	47, 545	38, 564	113, 612
Kentucky	1	6, 000	5			3, 047	5, 000	10, 000
Maine	2	1, 500	7		1	3, 150	2, 800	8, 000
Maryland	1	2, 000	4		1	2, 550	3, 700	9, 000
Massachusetts	12	73, 650	100	16	3	60, 711	56, 630	158, 340
Minnesota	1	100	1			300	200	1, 000
Missouri	3	11, 000	16			9, 450	7, 100	27, 600
New Jersey	6	45, 000	44		5	27, 090	41, 212	84, 893
New York	109	596, 130	842	86	133	451, 194	868, 452	1, 801, 962
Ohio	3	5, 650	14			8, 700	3, 525	23, 600
Pennsylvania	16	65, 600	115	13	10	58, 845	52, 283	160, 962
Rhode Island	2	11, 000	9	18		7, 936	7, 600	23, 140
Vermont	1	5, 000	5			1, 600	1, 100	4, 600

73.—GLOVES AND MITTENS.

(See also Hosiery and knit goods; Woolen goods.)

The United States	300	$3, 379, 648	2, 102	5, 249	346	$1, 655, 695	$4, 351, 469	$7, 379, 605
California	12	132, 800	85	185		77, 250	134, 225	265, 100
Colorado	1	500	2	1		2, 000	1, 500	4, 500
District of Columbia	1	1, 500	2			650	1, 000	3, 000
Illinois	12	130, 000	95	191	5	71, 191	211, 200	325, 200
Iowa	4	25, 100	14	85		23, 240	35, 915	78, 696
Maine	1	500		316	200	13, 000	24, 000	39, 000
Maryland	3	20, 500	15	41	10	8, 925	18, 800	35, 200
Massachusetts	4	5, 200	16	63	1	12, 260	33, 850	51, 668
Michigan	7	10, 800	10	19		7, 000	9, 950	25, 287
Minnesota	3	12, 500	11	28	1	15, 250	17, 500	40, 000
Missouri	4	14, 200	30	35	4	18, 030	19, 350	46, 700
New Hampshire	25	187, 300	171	300	1	92, 574	302, 142	478, 825
New Jersey	1	400		8		800	1, 000	3, 600
New York	199	2, 690, 048	1, 569	3, 623	121	1, 245, 013	3, 404, 937	5, 718, 529
Ohio	3	1, 100	4	1		1, 400	3, 500	7, 000
Oregon	2	10, 300	4	12		7, 800	12, 600	26, 800
Pennsylvania	2	51, 000	15	28	2	14, 587	70, 000	95, 000
Virginia	6	55, 400	41	231		28, 825	20, 700	70, 100
Washington	2	1, 650	3	7	1	3, 150	3, 400	9, 800
West Virginia	2	4, 000	2	7		950	3, 250	7, 500
Wisconsin	6	24, 850	13	68		11, 800	22, 650	48, 100

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

GLUCOSE.

(See Table IV (B) for Illinois, Iowa, and New York.)

74.—GLUE.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	82	$3, 916, 750	1, 486	186	129	$600, 018	$2, 786, 342	$4, 324, 072
California	5	25, 000	27		2	13, 612	23, 040	56, 000
Illinois	3	465, 000	199	75	8	95, 700	281, 000	563, 500
Indiana	4	47, 500	30		9	10, 320	61, 250	85, 500
Kansas	1	2, 500	3			1, 169	250	2, 400
Kentucky	2	70, 000	40		5	8, 345	4, 400	54, 000
Maine	1	4, 000	6			2, 000	11, 000	14, 000
Maryland	1	4, 000	3			800	5, 000	6, 400
Massachusetts	19	325, 400	242	4	2	99, 112	280, 016	447, 112
Michigan	1	3, 000	2			600	1, 000	3, 000
Missouri	6	36, 850	27		4	14, 120	43, 575	77, 500
New Hampshire	1	3, 000	4			1, 250	2, 500	6, 000
New Jersey	4	14, 500	11			5, 410	8, 400	18, 810
New York	9	867, 000	297	9	20	129, 139	624, 123	884, 280
Ohio	8	206, 600	57		26	22, 934	40, 667	157, 700
Pennsylvania	13	1, 810, 400	498	90	51	184, 950	1, 376, 821	1, 903, 470
West Virginia	1	2, 000	4		2	1, 085	800	3, 000
Wisconsin	3	30, 000	36	8		9, 472	22, 500	41, 600

75.—GOLD AND SILVER LEAF AND FOIL.

The United States	60	$458, 500	542	383	30	$410, 647	$1, 011, 792	$1, 614, 040
Connecticut	2	38, 000	19	7		10, 500	83, 538	106, 445
Illinois	3	22, 000	34	45	2	25, 750	41, 000	85, 000
Kentucky	1	500	2			850	1, 000	2, 200
Maryland	3	6, 000	16	29	2	10, 500	26, 000	49, 200
Massachusetts	9	26, 500	45	28	5	32, 385	105, 700	152, 475
New Jersey	3	4, 000	6			1, 380	11, 580	16, 918
New York	29	160, 700	254	110	11	189, 282	386, 824	655, 358
Ohio	2	3, 800	9	7		4, 700	12, 000	21, 100
Pennsylvania	8	237, 000	157	157	10	135, 300	344, 150	525, 344

76.—GOLD AND SILVER, REDUCED AND REFINED (NOT FROM THE ORE).

The United States	28	$817, 100	299		5	$178, 696	$9, 128, 811	$9, 548, 188
California	1	2, 000	5			2, 500	4, 500	8, 000
Illinois	2	40, 000	18			11, 170	96, 810	126, 470
Louisiana	1	5, 000	3			1, 200	20, 000	30, 000
Massachusetts	1	8, 000	5			2, 520	2, 000	7, 500
Missouri	1	350, 000	125			67, 747	4, 038, 925	4, 158, 606
New Jersey	4	60, 000	20		1	9, 350	368, 386	424, 500
New York	10	193, 600	85			56, 452	3, 030, 919	3, 120, 452
Pennsylvania	2	20, 500	13		4	9, 130	200, 800	251, 560
Rhode Island	6	138, 000	25			18, 627	1, 366, 471	1, 421, 100

GRAPHITE.

(See Table IV (B) for Massachusetts, New York, and Pennsylvania.)

77.—GREASE AND TALLOW.

The United States	156	$2, 566, 779	1, 075	3	13	$556, 015	$11, 779, 482	$13, 730, 013
California	3	107, 000	19			14, 240	364, 400	417, 200
Connecticut	7	21, 800	20			8, 516	123, 720	156, 500
Delaware	1	15, 000	4			3, 000	98, 000	124, 000
District of Columbia	3	25, 000	7			3, 422	47, 918	69, 400
Illinois	14	694, 000	227		1	123, 954	1, 454, 775	1, 764, 300
Indiana	6	10, 400	24		1	6, 800	44, 950	58, 790
Iowa	14	22, 750	32			8, 720	65, 322	96, 155
Kansas	1	4, 000	3			1, 300	13, 000	19, 000
Kentucky	2	18, 000	5			2, 450	109, 482	137, 600
Louisiana	1	20, 000	3			1, 500	35, 000	75, 000
Maryland	7	101, 750	22			10, 254	213, 849	259, 021
Massachusetts	14	456, 500	155		2	80, 355	557, 030	736, 968
Michigan	1	600	1			300	4, 500	5, 000
Missouri	7	44, 250	22			10, 150	72, 220	117, 300
New Hampshire	3	15, 500	12			4, 429	22, 925	41, 200
New Jersey	8	39, 200	29		1	12, 418	160, 740	218, 187
New York	23	564, 004	323	3	6	178, 898	6, 623, 526	7, 322, 970
Ohio	8	46, 550	35		1	18, 606	188, 200	232, 100
Pennsylvania	27	322, 075	110		1	56, 223	1, 416, 614	1, 671, 265
Rhode Island	2	13, 000	12			5, 950	76, 100	88, 100
Tennessee	1	10, 000	3			2, 570	49, 586	67, 105
Virginia	2	15, 000	6			1, 800	37, 500	52, 000
Wisconsin	1	400	1			100	125	852

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

GRINDSTONES.

(See Table IV (B) for Kansas, Maine, Massachusetts, Michigan, Ohio, and Pennsylvania.)

78.—GUNPOWDER.

(See also High explosives.)

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	33	$4, 983, 560	988	20	3	$510, 550	$2, 053, 488	$3, 348, 941
California	1	1, 000, 000	76			37, 200	137, 800	390, 000
Connecticut	2	635, 000	102			55, 119	300, 815	381, 625
Delaware	1	1, 000, 000	248	2		115, 778	127, 586	243, 365
Maine	2	160, 000	54			36, 400	171, 000	249, 000
Massachusetts	3	215, 000	42			29, 240	72, 918	140, 621
Michigan	1	75, 000	18			10, 000	75, 000	90, 000
New Jersey	1	55, 000	30			11, 442	70, 216	91, 560
New York	6	299, 660	122	10		73, 500	327, 319	567, 843
Ohio	3	550, 000	113			55, 000	280, 000	401, 073
Pennsylvania	11	858, 900	157	8	3	73, 871	420, 834	693, 854
Tennessee	1	100, 000	12			6, 000	25, 000	40, 000
Wisconsin	1	35, 000	14			7, 000	45, 000	60, 000

79.—HAIRWORK.

The United States	299	$613, 040	205	937	30	$323, 315	$667, 132	$1, 467, 723
California	13	15, 750	11	20		12, 517	17, 250	50, 084
Colorado	3	3, 300		10		4, 125	6, 600	15, 200
Connecticut	2	2, 500	1	4		1, 850	2, 300	6, 000
District of Columbia	12	6, 600		27		3, 276	6, 500	14, 800
Illinois	21	55, 050	9	120		28, 842	67, 950	143, 415
Indiana	3	500			1	120	850	3, 120
Iowa	9	7, 300	5	14	6	5, 300	9, 350	22, 000
Kentucky	6	8, 400		8		2, 431	10, 265	25, 600
Louisiana	7	6, 200	6	6		3, 592	7, 200	18, 400
Maine	2	700	1	3	1	350	2, 000	4, 600
Maryland	12	12, 450	4	29		5, 654	16, 675	34, 798
Massachusetts	22	33, 700	10	75		22, 937	39, 960	87, 200
Michigan	5	6, 700	1	20		5, 320	5. 300	16, 500
Minnesota	1	3, 000		1		250	1, 500	3, 000
Mississippi	1	600	1			100	74	550
Missouri	9	17, 700	6	24		7, 625	20, 250	42, 200
Montana	1	1, 500		1		75	1, 200	2, 600
New Hampshire	1	700	1			300	1, 000	1, 600
New Jersey	2	9, 750		5	1	1, 249	2, 500	8, 100
New York	88	228, 300	95	366	12	150, 622	313, 273	679, 629
Ohio	33	51, 465	18	60	1	18, 543	32, 120	82, 245
Oregon	1	2, 000	4			4, 500	2, 000	7, 000
Pennsylvania	25	95, 525	25	68	6	23, 987	46, 710	98, 137
Rhode Island	8	24, 050	1	19	2	6, 700	26, 930	44, 945
Virginia	4	7, 500	5	36		8, 200	16, 900	33, 000
Wisconsin	8	11, 800	1	21		4, 850	10, 475	23, 000

HAMMOCKS.

(See Table IV (B) for Louisiana, Massachusetts, Missouri, and New Jersey.)

HAND-KNIT GOODS.

(See Table IV (B) for Illinois, Maryland, Massachusetts, New York, Ohio, Pennsylvania, and Wisconsin.)

80.—HAND-STAMPS.

The United States	46	$103, 150	151	8	4	$82, 895	$103, 648	$318, 618
California	5	13, 000	16			14, 830	13, 532	51, 430
Connecticut	1	1, 000	3			1, 000	1, 000	3, 000
Illinois	4	5, 500	11	1	1	7, 140	11, 600	26, 050
Massachusetts	8	25, 200	31	1		15, 467	29, 500	58, 856
Missouri	1	2, 000	2			850	1, 000	5, 000
New York	17	41, 100	62	3	1	33, 108	34, 266	127, 032
Ohio	6	8, 400	15	1		4, 200	9, 800	27, 000
Pennsylvania	2	6, 000	7	2	2	2, 300	2, 200	13, 500
Rhode Island	1	600	4			4, 000	250	5, 500
Texas	1	350					500	1, 250

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

81.—HANDLES, WOODEN.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	206	$1,032,090	1,504	11	60	$436,664	$697,320	$1,656,608
California	1	1,500	2	....	1	585	300	1,500
Connecticut	5	14,700	18	....	1	6,300	6,700	25,300
Illinois	4	5,350	11	....	2	4,750	5,535	16,000
Indiana	10	34,300	42	3	1	9,795	18,880	43,850
Iowa	1	1,000	6	....	....	1,800	500	5,000
Kentucky	10	72,100	215	....	13	68,845	139,148	305,986
Maine	15	75,950	97	....	5	24,626	67,200	136,435
Massachusetts	8	5,550	9	....	....	1,145	1,745	6,590
Michigan	22	74,300	152	....	13	43,580	47,265	151,800
Minnesota	1	500	4	....	....	200	500	1,000
Missouri	8	3,800	14	....	....	3,850	3,020	13,700
New Hampshire	9	21,950	33	....	1	9,770	7,970	33,700
New Jersey	3	10,775	8	....	1	3,510	2,690	11,500
New York	30	139,235	190	....	4	44,037	74,948	166,842
Ohio	45	427,550	479	8	13	156,681	243,606	531,167
Pennsylvania	19	108,455	150	....	....	43,065	54,863	147,142
Tennessee	1	3,500	6	....	2	600	1,500	3,750
Vermont	11	24,075	48	....	1	8,150	12,750	32,486
West Virginia	1	1,500	10	....	2	2,375	2,000	7,250
Wisconsin	2	6,000	10	....	....	3,000	6,200	15,700

82.—HARDWARE.

(See Cutlery and edge tools; Tools; also Report by Special Agent C. H. Fitch, *post.*)

States and Territories.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	492	$15,363,551	14,481	814	1,506	$6,846,913	$10,097,577	$22,653,693
California	1	10,000	3	....	....	2,000	2,000	5,000
Connecticut	93	7,852,622	7,073	648	523	3,569,494	4,410,709	10,374,293
Illinois	22	291,370	300	1	36	146,583	296,795	575,502
Indiana	6	54,795	54	....	....	16,900	44,575	73,500
Iowa	3	3,200	10	....	1	2,500	6,800	15,500
Kansas	2	5,600	3	....	....	1,000	650	5,000
Kentucky	5	18,150	30	....	2	10,132	10,025	30,333
Louisiana	2	2,500	5	....	....	1,000	2,600	5,000
Maine	2	5,000	6	1	....	1,650	2,300	6,250
Maryland	5	18,100	31	....	4	13,844	14,100	37,504
Massachusetts	24	668,850	528	18	22	225,638	301,076	737,400
Michigan	10	66,500	69	....	7	23,738	45,315	102,889
Missouri	11	210,300	113	....	1	51,971	103,156	192,462
New Hampshire	2	14,500	9	5	6	5,600	4,400	13,500
New Jersey	35	507,450	392	33	51	217,090	540,793	965,986
New York	141	1,842,226	2,062	55	315	1,038,028	1,514,042	3,396,633
Ohio	39	1,357,109	1,105	11	93	407,894	744,963	1,592,827
Pennsylvania	68	1,980,729	2,184	41	359	893,032	1,761,884	3,725,526
Rhode Island	7	164,800	217	....	9	101,059	93,484	254,243
Texas	2	1,600	3	....	....	1,150	2,150	3,900
Vermont	1	50,000	25	....	....	10,000	20,000	80,000
West Virginia	1	110,000	60	....	40	27,500	63,000	190,000
Wisconsin	10	128,150	199	1	37	79,110	112,760	270,445

83.—HARDWARE, SADDLERY.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	64	$1,655,550	2,167	321	327	$960,432	$1,851,436	3,651,021
California	1	150	....	....	....	....	115	550
Connecticut	4	129,000	152	103	15	116,600	257,500	570,000
Illinois	3	30,100	32	1	20	18,200	48,200	87,000
Indiana	1	25,000	30	....	10	12,000	30,500	45,000
Massachusetts	3	26,000	39	1	2	17,720	9,500	36,300
New Jersey	37	870,200	856	139	150	441,972	779,958	1,609,555
New York	9	351,000	687	44	98	230,080	381,028	720,128
Ohio	3	178,000	338	12	30	93,120	275,000	440,000
Pennsylvania	2	36,100	28	20	2	28,040	52,635	114,488
Wisconsin	1	10,000	5	1	....	2,700	17,000	28,000

HAT AND CAP MATERIALS.

(See Table IV (B) for Connecticut, Massachusetts, New Jersey, New York, and Pennsylvania.)

84.—HATS AND CAPS, NOT INCLUDING WOOL HATS.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	489	$5,455,468	11,373	5,337	530	$6,635,522	$9,341,352	$21,303,107
California	19	48,925	25	40	....	33,816	42,117	95,078
Connecticut	33	842,400	2,299	852	34	1,423,981	1,949,520	4,407,993
Illinois	14	22,550	40	35	7	31,226	41,350	98,900
Indiana	5	3,050	7	4	1	3,825	8,200	17,620
Iowa	1	1,500	2	2	....	1,000	800	2,200

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

84.—HATS AND CAPS, NOT INCLUDING WOOL HATS—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Kentucky	2	$1,900	1	2	1	$750	$1,000	$3,900
Maine	4	21,500	12	14	....	9,600	29,450	51,300
Maryland	8	29,100	24	34	1	14,050	34,200	66,680
Massachusetts	37	199,500	584	207	17	236,752	401,357	901,666
Michigan	10	303,350	106	143	3	76,419	132,875	303,250
Minnesota	1	500	1	....	....	350	200	1,800
Missouri	10	60,900	51	83	4	44,365	80,740	182,531
New Hampshire	4	5,350	401	....	....	8,300	10,700	27,450
New Jersey	79	1,343,900	4,094	1,271	202	2,113,581	2,103,082	6,152,447
New York	168	1,682,140	2,408	1,917	201	1,877,123	3,335,778	6,464,058
North Carolina	1	500	2	....	....	200	200	800
Ohio	16	28,500	45	141	4	35,425	53,376	119,610
Pennsylvania	70	820,553	1,255	561	52	711,159	1,082,079	2,342,324
Rhode Island	1	1,500	3	7	....	4,000	8,000	16,000
Texas	2	1,850	3	2	1	1,100	2,400	5,500
Wisconsin	4	36,000	10	22	2	8,500	23,928	42,000

HIGH EXPLOSIVES.

(See Gunpowder; also Table IV (B) for California, Massachusetts, Michigan, New Jersey, and Pennsylvania.)

85.—HONES AND WHETSTONES.

The United States	25	$132,525	136	83	6	$52,961	$92,461	$224,130
Arkansas	2	6,500	11	....	....	1,750	2,421	5,550
Connecticut	1	1,000	1	....	....	300	300	1,500
Indiana	3	35,000	17	3	3	9,790	43,750	74,000
Maine	1	2,500	1	2	....	1,060	3,320	6,680
Maryland	1	6,000	6	2	2	2,000	7,500	12,700
Massachusetts	6	30,025	22	75	....	18,670	23,070	66,200
New Hampshire	4	26,100	45	....	....	10,648	6,700	32,500
New York	4	7,900	14	....	1	2,648	4,435	12,500
Vermont	3	17,500	19	1	....	6,095	965	12,500

HOOKS AND EYES.

(See Table IV (B) for Connecticut and Rhode Island.)

HOSIERY AND KNIT GOODS.

(See Report by Special Agent G. W. Bond, *post.*)

86.—HOUSEFURNISHING GOODS.

The United States	48	$456,806	405	137	50	$216,890	$812,361	$1,332,188
California	2	13,800	13	....	....	8,265	14,500	36,995
Connecticut	3	40,000	22	3	....	13,886	30,000	55,000
Georgia	1	3,000	2	....	....	500	2,000	3,000
Illinois	1	31,000	8	10	....	6,000	60,000	80,000
Maryland	2	3,250	1	....	1	600	1,350	4,800
Massachusetts	12	94,400	82	27	4	54,949	177,222	284,783
Michigan	4	47,500	68	32	12	39,600	64,480	128,600
Minnesota	5	108,000	44	25	1	35,740	321,467	510,270
New Jersey	1	1,900	2	....	....	1,200	1,000	3,700
New York	10	23,906	33	2	13	16,808	26,739	57,040
Ohio	2	10,500	21	....	1	3,300	5,900	13,000
Pennsylvania	4	79,000	109	38	18	36,042	107,203	154,000
Rhode Island	1	550	....	....	....	....	500	1,000

87.—ICE, ARTIFICIAL.

The United States	35	$1,251,200	389	50	8	$140,885	$158,112	$544,763
Alabama	3	39,200	15	....	....	3,965	1,575	13,659
Arkansas	1	25,000	5	....	....	5,000	5,500	12,000
California	5	77,000	24	....	....	12,750	16,432	44,294
Georgia	8	243,000	59	....	1	21,165	25,510	97,060
Kentucky	1	15,000	100	50	....	5,000	2,000	14,000
Louisiana	4	449,500	90	....	....	41,350	54,610	166,750
Missouri	1	60,000	17	....	....	4,800	7,000	21,000
Texas	12	342,500	79	....	7	46,855	45,485	176,000

88.—INK.

The United States	63	$1,251,050	339	79	62	$230,284	$864,765	$1,629,413
California	3	61,000	15	....	....	9,450	59,000	97,500
Connecticut	1	500	1	....	....	234	635	1,200
District of Columbia	1	300	1	....	....	78	400	1,200
Illinois	5	57,750	19	4	14	12,597	26,000	79,000
Kentucky	3	9,500	9	2	....	3,908	5,600	11,800

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

88.—INK—Continued.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Maine	1	$100	1			$40	$700	$1,000
Massachusetts	10	211,000	60	35	14	47,164	113,680	290,200
Michigan	1	1,000	2			700	2,000	5,000
Missouri	3	9,600	8			3,568	7,290	16,234
New Jersey	5	62,700	43	1	4	25,950	64,385	142,919
New York	12	368,800	77	22	11	51,342	348,000	505,010
Ohio	5	46,500	16	7	8	11,645	65,700	108,800
Pennsylvania	12	398,800	81	8	11	62,608	169,375	362,550
Wisconsin	1	3,500	6			1,000	2,000	7,000

89.—INSTRUMENTS, PROFESSIONAL AND SCIENTIFIC.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	171	$1,342,196	1,011	37	51	$588,751	$444,425	$1,639,094
California	8	18,050	17		1	9,948	17,088	44,712
District of Columbia	5	36,100	14	2	1	13,724	7,750	57,561
Georgia	2	5,000	6			3,500	5,300	16,000
Kentucky	3	11,500	6			3,820	1,800	11,000
Louisiana	3	1,600	3			1,260	1,700	5,460
Maine	1	1,000	2			1,000	500	2,000
Maryland	6	49,000	25	2	4	18,244	3,850	31,600
Massachusetts	20	148,300	137	8	5	81,398	56,350	215,640
Michigan	4	12,800	11			4,925	4,896	15,374
Minnesota	1	3,000	4			2,950	700	5,200
Missouri	4	54,660	22			12,700	35,725	81,450
New Hampshire	3	34,800	10			4,670	5,000	18,100
New Jersey	6	5,050	13			4,480	2,750	16,900
New York	67	571,350	465	16	23	266,113	188,186	716,922
Ohio	10	36,700	40	2	2	18,957	13,298	53,049
Pennsylvania	26	347,086	224	7	14	137,798	87,307	349,126
Tennessee	1	1,200	2			624	225	2,500
Virginia	1	5,000	10		1	2,640	12,000	16,500

IRON AND STEEL.

(See Report by Special Agent J. M. Swank, *post.*)

90.—IRON BOLTS, NUTS, WASHERS, AND RIVETS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	100	$4,933,019	4,264	182	618	$1,981,300	$6,097,011	$10,073,330
California	2	107,000	25		1	19,000	40,000	75,000
Connecticut	17	1,225,350	806	73	82	427,013	936,050	1,662,131
Delaware	1	10,000	20		2	6,550	28,044	57,100
Illinois	4	187,000	295		40	164,800	727,150	1,104,000
Indiana	1	26,000	44			13,000	60,000	85,000
Kentucky	1	20,000	12			4,232	8,965	17,258
Maryland	1	4,500	5			1,816	2,705	6,952
Massachusetts	9	266,000	245	9	29	123,794	300,150	533,952
Michigan	1	100,000	58		40	38,030	188,988	283,947
Missouri	4	235,000	123		14	60,498	301,937	493,560
New Hampshire	2	32,500	19		1	6,000	29,700	39,500
New Jersey	4	160,050	196		13	85,263	334,853	452,862
New York	26	432,619	416	15	49	185,094	572,326	929,111
Ohio	8	522,500	571	25	5	260,423	727,926	1,310,711
Pennsylvania	17	1,444,500	1,306	60	278	521,625	1,571,456	2,636,366
Rhode Island	1	130,000	83		4	33,562	86,761	165,880
Virginia	1	30,000	40		60	30,000	180,000	240,000

IRON DOORS AND SHUTTERS.

(See Table IV (B) for Illinois, Massachusetts, New Jersey, and Wisconsin.)

91.—IRON FORGINGS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	91	$3,598,241	2,977	95	138	$1,329,151	$3,960,780	$6,492,028
California	4	42,000	40		1	27,702	47,081	91,210
Connecticut	12	445,000	266		15	141,489	282,225	512,620
Delaware	3	51,000	53			16,590	57,043	83,782
Illinois	5	145,800	155			73,130	424,337	585,581
Indiana	1	5,000	3			1,000	9,000	11,000
Kentucky	1	25,000	26		6	10,954	26,400	41,355
Maine	3	48,000	54			17,675	65,516	107,61[illegible]
Maryland	2	2,500	9			1,200	3,570	7,550
Massachusetts	9	509,000	214	95	2	140,708	344,894	657,103
Michigan	1	50,000	50		15	36,000	90,000	150,000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

91.—IRON FORGINGS—Continued.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Missouri	2	$85,000	123	...	...	$40,000	$110,000	$199,000
New Hampshire	1	12,000	8	...	...	5,500	19,500	32,000
New Jersey	9	391,941	349	...	33	150,190	524,352	775,514
New York	12	852,500	703	...	28	273,770	809,912	1,314,274
Ohio	4	310,000	263	...	...	106,500	363,000	590,000
Pennsylvania	19	558,500	594	...	38	264,743	667,125	1,110,166
Rhode Island	1	4,000	6	...	...	2,600	4,765	8,500
Virginia	2	61,000	61	...	...	20,000	112,080	214,160

92.—IRON NAILS AND SPIKES, CUT AND WROUGHT.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	62	$3,877,805	2,011	519	380	$1,255,171	$3,312,602	$5,629,240
Connecticut	1	60,000	30	14	...	30,000	80,000	120,000
Illinois	5	448,000	339	29	78	192,528	375,430	804,270
Indiana	1	150,000	300	...	...	170,710	251,332	426,968
Kentucky	1	25,000	13	...	...	4,680	16,148	32,000
Maryland	1	26,300	14	...	...	5,352	34,930	52,800
Massachusetts	36	2,336,055	942	419	224	657,287	1,970,352	3,126,275
New York	3	250,000	204	22	29	94,795	183,000	356,000
Ohio	1	75,000	30	8	2	16,970	30,000	49,000
Pennsylvania	9	192,450	83	14	7	37,849	206,410	291,927
Rhode Island	1	105,000	6	...	4	5,000	60,000	134,000
Vermont	1	100,000	21	3	6	10,000	50,000	80,000
West Virginia	1	60,000	15	10	18	15,000	30,000	110,000
Wisconsin	1	50,000	14	...	12	15,000	25,000	46,000

93.—IRON PIPE, WROUGHT.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	35	$6,129,565	4,909	13	288	$1,788,258	$9,480,049	$13,292,162
California	2	10,500	10	...	...	5,604	10,200	20,980
Delaware	1	925,000	618	...	...	245,278	1,491,476	2,000,000
Illinois	2	735,000	690	12	70	321,521	881,027	1,455,470
Massachusetts	3	29,500	17	...	...	9,529	26,000	40,070
New Jersey	2	50,500	7	...	...	3,350	1,925	6,700
New York	9	379,500	236	...	30	105,997	640,699	924,745
Ohio	1	10,000	30	...	5	18,000	114,550	150,000
Pennsylvania	12	3,804,565	3,151	1	183	996,567	6,141,797	8,418,975
Rhode Island	3	125,000	150	...	...	82,412	172,375	275,222

94.—IRON RAILING, WROUGHT.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	131	$662,197	728	...	38	$369,903	$615,648	$1,300,549
California	2	2,000	2	...	...	1,550	5,400	14,100
Connecticut	1	4,000	4	...	...	925	2,116	5,335
District of Columbia	5	3,275	11	...	...	3,912	4,685	13,403
Illinois	5	10,000	27	...	...	15,590	17,400	42,882
Indiana	2	9,000	13	...	...	3,700	5,710	13,610
Kentucky	3	7,500	26	...	...	8,200	10,560	25,480
Maryland	7	6,800	21	...	...	8,450	15,000	36,300
Massachusetts	2	38,500	23	...	...	9,950	19,560	40,360
Missouri	6	23,400	34	...	5	20,760	25,360	63,400
New Jersey	9	23,675	23	...	4	13,489	53,692	80,874
New York	49	200,697	281	...	6	182,770	214,913	529,067
Ohio	18	201,050	128	...	22	51,980	130,419	223,786
Pennsylvania	20	130,150	130	...	1	44,633	107,333	202,352
Utah	1	2,000	4	...	...	3,744	3,000	8,100
Virginia	1	150	1	...	...	250	500	1,500

95.—IRON WORK, ARCHITECTURAL AND ORNAMENTAL.

(See also Foundery and machine-shop products.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	89	$738,000	1,152	...	16	$474,711	$1,083,817	$2,109,537
Colorado	1	5,000	8	...	...	3,600	6,000	15,000
Connecticut	1	10,000	14	...	...	2,100	8,000	12,000
District of Columbia	2	12,000	35	...	...	20,000	17,500	50,000
Illinois	13	68,000	144	...	12	72,854	177,800	318,900
Indiana	4	111,000	132	...	...	44,600	87,691	150,892
Iowa	4	11,700	28	...	...	14,100	21,000	49,500
Kentucky	6	36,000	37	...	...	14,454	27,440	59,993
Louisiana	3	1,800	10	...	...	3,477	4,200	14,500
Maine	1	4,000	6	...	...	3,800	4,500	9,250
Maryland	1	10,000	21	...	...	12,285	12,000	30,356

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

95.—IRON WORK, ARCHITECTURAL AND ORNAMENTAL—Continued.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years	Children and youths.			
Massachusetts	6	$51, 500	101	....	....	$34, 311	$69, 494	$202, 146
Michigan	2	2, 900	14	....	....	6, 500	7, 500	18, 350
Minnesota	3	19, 500	60	....	....	27, 500	41, 000	108, 117
Missouri	5	34, 800	54	....	....	21, 850	34, 860	77, 610
New Jersey	1	6, 000	25	....	....	9, 000	18, 000	30, 000
New York	9	106, 000	104	....	1	48, 653	184, 647	293, 131
Ohio	18	195, 350	291	....	1	102, 087	305, 115	549, 567
Pennsylvania	5	16, 450	37	....	....	20, 000	32, 370	66, 825
Tennessee	1	2, 000	3	....	....	1, 040	1, 000	2, 750
Texas	1	2, 000	3	....	....	2, 500	4, 000	8, 000
Virginia	2	32, 000	25	....	2	10, 000	19, 700	42, 650

96.—IVORY AND BONE WORK.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	55	$775, 564	843	137	125	$414, 701	$754, 654	$1, 454, 901
California	2	3, 100	8	....	....	7, 225	12, 475	26, 200
Connecticut	9	305, 800	219	32	8	109, 373	322, 460	498, 141
Illinois	2	2, 900	1			246	1, 500	6, 200
Maine	1	3, 000	1	....	....	850	700	2, 000
Maryland	1	3, 000	....	....	....	....	3, 000	6, 000
Massachusetts	3	21, 000	39	5	1	18, 300	13, 700	43, 500
Minnesota	1	1, 500	1	....	....	300	200	3, 000
New Jersey	3	7, 100	29	6	22	13, 900	12, 800	37, 500
New York	18	182, 414	232	59	28	116, 389	217, 845	401, 674
Pennsylvania	11	209, 750	253	29	64	112, 888	152, 599	358, 019
Rhode Island	4	36, 000	60	6	2	35, 230	17, 375	72, 667

JAPANNING.

(See Table IV (B) for Illinois, Louisiana, Maryland, Massachusetts, New York, and Pennsylvania.)

97.—JEWELRY.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	739	$11, 431, 164	10, 050	1, 998	649	$6, 441, 688	$10, 324, 990	$22, 201, 621
California	12	283, 500	128	....	11	100, 597	159, 753	315, 115
Connecticut	1	65, 000	25	....	1	21, 554	27, 530	67, 680
Dakota	4	17, 000	15	....	....	17, 300	13, 200	40, 500
District of Columbia	11	19, 600	21	....	2	12, 444	11, 310	37, 533
Illinois	13	74, 600	81	4	5	53, 396	107, 380	247, 004
Indiana	1	10, 000	3	....	....	1, 800	1, 000	3, 500
Iowa	6	12, 800	10	1	....	5, 050	3, 775	16, 700
Kentucky	11	32, 899	37	2	1	18, 346	36, 584	67, 850
Maryland	4	11, 300	16	1	3	9, 744	12, 860	33, 100
Massachusetts	105	1, 936, 800	2, 485	743	37	1, 464, 993	1, 681, 034	4, 265, 525
Michigan	10	89, 802	57	....	4	40, 915	59, 251	138, 600
Missouri	8	52, 000	55	....	7	37, 600	98, 000	189, 500
Montana	2	1, 200	2	....	....	4, 800	16, 000	26, 000
Nebraska	3	49, 000	25	....	2	14, 500	105, 000	210, 000
New Jersey	68	2, 555, 899	1, 781	264	189	1, 114, 946	1, 967, 054	4, 079, 677
New Mexico	3	13, 000	16	....	....	11, 000	14. 000	35, 000
New York	260	2, 663, 938	2, 052	220	118	1, 417, 710	2, 765, 347	5, 340, 806
Ohio	23	168, 250	225	25	49	149, 836	158, 735	470, 500
Oregon	2	11, 000	1	....	....	900	3, 000	10, 000
Pennsylvania	33	485, 256	394	24	32	220, 902	437, 416	846, 736
Rhode Island	148	2, 836, 620	2, 568	714	188	1, 688, 616	2, 590, 611	5, 650, 133
Texas	1	10, 000	7	....	....	8, 000	2, 000	12, 000
Utah	3	2, 600	7	....	....	6, 783	9, 150	19, 362
Virginia	1	13, 000	16	....	....	5, 000	8, 000	15, 000
Wisconsin	5	15, 100	19	....	....	8, 716	32, 000	48, 800
Wyoming	1	1, 000	4	....	....	6, 240	5, 000	15, 000

98.—JEWELRY AND INSTRUMENT CASES.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	17	$62, 000	102	31	5	$51, 000	$48, 550	$131, 670
California	1	10, 000	12	....	....	6, 500	5, 000	15, 000
Colorado	1	5, 000	2	....	....	1, 800	2, 000	5, 000
Connecticut	2	1, 700	6	6	1	2, 000	2, 150	5, 200
Illinois	2	3, 100	4	....	1	2, 100	3, 250	8, 000
Massachusetts	3	7, 900	9	10	1	5, 920	10, 100	21, 300
Missouri	1	900	....	....	....	....	1, 500	3, 000
New Jersey	1	1, 000	4	2	2	1, 900	3, 000	8, 000
New York	2	6, 900	26	....	....	18, 980	7, 450	29, 830
Ohio	1	500	2	....	....	500	500	1, 340
Pennsylvania	3	25, 000	37	13	....	11, 300	13, 600	35, 000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

JUTE AND JUTE GOODS.

(See Table IV (B) for Delaware and New York.)

99.—KAOLIN AND GROUND EARTHS.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	63	$1, 291, 527	866	3	29	$310, 909	$697, 006	$1, 455, 757
Alabama	1	2, 400	6			1, 400	2, 400	4, 800
Colorado	1	10, 000	8			2, 000	1, 750	6, 000
Connecticut	5	80, 000	73	1		26, 100	132, 000	191, 590
Georgia	1	10, 000	15		5	3, 000	3, 500	10, 000
Maine	2	29, 100	19			8, 750	3, 050	54, 600
Maryland	7	410, 400	192		3	87, 580	309, 300	559, 260
Massachusetts	9	198, 700	96		1	29, 135	85, 676	141, 250
Missouri	1	100	4			1, 400	200	2, 000
New Jersey	2	80, 000	56	2		28, 300	61, 216	142, 000
New York	3	73, 000	87			26, 410	12, 100	87, 000
Ohio	9	76, 500	37			14, 196	24, 112	49, 046
Pennsylvania	8	163, 000	113		3	38, 113	28, 833	101, 006
Tennessee	1	44, 027	20			6, 000	4, 914	10, 695
Utah	1	500	1		1	500	1, 000	2, 000
Vermont	7	63, 500	68			15, 800	9, 300	45, 500
Virginia	5	50, 500	71		16	22, 225	17, 655	49, 100

100.—KINDLING WOOD.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	213	$1, 018, 490	1, 187	14	242	$526, 861	$1, 403, 010	$2, 480, 953
California	2	600	7		4	1, 650	1, 500	8, 000
Connecticut	2	2, 000	6			1, 925	3, 500	6, 750
Delaware	4	6, 800	15			3, 975	4, 150	12, 500
District of Columbia	6	18, 465	28		7	11, 114	21, 969	40, 650
Maryland	11	36, 925	42		22	18, 256	36, 245	72, 296
Massachusetts	12	32, 050	71		6	25, 914	37, 853	84, 648
Michigan	1	13, 000	12		8	5, 600	7, 000	10, 000
Minnesota	1	3, 000		2		900	6, 500	9, 250
New Hampshire	1	200					50	600
New Jersey	28	54, 700	92	2	15	43, 958	93, 315	181, 698
New York	109	738, 500	755	10	154	359, 377	1, 071, 730	1, 818, 721
Ohio	2	2, 100	12			2, 880	3, 500	7, 720
Pennsylvania	30	106, 750	130		26	48, 612	110, 498	216, 620
Texas	2	2, 250	9			1, 600	3, 000	6, 700
Virginia	2	1, 150	8			1, 100	2, 200	4, 800

LABELS AND TAGS.

(See Table IV (B) for Illinois, Kentucky, Massachusetts, Missouri, New Jersey, New York, and Ohio.)

101.—LAMPS AND REFLECTORS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	74	$1, 873, 625	1, 478	81	171	$742, 423	$1, 852, 906	$3, 357, 829
California	1	20, 000	3			3, 000	6, 000	12, 000
Connecticut	5	49, 000	82	1	2	35, 300	46, 800	102, 800
Illinois	4	453, 500	345	25	55	159, 250	648, 408	1, 051, 346
Maine	1	1, 500	2			973	2, 200	3, 500
Maryland	2	1, 500	3			1, 452	3, 250	7, 500
Massachusetts	2	51, 500	50	4	1	26, 121	25, 000	75, 000
Missouri	7	291, 600	139		20	74, 139	376, 540	519, 360
New Jersey	5	47, 975	33	1	21	20, 470	15, 456	55, 160
New York	25	487, 000	447	3	24	254, 163	363, 885	857, 467
Ohio	7	309, 500	257	27	30	100, 247	261, 400	432, 000
Pennsylvania	13	136, 550	95	12	6	51, 908	57, 967	151, 756
West Virginia	1	20, 000	16	8	6	13, 000	36, 000	75, 000
Wisconsin	1	4, 000	6		6	2, 400	10, 000	15, 000

102.—LAPIDARY WORK.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	55	$176, 875	207	17	28	$142, 075	$226, 277	$544, 689
California	7	4, 425	9	1	3	11, 035	16, 670	39, 120
Illinois	1	400	1			300	200	2, 000
Kentucky	1	100					50	600
Massachusetts	6	45, 000	43	3	3	23, 932	61, 075	116, 700
New Jersey	6	5, 400	25		4	9, 900	8, 200	29, 506
New York	26	99, 250	90	11	16	80, 226	128, 682	313, 230
Ohio	1	300					200	600
Rhode Island	7	22, 000	39	2	2	16, 682	11, 200	42, 333

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

103.—LARD, REFINED.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	26	$2, 513, 066	1, 030	46	105	$546, 258	$21, 948, 826	$23, 195, 702
Illinois	4	1, 012, 700	329	40	75	181, 200	4, 637, 050	5, 055, 000
Iowa	1	1, 000	1			200	3, 000	5, 000
Maryland	2	240, 000	42			20, 000	1, 445, 000	1, 544, 000
Massachusetts	3	45, 000	25			15, 544	236, 950	262, 984
Missouri	2	53, 000	48		20	30, 000	24, 000	174, 000
New Jersey	1	25, 000	28			15, 000	150, 000	175, 000
New York	11	786, 366	492		10	254, 883	14, 317, 826	14, 758, 718
Pennsylvania	2	350, 000	65	6		29, 631	1, 135, 000	1, 221, 000

104.—LASTS.

The United States	62	$477, 692	497	18	22	$308, 975	$221, 905	$765, 296
California	2	6, 500	8			7, 100	2, 160	13, 150
Illinois	3	16, 500	34		2	19, 988	34, 075	61, 700
Maine	3	13, 000	12			4, 892	2, 600	10, 627
Maryland	1	2, 000	3		1	1, 904	1, 500	4, 000
Massachusetts	26	230, 490	217		1	164, 877	110, 483	386, 903
Michigan	1	5, 000	15			7, 000	3, 500	15, 000
New Hampshire	2	4, 000	11			4, 400	2, 900	9, 000
New Jersey	1	20, 000	8		1	4, 900	2, 950	15, 000
New York	11	87, 382	100	2		52, 869	37, 347	146, 582
Ohio	2	42, 000	41	8	1	15, 100	11, 100	35, 300
Pennsylvania	6	37, 400	29	8	16	18, 295	10, 890	44, 234
Utah	1	400					75	600
Vermont	3	13, 020	19			7, 650	2, 325	23, 200

105.—LEAD, BAR, PIPE, SHEET, AND SHOT.

The United States	32	$2, 466, 375	551	5	15	$316, 363	$4, 363, 209	$5, 600, 671
California	2	100, 000	130			87, 952	826, 500	948, 000
Illinois	3	153, 000	28	1	3	17, 379	85, 750	150, 401
Iowa	1	2, 800	5	1		2, 500	35, 000	52, 000
Maryland	2	135, 000	25		2	7, 464	161, 493	192, 933
Massachusetts	2	174, 000	25			15, 042	483, 024	578, 057
Missouri	2	205, 000	26			13, 000	460, 000	548, 000
New York	10	901, 575	113	3	3	60, 558	1, 250, 492	1, 701, 717
Ohio	3	61, 000	21			9, 700	119, 000	208, 000
Pennsylvania	4	665, 000	89		2	49, 076	820, 500	1, 008, 000
Rhode Island	2	65, 000	83		5	52, 092	110, 350	200, 563
Wisconsin	1	4, 000	6			1, 600	11, 100	13, 000

LEATHER BOARD.

(See also Paper; also Table VII, and Table IV (B) for Maine, Massachusetts, New Hampshire, and New Jersey.)

LEATHER, CURRIED.

(See Table VII.)

106.—LEATHER, DRESSED SKINS.

The United States	202	$6, 266, 237	4, 966	208	221	$2, 441, 372	$11, 063, 265	$15, 399, 311
California	2	78, 000	52			21, 248	401, 500	453, 000
Colorado	1	2, 500	3			300	3, 000	4, 175
Connecticut	4	75, 000	64		3	35, 250	385, 200	460, 000
Delaware	16	926, 500	848	61	73	388, 064	1, 350, 860	1, 886, 597
District of Columbia	1	4, 000	5			3, 500	17, 000	30, 000
Kansas	1	2, 000	4	1		2, 500	500	6, 000
Maine	2	16, 000	18			8, 700	136, 000	173, 000
Maryland	1	75, 000	70	5		22, 544	156, 300	190, 000
Massachusetts	27	513, 950	589	11	12	280, 809	1, 359, 920	1, 931, 617
Michigan	1	4, 000	9	3	2	1, 800	4, 000	8, 000
Minnesota	1	10, 000	18			4, 500	50, 000	60, 000
Missouri	1	1, 000	1			140	1, 000	1, 600
New York	71	1, 831, 040	1, 071	23	41	450, 130	2, 061, 438	3, 095, 302
Ohio	3	21, 000	24			9, 250	77, 000	98, 000
Pennsylvania	57	2, 619, 347	2, 121	103	89	1, 183, 898	4, 971, 982	6, 859, 044
Rhode Island	1	2, 500	2			628	700	2, 100
Utah	2	5, 700	6			2, 112	5, 400	12, 400
Wisconsin	10	78, 700	61	1	1	25, 999	81, 465	128, 476

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

LEATHER GOODS.

(See Table IV (B) for Maine, Massachusetts, New York, Pennsylvania, and Rhode Island.)

LEATHER, PATENT AND ENAMELED.

(See Table IV (B) for New Hampshire and New York.)

LEATHER, TANNED.

(See Table VII.)

107.—LIGHTNING RODS.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	20	$431,750	168			$73,718	$526,691	$801,192
Illinois	3	21,250	22			13,333	37,650	65,200
Indiana	1	45,000	32			9,000	6,000	30,000
Iowa	1	5,000	6			3,160	3,000	9,000
Kentucky	1	2,000	3			2,000	5,000	10,000
Maryland	1	500	1			100	500	1,000
Minnesota	2	4,000	12			4,450	2,050	11,200
Missouri	3	54,000	16			7,250	14,491	39,292
Ohio	3	40,000	13			6,950	96,000	144,500
Pennsylvania	3	255,000	58			25,475	358,500	481,000
Wisconsin	2	5,000	5			2,000	3,500	10,000

108.—LIME.

The United States	579	$4,505,138	4,453	3	114	$1,237,207	$2,122,769	$4,638,882
Alabama	2	7,000	75			22,200	18,500	56,000
California	4	210,000	83			34,200	54,250	137,350
Colorado	5	6,300	17			8,200	11,500	27,600
Connecticut	6	62,000	65			22,630	49,500	88,700
District of Columbia	5	19,100	24			11,959	17,424	51,648
Georgia	1	5,000	20		5	5,500	3,600	11,500
Illinois	23	313,150	397			149,212	190,460	444,990
Indiana	24	196,200	321		5	67,850	97,604	219,715
Iowa	32	56,285	98		1	23,245	30,959	82,760
Kansas	19	23,600	57		1	18,762	21,087	58,129
Kentucky	4	42,220	40			1,900	4,817	9,837
Maine	28	942,150	301			86,274	393,309	599,695
Maryland	26	87,700	161			32,855	50,743	121,340
Massachusetts	8	30,200	76			26,250	37,600	86,100
Michigan	18	158,800	91			28,834	67,616	121,416
Minnesota	14	39,875	78			22,052	17,715	61,340
Missouri	17	172,050	135		7	52,100	86,575	186,075
Nebraska	1	500	2			500	300	1,200
New Jersey	26	136,400	132			37,904	85,095	169,754
New York	79	794,332	763		62	178,116	345,433	707,571
Ohio	53	352,456	386		19	121,251	171.633	431,328
Pennsylvania	120	471,610	579		10	141,887	174,979	466,532
Rhode Island	1	1,500	4			1,250	400	2,400
South Carolina	2	5,000	28			5,265	2,660	9,500
Tennessee	3	13,500	49			10,000	8,350	25,800
Texas	3	80,000	54			17,400	13,916	48,264
Utah	5	37,300	21		2	7,720	4,500	19,250
Vermont	9	41,050	105			27,328	39,403	92,078
Virginia	9	44,100	99			25,490	22,486	78,510
Washington	2	25,000	22	2		10,000	8,350	28,000
West Virginia	2	6,800	4			450	6,060	9,500
Wisconsin	28	123,960	166	1	2	38,773	85,975	185,000

LINEN GOODS.

(See Table IV (B) for Massachusetts and New York.)

109.—LIQUORS, DISTILLED.

The United States	844	$24,247,595	6,452	10	40	$2,663,967	$27,744,245	$41,063,663
Alabama	1	3,000	3			510	3,221	5,170
Arkansas	11	22,100	16			1,965	14,202	22,105
California	37	1,223,024	104		8	51,653	424,252	637,298
Connecticut	4	61,000	7			2,075	19,135	29,075
Delaware	1	800	1			75	415	700
Georgia	25	41,073	31			5,350	45,817	73,070
Idaho	1	6,000	1			375	2,230	3,710
Illinois	36	3,457,616	2,114			934,751	10,065,860	14,630,760
Indiana	22	2,300,250	415			177,767	2,000,523	2,997,063
Iowa	3	118,200	75			20,000	192,338	288,000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

109.—LIQUORS, DISTILLED—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Kansas	1	$25,000	4			$1,350	$14,750	$22,000
Kentucky	215	6,345,922	1,414	3	13	560,121	5,453,575	8,281,018
Louisiana	2	8,500	2			240	1,925	2,925
Maryland	16	715,500	156	1		65,340	858,654	1,202,393
Massachusetts	10	583,840	155		3	67,828	740,060	1,104,391
Minnesota	1	5,200	2			760	8,335	12,500
Missouri	20	230,100	54		5	35,338	354,973	527,530
Nebraska	1	200,000	50			17,775	150,000	225,000
New Hampshire	1	25,000	4			1,700	20,500	31,500
New Jersey	19	102,045	14			2,900	27,550	41,890
New Mexico	1	1,000	1			40	350	535
New York	19	453,025	155			70,820	673,472	1,012,550
North Carolina	174	176,049	110			20,045	167,223	255,838
Ohio	37	4,813,185	976	5	11	406,197	4,533,049	6,692,736
Pennsylvania	70	2,198,753	334			138,745	1,216,120	1,856,484
South Carolina	10	6,700	10			785	6,246	9,705
Tennessee	63	373,573	136			43,344	353,776	540,729
Texas	1	600	1			50	425	650
Virginia	34	175,540	37	1		8,860	75,553	114,895
West Virginia	2	201,000	26			8,808	113,420	169,230
Wisconsin	6	394,000	44			18,400	205,296	302,213

110.—LIQUORS, MALT.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	2,191	$91,208,224	26,001	29	190*	$12,198,053	$56,836,500	$101,058,385
Arizona	9	35,550	6			2,140	7,824	14,345
California	185	2,800,515	1,201			570,624	2,144,119	3,862,431
Colorado	23	527,100	134		5	62,096	230,695	418,902
Connecticut	19	461,600	114			55,484	315,702	533,773
Dakota	10	64,400	20			8,604	31,649	57,160
Delaware	2	95,000	15			7,370	38,959	66,998
District of Columbia	10	208,300	60		4	30,186	162,739	275,232
Georgia	1	65,000	25			10,943	60,567	99,584
Idaho	2	9,000	3			794	3,077	5,395
Illinois	111	6,098,835	1,640	2	6	754,510	3,261,272	5,798,109
Indiana	63	1,609,179	577			257,514	1,092,752	1,990,803
Iowa	114	1,987,343	526			218,017	928,135	1,653,851
Kansas	30	463,500	102	2		35,338	133,291	240,110
Kentucky	30	1,260,914	435	1	3	209,143	897,922	1,491,659
Louisiana	9	160,613	114			55,092	295,778	458,459
Maryland	53	2,145,590	421			200,291	1,001,766	1,820,303
Massachusetts	31	3,285,400	1,180			563,547	2,855,046	5,112,227
Michigan	113	2,212,848	633	6	4	285,726	1,225,866	2,184,392
Minnesota	101	1,389,900	416	8	11	150,952	647,345	1,153,122
Missouri	64	4,942,700	1,394		108	699,616	2,852,236	5,048,077
Montana	17	170,500	32			10,825	40,928	72,142
Nebraska	23	427,200	143			56,663	210,109	393,874
Nevada	33	186,170	59			23,363	88,488	157,551
New Hampshire	5	845,000	304			138,719	701,523	1,265,477
New Jersey	49	3,260,800	1,121			493,741	2,564,748	4,532,733
New Mexico	3	6,000	2			410	1,772	3,290
New York	325	27,580,502	8,064	8	21	3,912,798	19,823,853	35,392,677
Ohio	163	8,178,545	2,692	2	12	1,184,825	5,110,587	9,125,014
Oregon	23	287,500	57			24,961	92,409	167,681
Pennsylvania	291	12,073,068	2,439		13	1,200,289	5,765,837	10,124,348
Rhode Island	4	165,000	90			39,410	236,944	398,743
South Carolina	1	75,000	6			2,917	13,446	22,240
Tennessee	3	66,500	30			9,602	43,637	73,869
Texas	19	45,400	18			6,241	28,841	47,059
Utah	14	153,500	47		3	20,719	77,011	139,239
Virginia	2	253,500	51			16,375	73,672	137,807
Washington	18	101,500	39			12,247	46,430	83,011
West Virginia	9	221,017	95			36,434	168,741	280,966
Wisconsin	203	7,253,205	1,680			823,124	3,536,438	6,312,173
Wyoming	6	35,000	16			6,403	24,326	43,293

111.—LIQUORS, VINOUS.

(See also Liquors, distilled.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States*	117	$2,581,910	781	57	129	$216,559	$1,340,629	$2,169,193
California	45	639,600	383		26	72,307	292,075	622,087
Indiana	2	3,060	4		3	2,540	10,171	30,931
Iowa	9	163,950	37	24	84	12,337	35,257	66,445
Kansas	2	1,200	3	1		75	400	1,300
Kentucky	2	1,250	3		5	700	400	2,400

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

111.—LIQUORS, VINOUS—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Michigan	1	$3, 600	2			$250	$700	$1, 570
Missouri	9	459, 950	49	2		23, 135	94, 230	185, 900
New Jersey	5	68, 000	42	2		8, 525	58, 360	79, 700
New Mexico	1	1, 300	3			800	1, 500	4, 000
New York	12	459, 000	93			33, 650	254, 056	375, 150
North Carolina	1	5, 000	3			400	150	4, 000
Ohio	21	747, 500	133	23	9	54, 990	583, 700	773, 110
Pennsylvania	1	5, 000	4			1, 200	3, 500	7, 000
Texas	3	17, 500	10	1		4, 300	2, 900	9, 000
Virginia	3	6, 000	12	4	2	1, 350	3, 230	6, 600

112.—LITHOGRAPHING.

(See also Printing and publishing.)

The United States	167	$4, 501, 825	3, 641	308	373	$2, 307, 302	$2, 755, 264	$6, 912, 338
California	7	122, 000	84		9	63, 391	77, 200	193, 712
Colorado	1	10, 000	23			12, 222	18, 000	40, 000
Connecticut	3	150, 000	53	2	11	27, 328	43, 526	99, 835
District of Columbia	5	33, 200	40		3	23, 164	16, 860	52, 334
Georgia	1	1, 500	2			626	6, 000	12, 000
Illinois	13	494, 150	307	12	11	220, 955	263, 549	698, 387
Indiana	1	800	4			2, 300	400	5, 000
Iowa	2	11, 500	15			10, 850	9, 000	27, 000
Kentucky	4	26, 200	43	12	10	22, 324	22, 526	59, 270
Louisiana	3	2, 000	8			4, 500	3, 250	13, 500
Maryland	2	128, 000	59	4	12	42, 184	39, 250	131, 184
Massachusetts	13	534, 550	616	98	23	352, 983	463, 360	1, 046, 676
Minnesota	3	14, 000	14	1	1	9, 785	19, 657	37, 525
Missouri	5	71, 500	94	6	17	51, 265	83, 344	214, 989
New York	58	1, 628, 550	1, 193	61	144	828, 615	842, 379	2, 270, 854
Ohio	13	423, 100	422	36	44	255, 663	407, 617	856, 744
Oregon	1	17, 500	10	1	2	7, 500	25, 000	55, 000
Pennsylvania	24	659, 550	483	65	59	269, 011	259, 627	765, 003
Rhode Island	2	80, 000	37	5	1	31, 760	34, 929	109, 642
Virginia	2	24, 600	18	3	13	13, 125	40, 150	56, 823
Wisconsin	4	69, 125	116	2	13	57, 751	79, 640	166, 860

113.—LOCK- AND GUN-SMITHING.

The United States	607	$705, 815	818	6	63	$368, 967	$398, 642	$1, 317, 810
Alabama	7	3, 550	1		1	430	2, 000	8, 200
Arkansas	1	1, 000	2			1, 200	500	3, 500
California	46	43, 625	38		1	21, 814	20, 696	82, 859
Colorado	3	2, 600	11			3, 700	2, 200	10, 500
Connecticut	3	3, 700	4			2, 300	1, 800	7, 800
District of Columbia	6	11, 700	10			5, 595	3, 745	13, 546
Georgia	4	3, 500	2		1	950	925	3, 900
Illinois	38	44, 380	62		3	24, 953	18, 739	77, 512
Indiana	24	16, 750	18		1	8, 556	14, 425	39, 875
Iowa	25	20, 900	18			9, 299	8, 025	33, 478
Kansas	7	9, 800	6			3, 350	2, 750	10, 300
Kentucky	7	4, 025	12			5, 058	12, 650	23, 800
Louisiana	16	3, 850	12			3, 000	2, 465	14, 370
Maine	3	6, 500	3			1, 700	1, 100	5, 700
Maryland	22	28, 775	35		1	15, 932	12, 593	43, 986
Massachusetts	25	33, 275	53	1	2	22, 860	24, 810	73, 660
Michigan	19	17, 775	21			8, 264	5, 650	28, 784
Minnesota	19	20, 100	17			8, 700	9, 250	35, 650
Mississippi	7	3, 850	3			1, 604	1, 675	7, 450
Missouri	25	21, 425	28		2	12, 924	12, 590	41, 924
Nebraska	2	1, 400	4			1, 125	1, 150	4, 850
Nevada	1	10, 000	1			1, 250	500	2, 500
New Hampshire	3	62, 800	104	3	5	37, 500	35, 300	100, 500
New Jersey	10	7, 300	9		1	3, 275	3, 400	14, 400
New York	122	125, 325	157	2	27	90, 582	105, 352	324, 798
North Carolina	3	690	2			900	250	2, 700
Ohio	27	34, 345	26		4	10, 184	10, 085	47, 017
Oregon	6	5, 750	4			2, 450	2, 100	11, 300
Pennsylvania	55	91, 950	87		8	32, 257	40, 735	119, 458
Rhode Island	5	4, 950	5			3, 702	2, 762	10, 515
South Carolina	[illegible]	2, 430	6		3	2, 858	2, 150	11, 968
Tennessee	12	8, 750	12		2	5, 275	6, 650	21, 425
Texas	15	9, 025	11		1	4, 450	8, 135	21, 050
Utah	1	400	1			250	230	850
Vermont	6	7, 000	5			2, 075	2, 330	9, 350

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

113.—LOCK- AND GUN-SMITHING—Continued.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Virginia	10	$7,620	15			$5,345	$7,600	$22,250
Washington	2	600					150	1,175
West Virginia	2	1,000					175	1,760
Wisconsin	9	19,400	12			3,200	9,000	20,150
Wyoming	1	4,000	1			100	2,000	3,000

114.—LOOKING-GLASS AND PICTURE FRAMES.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	645	$4,437,666	5,224	316	643	$2,471,105	$4,831,248	$9,596,219
California	23	231,200	80	2	11	59,150	137,553	285,703
Colorado	1	1,000	2			1,800	1,500	3,500
Connecticut	16	44,100	36	1	1	18,793	45,740	81,610
Delaware	3	1,900	2		1	1,850	2,400	6,500
District of Columbia	10	15,000	32			16,308	28,706	65,227
Georgia	4	4,600	8			2,920	8,600	15,339
Illinois	63	350,925	798	32	158	361,675	619,090	1,304,903
Indiana	16	41,250	44	1	6	24,007	63,303	110,825
Iowa	9	25,000	22	3		12,142	21,800	46,600
Kansas	1	1,000	3			1,404	800	2,644
Kentucky	5	4,162	9			2,980	4,910	13,540
Louisiana	5	7,050	6		1	2,892	8,575	16,559
Maine	6	9,200	11		1	4,100	10,300	18,100
Maryland	31	118,550	271	70	25	98,653	160,492	402,423
Massachusetts	70	199,600	415	45	14	215,348	374,548	770,908
Michigan	30	310,850	315	80	63	155,042	262,655	563,737
Minnesota	7	15,550	12			4,250	19,800	34,100
Missouri	22	327,400	135	1	22	83,351	107,825	282,682
Nebraska	1	3,000	3		1	1,500	3,500	6,000
New Hampshire	6	19,250	17		1	5,254	7,187	19,432
New Jersey	19	160,130	245	39	37	104,196	243,650	394,000
New York	146	1,026,481	1,354	18	142	670,780	1,550,915	2,828,757
North Carolina	1	2,000	4			1,000	5,000	10,000
Ohio	39	613,700	590	3	69	239,403	408,573	788,919
Oregon	3	8,600	5			2,950	11,700	18,200
Pennsylvania	74	799,793	696	19	75	330,660	610,641	1,276,471
Rhode Island	11	40,200	26	2	2	13,601	42,200	77,746
Tennessee	5	15,000	28		4	10,164	18,375	38,675
Texas	2	11,500	4			3,560	3,750	11,800
Vermont	4	6,750	11			3,150	4,550	12,850
Virginia	7	8,950	28		9	10,400	21,850	50,500
Wisconsin	5	13,975	12			7,822	20,700	37,970

115.—LUMBER, PLANED.

(See also Sash, doors, and blinds; Wood, turned and carved.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	1,203	$17,612,923	14,614	23	652	$5,890,724	$24,477,543	$36,803,356
Alabama	5	30,000	29		2	8,950	47,700	62,800
Arkansas	3	3,175	18		1	5,300	20,885	33,100
California	26	352,385	268			164,848	530,228	850,395
Colorado	5	168,500	178			124,500	997,000	1,276,000
Connecticut	6	53,700	52			22,210	73,930	111,425
Dakota	1	10,000	10			9,000	7,000	20,000
Delaware	7	51,800	54		7	12,600	63,650	90,600
District of Columbia	10	96,200	86		5	40,920	124,925	192,792
Florida	1	7,000	15			5,460	8,000	17,000
Georgia	13	122,000	319		15	85,389	195,300	371,200
Illinois	65	971,808	1,155	2	71	474,739	3,799,814	4,813,290
Indiana	84	655,546	691		26	251,410	762,494	1,266,215
Iowa	12	94,600	95		6	42,633	161,580	256,800
Kansas	4	48,500	40		3	12,860	35,500	59,500
Kentucky	21	444,268	432		7	184,187	540,197	950,638
Louisiana	8	79,500	100		4	44,973	163,710	270,480
Maine	33	300,000	224		14	89,865	351,471	511,799
Maryland	7	59,500	49			20,425	58,425	104,575
Massachusetts	39	742,700	518		5	233,442	773,973	1,197,371
Michigan	54	578,500	513		35	202,011	629,630	1,076,049
Minnesota	18	360,500	283			131,392	398,450	657,377
Mississippi	6	15,200	33		5	9,310	51,800	71,350
Missouri	26	409,350	546	2	41	245,963	774,442	1,267,636
Montana	4	43,000	33			24,999	26,900	59,515
Nebraska	1	15,000	5			1,500	3,000	5,000
New Hampshire	22	80,900	114	8	2	40,276	81,726	162,429
New Jersey	11	162,000	136		27	58,739	152,230	254,285
New York	222	4,556,865	3,113		185	1,356,491	5,271,184	8,073,766
North Carolina	4	25,000	26		2	6,575	9,400	21,200
Ohio	148	1,728,551	1,532	1	29	605,926	1,773,590	2,961,567

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

115.—LUMBER, PLANED—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Oregon	11	$62, 000	63	....	....	$37, 040	$43, 500	$120, 500
Pennsylvania	200	3, 250, 225	2, 142	6	61	758, 281	2, 749, 840	4, 602, 753
Rhode Island	9	163, 000	88	....	....	38, 274	76, 727	150, 244
South Carolina	12	109, 500	220	....	34	52, 770	142, 700	238, 250
Tennessee	15	117, 700	169	....	24	63, 275	150, 570	270, 405
Texas	17	143, 000	187	....	4	73, 775	295, 640	456, 600
Utah	1	15, 000	5	....	....	1, 000	1, 000	3, 000
Vermont	18	854, 800	528	....	19	170, 948	2, 371, 512	2, 709, 52[illegible]
Virginia	9	67, 200	120	....	2	37, 420	189, 950	284, 000
Washington	3	24, 000	18	....	....	6, 609	7, 600	29, 000
West Virginia	15	284, 100	149	....	2	58, 566	237, 800	353, 550
Wisconsin	27	256, 350	258	4	14	75, 873	322, 650	519, 378

LUMBER, SAWED.

(See Table VII.)

116.—MALT.

The United States	216	$14, 390, 441	2, 320	8	4	$1, 004, 548	$14, 321, 423	$18, 273, 102
California	2	55, 000	17	....	....	14, 500	58, 800	84, 400
Illinois	22	941, 200	257	....	1	117, 710	1, 703, 169	2, 113, 080
Indiana	5	123, 000	22	....	....	9, 715	142, 400	182, 000
Iowa	2	95, 000	19	....	....	8, 500	76, 050	100, 750
Kentucky	2	89, 000	26	....	1	19, 000	350, 000	510, 000
Maryland	6	705, 000	98	....	....	52, 060	547, 000	752, 000
Massachusetts	1	20, 000	5	....	....	2, 500	18, 000	27, 000
Michigan	1	30, 000	7	....	....	3, 000	27, 000	33, 000
Minnesota	4	30, 500	18	....	....	9, 485	49, 300	74, 000
Missouri	1	30, 000	8	....	....	4, 800	90, 000	100, 000
New Jersey	1	10, 000	4	....	....	800	13, 500	16, 875
New York	111	8, 196, 810	1, 252	....	....	513, 229	7, 781, 359	9, 874, 098
Ohio	29	1, 402, 931	247	7	2	125, 287	1, 391, 584	1, 756, 551
Pennsylvania	26	2, 522, 000	309	1	....	108, 892	1, 794, 761	2, 333, 348
Wisconsin	3	140, 000	31	....	....	15, 070	278, 500	316, 000

117.—MANTELS, SLATE, MARBLE, AND MARBLEIZED.

The United States	46	$750, 300	690	....	35	$313, 009	$476, 431	$1, 030, 660
California	1	20, 000	23	....	....	11, 700	10, 000	25, 000
Connecticut	2	5, 700	10	....	2	5, 000	10, 100	18, 500
District of Columbia	2	28, 000	78	....	2	28, 900	56, 080	112, 000
Illinois	1	6, 000	4	....	....	2, 496	7, 200	12, 604
Maryland	3	23, 000	19	....	2	8, 388	10, 784	30, 205
Massachusetts	1	1, 200	1	....	....	750	1, 800	3, 600
Missouri	2	13, 600	11	....	2	6, 550	17, 550	27, 700
New Hampshire	1	20, 000	2	....	....	673	1, 300	2, 000
New Jersey	1	2, 500	6	....	....	1, 458	1, 000	3, 550
New York	5	221, 500	108	....	....	50, 680	65, 864	147, 565
Ohio	6	211, 000	210	....	17	96, 722	137, 740	311, 330
Pennsylvania	15	145, 800	171	....	4	77, 792	127, 513	263, 106
Vermont	6	22, 000	47	....	6	21, 900	29, 500	73, 500

118.—MARBLE AND STONE WORK.

The United States	2, 846	$16, 498, 221	21, 112	23	336	$10, 238, 885	$12, 743, 345	$31, 415, 150
Alabama	5	17, 475	29	....	....	10, 250	13, 050	34, 500
Arkansas	3	790	2	....	....	225	900	2, 600
California	67	332, 650	339	....	1	231, 817	319, 904	710, 546
Colorado	6	22, 500	66	....	....	25, 200	23, 750	66, 200
Connecticut	63	522, 850	322	....	4	164, 432	139, 203	419, 948
Delaware	4	28, 500	24	....	....	8, 700	10, 700	23, 900
District of Columbia	25	113, 745	137	....	1	60, 490	91, 806	198, 699
Florida	1	10, 000	5	....	....	1, 622	3, 000	5, 500
Georgia	10	45, 100	65	....	....	24, 720	32, 039	88, 567
Illinois	188	799, 125	1, 556	....	21	712, 515	909, 793	2, 102, 387
Indiana	156	338, 547	582	....	12	250, 599	427, 253	980, 072
Iowa	85	240, 970	317	1	3	142, 200	186, 119	499, 744
Kansas	31	62, 900	196	....	....	75, 880	60, 885	205, 500
Kentucky	45	186, 775	281	....	....	132, 469	200, 306	496, 980
Louisiana	11	62, 550	65	....	....	32, 575	61, 208	134, 490
Maine	67	137, 600	260	....	1	90, 230	71, 902	245, 750
Maryland	59	673, 926	863	....	10	336, 327	467, 243	1, 007, 893
Massachusetts	199	1, 273, 489	2, 029	1	1	835, 244	1, 061, 482	2, 594, 182
Michigan	86	292, 550	423	1	11	206, 809	274, 446	674, 780
Minnesota	35	105, 100	177	....	....	80, 323	82, 280	221, 175

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

118.—MARBLE AND STONE WORK—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Mississippi	6	$5, 000	23	....	....	$8, 883	$10, 765	$34, 688
Missouri	115	376, 800	697	....	21	330, 011	354, 958	1, 003, 514
Nebraska	17	20, 700	52	....	....	23, 720	47, 250	96, 250
Nevada	1	1, 500	1	....	....	800	1, 000	2, 326
New Hampshire	55	153, 331	351	1	....	157, 887	91, 119	374, 603
New Jersey	85	411, 860	503	1	41	308, 683	286, 512	811, 996
New York	560	4, 892, 056	5, 759	10	108	3, 496, 242	4, 055, 445	10, 189, 267
North Carolina	8	7, 600	52	....	1	9, 668	9, 798	27, 010
Ohio	246	1, 127, 930	1, 564	6	70	633, 312	904, 069	2, 240, 160
Oregon	11	13, 175	27	....	....	14, 575	20, 150	52, 650
Pennsylvania	321	2, 476, 752	2, 185	1	11	970, 026	1, 467, 475	3, 135, 651
Rhode Island	39	346, 000	354	1	5	155, 011	110, 299	374, 900
South Carolina	14	26, 650	44	....	4	18, 870	27, 950	59, 734
Tennessee	30	82, 280	171	....	2	61, 065	81, 937	237, 596
Texas	9	21, 450	42	....	....	17, 400	26, 800	68, 100
Utah	3	4, 400	5	....	....	3, 868	3, 300	9, 400
Vermont	69	904, 575	1, 032	....	4	394, 400	535, 837	1, 303, 790
Virginia	24	39, 260	95	....	....	35, 299	40, 953	110, 525
Washington	2	1, 600	1	....	....	600	2, 100	4, 500
West Virginia	13	20, 450	50	....	....	20, 135	20, 500	60, 334
Wisconsin	72	297, 710	366	....	4	155, 803	207, 879	504, 713

119.—MASONRY, BRICK AND STONE.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	1, 591	$3, 990, 706	15, 877	1	142	$6, 880, 866	$10, 123, 478	$20, 586, 553
Arkansas	2	2, 500	35	....	....	19, 000	20, 500	49, 000
California	25	76, 150	192	....	1	136, 127	182, 708	392, 409
Colorado	1	800	6	....	....	6, 000	3, 500	12, 800
Connecticut	59	146, 705	723	....	2	313, 124	397, 949	841, 493
Delaware	10	21, 370	78	....	2	22, 975	104, 290	172, 590
District of Columbia	31	10, 500	190	....	....	68, 750	90, 050	200, 970
Georgia	4	2, 675	38	....	....	7, 450	7, 500	18, 500
Illinois	99	297, 867	1, 893	....	19	863, 283	1, 778, 296	2, 942, 422
Indiana	48	44, 937	305	....	1	127, 684	186, 280	389, 325
Iowa	43	53, 646	270	....	1	76, 575	119, 159	240, 797
Kansas	17	27, 750	92	....	1	33, 078	52, 219	98, 292
Kentucky	12	52, 200	146	....	7	56, 874	79, 889	172, 359
Louisiana	18	18, 500	87	....	15	36, 950	31, 600	92, 400
Maine	16	13, 050	133	....	....	33, 750	34, 715	87, 020
Maryland	47	203, 600	655	....	1	266, 889	399, 777	767, 946
Massachusetts	272	784, 750	3, 042	....	1	1, 309, 693	1, 793, 923	3, 711, 075
Michigan	39	61, 540	330	....	2	100, 210	153, 898	309, 324
Minnesota	81	145, 770	871	....	....	304, 665	293, 450	735, 818
Mississippi	5	3, 000	14	....	....	3, 475	1, 300	7, 700
Missouri	79	95, 440	473	....	1	243, 484	264, 221	683, 900
Nebraska	9	25, 575	144	....	12	41, 900	70, 536	138, 100
New Hampshire	12	13, 100	122	....	....	39, 738	58, 977	117, 728
New Jersey	69	224, 930	704	....	12	282, 135	397, 005	853, 046
New Mexico	2	700	4	....	....	2, 000	3, 300	7, 000
New York	280	966, 695	2, 873	....	33	1, 520, 550	2, 265, 235	4, 649, 356
North Carolina	1	150	4	....	....	350	300	1, 500
Ohio	102	220, 270	850	....	14	325, 121	479, 113	1, 022, 469
Pennsylvania	109	306, 325	734	....	8	329, 237	419, 630	966, 050
Rhode Island	47	80, 175	346	1	....	138, 924	202, 385	413, 044
Tennessee	8	31, 440	180	....	....	56, 410	134, 715	221, 625
Texas	4	2, 500	17	....	....	1, 440	3, 100	9, 200
Utah	4	620	2	....	....	250	260	2, 535
Virginia	10	13, 100	104	....	7	27, 250	13, 554	56, 750
West Virginia	4	2, 076	38	....	....	12, 190	6, 019	23, 400
Wisconsin	22	40, 300	182	....	2	73, 335	74, 125	178, 800

120.—MATCHES.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	37	$2, 114, 850	868	1, 120	231	$535, 911	$3, 298, 562	$4, 668, 446
California	4	35, 600	58	....	5	23, 000	164, 800	213, 600
Connecticut	5	152, 000	77	85	....	51, 817	354, 454	465, 692
Delaware	1	250, 000	200	....	....	44, 000	446, 727	550, 000
Illinois	2	51, 500	16	51	....	16, 065	195, 894	235, 000
Maine	3	71, 000	64	39	2	38, 212	263, 693	314, 593
Massachusetts	3	91, 000	57	57	1	40, 000	247, 500	315, 000
Michigan	2	260, 000	95	205	75	80, 000	130, 000	237, 500
New Jersey	1	6, 000	4	15	5	1, 840	1, 470	3, 600
New York	8	321, 950	104	234	52	84, 860	270, 632	551, 270
Ohio	1	300, 000	102	46	80	68, 686	600, 000	935, 529
Oregon	1	13, 000	2	2	....	1, 300	2, 000	4. 230
Pennsylvania	5	237, 800	39	66	11	29, 931	166, 592	311, 500
Wisconsin	1	325, 000	50	320	....	56, 200	454, 800	532, 932

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

MATS AND MATTING.

(See Table IV (B) for Connecticut, Delaware, Massachusetts, and New York.)

121.—MATTRESSES AND SPRING BEDS.

(See also Furniture.)

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	357	$1,749,750	1,770	466	158	$868,325	$3,116,471	$5,288,234
Alabama	4	1,800	9			2,401	6,764	14,000
Arkansas	1	1,000	3	1		2,500	2,500	6,000
California	13	126,300	64	2	2	37,076	98,475	168,337
Colorado	1	1,000	2			2,100	1,000	6,500
Connecticut	9	149,000	64		6	29,016	134,754	242,315
District of Columbia	3	8,250	6	2		2,000	12,640	17,440
Georgia	4	4,900	9	7	2	3,760	5,100	12,600
Illinois	32	223,350	298	63	50	136,316	342,850	758,508
Indiana	11	29,300	38	5	2	15,250	35,390	74,225
Iowa	7	15,300	24	2	1	8,137	49,230	73,800
Kansas	8	27,790	14	6	2	5,785	40,203	61,450
Kentucky	18	23,850	46	6		19,051	47,555	94,150
Louisiana	3	3,450	8	1		2,712	25,500	39,200
Maine	1	2,500	2	3		1,200	3,375	5,250
Maryland	6	7,075	11	2		4,867	32,843	45,525
Massachusetts	44	267,212	302	157	16	188,211	658,433	1,008,793
Michigan	18	32,085	47	2	2	16,471	53,005	93,408
Minnesota	4	10,000	19	3		7,300	18,000	39,500
Mississippi	6	2,300	8			2,661	3,825	8,450
Missouri	11	24,950	59	23	13	32,659	94,036	172,300
Nevada	1	250	1			180	600	2,000
New Hampshire	1	200	1			25	350	550
New Jersey	9	28,550	63	7	8	20,216	58,976	101,900
New York	65	449,198	366	88	19	205,252	873,987	1,426,602
North Carolina	2	1,600	8	7		800	927	2,500
Ohio	22	98,890	84	19	15	34,943	128,285	223,860
Oregon	2	2,750					250	1,100
Pennsylvania	27	123,850	119	46	15	51,263	252,990	362,599
Rhode Island	4	29,700	21	6		9,356	80,260	113,656
South Carolina	1	500	2			100	300	900
Tennessee	2	4,000	9	1		3,770	5,550	16,000
Texas	6	14,900	20	2		7,350	10,300	23,400
Utah	1	150	1			250	300	800
West Virginia	1	200	1			50	200	600
Wisconsin	9	33,600	41	5	5	15,297	37,718	70,016

122.—MILLINERY AND LACE GOODS.

(See also Artificial feathers and flowers.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	247	$2,678,880	971	5,248	336	$1,661,044	$6,142,091	$9,577,840
California	19	137,600	13	198	2	78,932	305,900	456,300
Connecticut	3	40,000	22	56		22,300	59,900	98,000
Illinois	19	122,750	56	306	65	90,360	267,060	471,400
Indiana	6	37,000		69		12,100	78,000	132,000
Iowa	2	8,000		11		2,815	11,000	15,500
Kentucky	7	61,000	3	79	5	20,240	96,600	149,900
Maryland	11	79,100	24	133	41	35,896	148,240	229,460
Massachusetts	4	38,500	15	109	20	33,300	224,900	317,000
Minnesota	3	13,500		34		9,500	33,000	60,500
New Jersey	1	6,000	6	28		4,000	5,580	11,580
New York	110	1,460,680	722	2,827	138	1,068,173	3,685,280	5,797,531
Ohio	22	81,450	25	259	11	77,486	162,852	320,091
Pennsylvania	40	593,300	85	1,139	54	205,942	1,063,779	1,518,578

MILLSTONES.

(See Table IV (B) for California, Georgia, Maryland, Massachusetts, New York, Ohio, and Pennsylvania.)

123.—MINERAL AND SODA WATERS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	512	$2,569,561	2,480	27	219	$1,065,633	$2,117,764	$4,741,709
Alabama	1	5,000	4			1,500	4,800	10,000
Arkansas	2	3,100	6			1,750	4,500	7,700
California	18	69,875	46		1	29,315	50,307	121,645
Colorado	6	22,100	20			12,130	20,380	55,575
Connecticut	8	24,900	17	2		4,003	14,350	29,950
Dakota	1	1,500			1	60	600	2,000
Delaware	1	5,000	8			2,500	1,000	6,000
District of Columbia	3	19,200	24		8	13,432	10,100	33,700
Georgia	6	13,300	22		2	8,206	10,889	33,288
Illinois	56	290,118	314	1	17	120,868	274,702	613,358

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

123.—MINERAL AND SODA WATERS—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Indiana	11	$23, 500	34	1		$7, 166	$19, 246	$37, 840
Iowa	21	75, 100	50	1	15	16, 804	70, 000	116, 400
Kansas	4	10, 000	10			3, 900	4, 000	11, 200
Kentucky	11	25, 400	25		5	10, 697	13, 550	39, 393
Louisiana	7	29, 100	37			18, 312	24, 350	75, 900
Maine	3	8, 275	28			7, 000	5, 000	20, 000
Maryland	20	69, 400	90		2	34, 153	109, 085	202, 307
Massachusetts	30	180, 700	214		4	107, 619	220, 789	434, 303
Michigan	13	25, 995	29	1	5	8, 423	16, 166	40, 800
Minnesota	13	31, 100	39		1	12, 936	26, 300	61, 200
Mississippi	1	1, 000	1			310	250	1, 160
Missouri	27	152, 000	128	5	28	57, 076	102, 390	274, 100
Montana	2	5, 500	6			3, 400	5, 100	16, 500
Nebraska	3	16, 000	15		6	3, 100	7, 000	19, 000
Nevada	1	3, 000	3			990	1, 000	3, 600
New Hampshire	3	6, 500	9			2, 925	5, 300	11, 951
New Jersey	19	76, 200	89		6	35, 709	93, 670	178, 847
New York	99	864, 948	664	2	57	351, 014	590, 273	1, 368. 542
Ohio	34	132, 200	151	2	19	47, 387	79, 412	210, 792
Pennsylvania	33	192, 800	206		22	83, 044	181, 095	340, 433
Rhode Island	6	25, 400	22		3	8, 399	18, 140	48, 375
South Carolina	4	5, 000	14			4, 209	8, 200	21, 150
Tennessee	5	43, 000	48		1	12, 602	52, 675	123, 775
Texas	11	19, 450	18	6		7, 670	9, 450	28, 400
Utah	2	6, 500	6		1	1, 512	4, 200	7, 700
Virginia	3	9, 200	14		4	5, 350	7, 900	23, 000
Washington	1	3, 000	2			550	4, 000	7, 000
Wisconsin	23	75, 200	67	6	11	19, 612	47, 595	104, 825

MIRRORS.

(See Table IV (B) for California, Louisiana, Massachusetts, New York, and Ohio.)

MIXED TEXTILES.

(See Table VII.)

124.—MODELS AND PATTERNS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	230	$377, 551	699	21	19	$389, 837	$168, 696	$908, 830
California	7	8, 900	15		1	9, 532	3, 856	23, 966
Connecticut	10	11, 300	37		1	28, 115	10, 575	60, 665
District of Columbia	7	7, 200	12			6, 838	2, 605	16, 440
Georgia	1	500	1			600	400	1, 840
Illinois	18	18, 200	66		1	36, 280	9, 851	72, 572
Indiana	2	300	3			600	150	1, 900
Iowa	3	5, 330	3			2, 247	850	4, 800
Kentucky	1	700	3			1, 944	300	3, 500
Maine	2	2, 000	4			2, 100	400	3, 200
Maryland	3	1, 450	5			2, 050	1, 700	8, 100
Massachusetts	39	50, 050	125	2	1	58, 684	23, 275	136, 933
Michigan	6	8, 800	12		1	7, 830	3, 275	18, 700
Minnesota	3	2, 800	5			2, 716	800	6, 000
Missouri	4	13, 700	11		1	7, 600	1, 920	21, 400
New Jersey	8	7, 575	14			6, 543	2, 437	17, 477
New York	54	131, 121	202	1	3	119, 125	47, 196	272, 665
Ohio	21	19, 450	42	8	4	19, 893	9, 615	51, 396
Pennsylvania	31	70, 225	109	10	4	59, 271	31, 811	139, 224
Rhode Island	6	16, 500	26		1	16, 089	16, 280	42, 432
Texas	2	450	2		1	700	500	2, 000
Wisconsin	2	1, 000	2			1, 080	900	3, 620

MUCILAGE AND PASTE.

(See Table IV (B) for California, New Jersey, and Pennsylvania.)

125.—MUSICAL INSTRUMENTS AND MATERIALS (NOT SPECIFIED).

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	84	$654, 850	528	29	16	$293, 062	$385, 776	$853, 746
California	4	2, 550	7			3, 660	1, 150	8, 400
Connecticut	1	250, 000	105	15		62, 500	160, 000	240, 000
District of Columbia	1	2, 000	2			1, 036	200	2, 400
Illinois	1	150					400	800
Indiana	5	32, 850	82			33, 450	13, 000	58, 800
Kansas	1	150	1			360	125	1, 500
Maine	1	400					200	600
Maryland	6	4, 900	4			1, 395	1, 975	7, 400
Massachusetts	10	46, 700	48	2		23, 042	11, 663	49, 300
Minnesota	3	2, 000	6			4, 500	1, 200	8, 000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

125.—MUSICAL INSTRUMENTS AND MATERIALS (NOT SPECIFIED)—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Missouri	10	$61, 500	12	1	1	$6, 050	$9, 425	$31, 250
New Hampshire	2	12, 500	11	1		6, 000	5, 500	19, 000
New Jersey	4	26, 000	28	5		13, 900	10, 600	30, 000
New York	16	44, 150	73	2	6	37, 278	76, 433	153, 204
Ohio	7	12, 300	17			6, 875	4, 925	19, 625
Pennsylvania	9	149, 200	129	3	9	91, 016	88, 555	219, 067
Tennessee	2	5, 500	3			2, 000	175	3, 500
Vermont	1	2, 000					250	900

126.—MUSICAL INSTRUMENTS, ORGANS AND MATERIALS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	171	$3, 922, 338	3, 948	89	165	$2, 142, 539	$2, 692, 332	$6, 136, 472
California	2	7, 000	3			5, 000	3, 000	12, 000
Connecticut	7	238, 000	419	4	1	199, 737	302, 126	604, 937
Delaware	1	2, 500	2			200	200	1, 000
Georgia	1	1, 500	2			750	1, 500	2, 400
Illinois	17	261, 000	305	1	42	201, 007	323, 978	656, 500
Indiana	5	53, 000	96	2	21	60, 400	64, 400	156, 500
Iowa	1	300	1			275	750	2, 500
Kentucky	1	25, 000	10		2	3, 050	9, 000	20, 000
Maine	4	41, 500	39			14, 000	15, 200	54, 000
Maryland	3	16, 250	21		2	8, 000	24, 810	41, 000
Massachusetts	31	1, 324, 866	1, 466	37	17	876, 785	1, 028, 501	2, 354, 243
Michigan	4	137, 000	139		27	64, 850	83, 177	202, 179
Minnesota	3	2, 300	5			1, 995	1, 300	5, 600
Missouri	3	10, 600	9			6, 000	5, 200	16, 600
New Hampshire	3	18, 200	29			12, 948	12, 141	30, 713
New Jersey	5	354, 022	409	2		160, 900	215, 168	467, 000
New York	52	460, 350	433	8	20	234, 648	205, 661	604, 891
North Carolina	1	1, 000	5			3, 000	5, 000	10, 000
Ohio	6	86, 000	105		26	53, 300	58, 200	132, 315
Pennsylvania	15	68, 950	72		7	23, 894	24, 020	65, 794
Rhode Island	1	5, 000	4			3, 000	1, 000	7, 000
Vermont	2	803, 000	367	35		206, 200	304, 500	680, 800
Virginia	1	500	3			1, 000	500	2, 000
Wisconsin	2	4, 500	4			1, 600	3, 000	6, 500

127.—MUSICAL INSTRUMENTS, PIANOS AND MATERIALS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	174	$9, 869, 577	6, 449	57	69	$4, 663, 193	$5, 283, 119	$12, 264, 521
California	6	50, 000	27			18, 425	41, 725	92, 700
Connecticut	3	257, 000	290	12		142, 057	182, 018	386, 583
Illinois	5	20, 300	27			16, 902	11, 800	37, 675
Indiana	2	77, 000	90			42, 500	43, 000	109, 000
Kentucky	5	40, 700	26			12, 833	13, 800	42, 200
Maryland	4	638, 382	380		5	200, 988	157, 699	534, 099
Massachusetts	45	1, 905, 700	1, 473	21	10	890, 721	1, 132, 847	2, 652, 856
Michigan	1	4, 000	4			2, 200	1, 500	5, 500
Missouri	7	21, 350	19			10, 398	8, 060	27, 200
New Hampshire	3	18, 000	32			8, 894	15, 994	30, 380
New Jersey	2	10, 200	6		1	4, 500	6, 000	13, 000
New York	82	6, 627, 845	3, 892	24	50	3, 213, 481	3, 579, 131	8, 084, 154
Ohio	1	15, 000	20			6, 000	3, 000	15, 000
Pennsylvania	5	169, 500	153		1	87, 044	81, 145	217, 924
Texas	1	4, 000	2			2, 000	900	3, 500
Wisconsin	2	10, 600	8		2	4, 250	4, 500	12, 750

128.—NEEDLES AND PINS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	40	$1, 144, 550	604	380	93	$392, 214	$591, 013	$1, 378, 023
Connecticut	13	636, 500	252	194	46	183, 903	389, 585	804, 985
Maryland	2	9, 000	8			4, 300	1, 900	9, 000
Massachusetts	11	185, 200	212	55	26	109, 719	83, 268	257, 413
Michigan	2	180, 000	28	37	6	27, 600	64, 500	150, 000
New Hampshire	5	19, 250	46	33	5	23, 280	5, 560	37, 625
New Jersey	2	4, 500	22	1	2	8, 700	4, 400	16, 000
New York	4	104, 100	26	60	8	31, 712	39, 300	91, 000
Vermont	1	6, 000	10			3, 000	2, 500	12, 000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

NETS AND SEINES.

(See Table IV (B) for Connecticut, Kentucky, Massachusetts, New York, Pennsylvania, and Virginia.)

OIL, CASTOR.

(See Table IV (B) for Illinois, Kansas, Missouri, New Jersey, and Ohio.)

129.—OIL, COTTONSEED AND CAKE.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	45	$3,862,300	3,114	33	172	$880,836	$5,091,251	$7,690,921
Alabama	2	82,000	150	....	....	42,500	158,000	247,982
Arkansas	4	275,000	237	....	....	79,400	378,000	590,000
Connecticut	1	2,800	....	....	....	....	500	575
Louisiana	12	1,557,500	1,352	19	75	422,165	2,280,910	3,739,466
Mississippi	8	450,000	440	3	66	94,860	371,080	560,363
Missouri	2	80,000	55	....	....	18,750	80,000	140,000
Ohio	1	150,000	45	....	10	7,450	400,000	435,000
Rhode Island	1	125,000	32	3	....	14,899	415,820	458,085
Tennessee	9	935,000	644	4	18	163,340	812,000	1,235,000
Texas	4	202,000	151	4	3	36,272	192,441	276,450
Virginia	1	3,000	8	....	....	1,200	2,500	8,000

OIL, ESSENTIAL.

(See Table IV (B) for California, Illinois, Michigan, New Jersey, New York, Pennsylvania, and Virginia.)

OIL, ILLUMINATING, NOT INCLUDING PETROLEUM REFINING.

(See Table IV (B) for Maryland, Massachusetts, Ohio, and Pennsylvania.)

130.—OIL, LARD.

The United States	28	$1,127,500	424	....	8	$161,672	$4,184,450	$4,721,066
Illinois	3	190,000	82	....	3	42,600	928,000	1,107,000
Indiana	2	40,000	10	....	....	4,260	130,000	146,000
Iowa	1	8,000	5	....	....	2,000	20,000	30,600
Maryland	1	75,000	18	....	....	10,000	500,000	550,000
Missouri	3	96,000	25	....	....	13,050	505,750	539,000
New York	3	170,000	100	....	2	37,415	920,600	1,026,800
Ohio	9	472,500	166	....	2	42,772	1,035,636	1,141,835
Pennsylvania	6	76,000	18	....	1	9,575	144,464	179,831

131.—OIL, LINSEED.

The United States	81	$5,872,750	1,378	17	21	$681,677	$12,874,294	$15,393,812
California	1	400,000	60	....	....	30,000	400,000	461,000
Illinois	12	1,035,000	238	4	11	117,255	2,520,380	3,099,893
Indiana	8	435,000	103	1	2	41,715	1,125,000	1,276,806
Iowa	7	432,000	94	1	2	46,330	570,812	766,800
Kansas	3	29,000	29	....	....	9,200	90,400	110,000
Kentucky	1	75,000	12	....	....	4,500	50,000	70,000
Minnesota	2	210,000	60	....	....	30,000	277,000	352,000
Nebraska	1	100,000	19	....	....	10,500	85,000	125,000
New Jersey	1	14,000	1	....	....	450	9,000	9,500
New York	9	1,406,000	359	6	6	196,277	4,961,782	5,679,607
Ohio	21	1,123,550	299	....	....	143,454	1,903,103	2,381,934
Oregon	2	37,000	14	....	....	4,550	31,817	42,967
Pennsylvania	9	409,200	59	5	....	29,846	596,500	697,205
Virginia	1	1,000	1	....	....	120	100	700
Wisconsin	3	166,000	30	....	....	14,480	253,400	320,400

132.—OIL, LUBRICATING.

The United States	51	$1,370,225	399	8	6	$208,145	$2,129,589	$2,925,501
Georgia	1	3,000	3	....	....	750	100	3,000
Maine	1	100,000	4	....	....	2,400	6,000	15,000
Massachusetts	5	89,000	32	6	....	17,800	170,000	247,600
Michigan	1	52,000	8	....	....	2,700	3,560	12,000
Minnesota	1	5,000	1	....	....	600	3,500	4,350
Missouri	1	2,000	3	....	....	1,000	7,000	9,000
New Jersey	1	3,000	3	....	....	1,135	2,035	6,047
New York	12	231,800	92	....	1	60,485	386,571	534,795
Ohio	16	786,925	164	....	4	78,692	1,031,112	1,431,039
Pennsylvania	9	85,500	82	2	....	41,593	508,411	642,370
Virginia	3	12,000	7	....	1	990	11,300	20,500

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

133.—OIL, NEAT'S-FOOT.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	15	$433, 050	50	....	....	$16, 554	$210, 524	$259, 086
Connecticut	1	5, 500	5	....	....	3, 200	18, 000	30, 000
District of Columbia	2	2, 250	5	....	....	1, 560	19, 025	23, 486
Maryland	1	100	1	....	....	50	450	1, 000
Massachusetts	5	14, 900	19	....	....	5, 930	73, 300	89, 750
Missouri	2	400, 300	11	....	....	3, 946	92, 666	102, 300
New York	2	4, 800	6	....	....	1, 200	3, 500	6, 500
Rhode Island	1	4, 000	1	....	....	468	3, 375	5, 550
Virginia	1	1, 200	2	....	....	200	208	500

OIL, RESIN.

(See Table IV (B) for New York.)

OILCLOTH, ENAMELED.

(See Table IV (B) for New Jersey and New York.)

OILCLOTH, FLOOR.

(See Table IV (B) for Maine, Massachusetts, New Jersey, New York, and Pennsylvania.)

134.—OLEOMARGARINE.

The United States	15	$1, 680, 300	561	18	20	$212, 952	$5, 486, 141	$6, 892, 939
Connecticut	1	2, 000	30	....	....	7, 931	125, 000	150, 000
Illinois	3	208, 800	63	....	7	21, 310	328, 500	437, 800
Indiana	1	1, 000	10	....	....	1, 200	8, 000	18, 000
Kentucky	1	400, 000	75	....	10	10, 000	200, 000	250, 000
Maryland	1	20, 000	20	....	....	5, 000	55, 000	85, 000
Massachusetts	1	3, 000	28	2	....	6, 875	50, 000	65, 000
New York	5	645, 500	270	....	....	126, 636	4, 418, 695	5, 338, 753
Ohio	1	300, 000	20	....	....	8, 000	108, 000	250, 000
Pennsylvania	1	100, 000	45	16	3	26, 000	192, 946	298, 386

135.—PAINTING AND PAPERHANGING.

The United States	3, 968	$5, 645, 950	17, 271	131	309	$7, 920, 866	$8, 762, 780	$22, 457, 560
Alabama	4	5, 850	16	....	....	5, 400	7, 000	18, 000
California	155	109, 750	490	1	16	294, 870	244, 949	760, 596
Colorado	1	250	3	....	....	1, 000	250	2, 500
Connecticut	88	109, 535	398	....	3	180, 946	228, 012	546, 118
Delaware	6	3, 825	17	....	....	4, 362	8, 275	16, 648
District of Columbia	37	16, 600	101	....	2	50, 044	49, 387	143, 471
Florida	1	100	3	....	....	500	2, 000	4, 000
Georgia	21	46, 650	105	....	1	46, 603	44, 513	124, 830
Illinois	269	389, 376	1, 349	1	42	662, 180	745, 547	1, 861, 048
Indiana	87	79, 750	314	39	3	139, 809	269, 360	531, 902
Iowa	43	38, 525	138	1	3	59, 787	80, 019	187, 916
Kansas	28	28, 510	66	....	2	24, 558	39, 988	85, 424
Kentucky	45	44, 890	177	....	5	68, 333	81, 670	204, 771
Louisiana	12	10, 425	98	....	....	30, 412	33, 800	86, 000
Maine	55	36, 575	135	....	....	45, 510	64, 565	147, 850
Maryland	95	103, 273	285	....	8	148, 726	175, 307	467, 617
Massachusetts	617	670, 528	2, 530	4	17	1, 064, 367	1, 076, 024	2, 902, 719
Michigan	71	144, 525	453	....	11	184, 957	278, 027	567, 570
Minnesota	47	38, 285	137	....	5	57, 855	95, 360	226, 300
Mississippi	4	2, 375	10	....	1	3, 470	8, 300	19, 170
Missouri	156	392, 180	975	15	19	443, 944	610, 594	1, 404, 122
Montana	1	300	1	....	....	500	2, 000	4, 000
Nebraska	14	32, 875	74	....	5	34, 481	41, 489	106, 100
Nevada	1	100	1	....	....	190	100	1, 500
New Hampshire	45	67, 325	148	18	....	71, 754	87, 024	215, 062
New Jersey	150	193, 675	598	2	14	277, 628	300, 909	798, 077
New York	852	1, 567, 235	4, 000	33	82	2, 180, 099	2, 257, 425	5, 897, 276
North Carolina	5	2, 340	12	1	1	4, 456	4, 200	11, 950
Ohio	261	221, 411	935	10	10	334, 129	357, 869	996, 572
Oregon	3	1, 100	4	....	....	2, 550	2, 750	10, 700
Pennsylvania	507	940, 997	2, 620	5	39	1, 040, 820	1, 045, 007	2, 781, 153
Rhode Island	113	138, 365	419	....	7	205, 507	190, 703	545, 615
South Carolina	10	6, 810	51	....	....	11, 794	14, 754	34, 365
Tennessee	12	27, 600	76	....	....	28, 268	34, 375	93, 468
Texas	25	44, 200	92	....	....	50, 475	74, 400	167, 250
Utah	4	11, 500	18	1	6	12, 533	8, 126	28, 630
Vermont	9	4, 300	13	....	....	4, 425	4, 175	12, 925
Virginia	29	25, 940	74	....	1	25, 491	39, 563	92, 843
West Virginia	4	2, 200	11	....	....	4, 566	6, 567	14, 050
Wisconsin	72	85, 900	324	....	6	113, 567	148, 397	337, 452

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

136.—PAINTS.

(See also Varnish.)

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	244	$13, 555, 292	4, 192	188	103	$2, 132, 255	$17, 062, 552	$23, 390, 767
California	6	320, 300	92	1		41, 576	300, 239	406, 326
Connecticut	5	30, 500	28	1	1	16, 350	54, 175	104, 940
Delaware	1	60, 000	10		1	5, 200	20, 000	30, 000
District of Columbia	2	11, 000	25			6, 080	10, 600	20, 400
Georgia	1	1, 000	3		3	1, 200	1, 200	4, 500
Illinois	14	792, 800	257	18	7	154, 328	2, 112, 145	2, 799, 700
Indiana	1	8, 000	1		3	1, 200	18, 000	35, 000
Iowa	2	55, 000	24	1	1	9, 250	58, 000	112, 000
Kansas	1	1, 000					920	1, 500
Kentucky	2	10, 800	11			4, 880	20, 900	34, 000
Maine	3	30, 000	17			7, 030	65, 938	85, 532
Maryland	11	417, 200	113		7	47, 751	245, 185	412, 658
Massachusetts	18	596, 100	209	8	2	105, 805	733, 393	987, 960
Michigan	1	50					100	500
Mississippi	1	200	3			500	1, 000	3, 000
Missouri	16	1, 808, 350	563	10	4	270, 532	2, 186, 480	2, 825, 860
Nebraska	1	100, 000	40			17, 000	200, 000	350, 000
New Jersey	13	761, 000	164	8	10	71, 204	428, 165	598, 338
New York	73	4, 842, 600	1, 540	103	40	831, 863	6, 994, 561	9, 455, 900
North Carolina	1	4, 000	1			500	1, 760	3, 600
Ohio	15	447, 000	232	12	15	123, 164	835, 734	1, 263, 980
Pennsylvania	46	3, 128, 192	791	26	7	394, 437	2, 657, 857	3, 674, 043
Rhode Island	2	58, 000	7		1	4, 167	50, 000	69, 800
Tennessee	1	1, 200	3			1, 170	1, 200	2, 730
Vermont	2	33, 000	35		1	9, 508	13, 000	25, 000
Virginia	2	1, 500	6			1, 160	2, 000	5, 500
Wisconsin	3	36, 500	17			6, 400	50, 000	78, 000

PAPER.

(See Collars and cuffs, paper; Envelopes; Leather board; Wood pulp; also Table VII.)

PAPERHANGINGS.

(See Table IV (B) for Massachusetts, New Jersey, New York, Ohio, and Pennsylvania.)

PAPER PATTERNS.

(See Table IV (B) for New York.)

137.—PATENT MEDICINES AND COMPOUNDS.

(See also Drugs and chemicals.)

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	563	$10, 620, 880	2, 504	1, 186	335	$1, 651, 596	$6, 704, 729	$14, 682, 494
Arkansas	2	3, 500	7			4, 500	7, 500	15, 000
California	22	69, 800	59	6	13	22, 487	97, 350	198, 900
Colorado	1	700	2	1	1	2, 000	1, 000	4, 200
Connecticut	13	171, 000	36	11		16, 132	130, 501	213, 144
District of Columbia	5	5, 600	9			7, 098	7, 200	20, 454
Georgia	12	114, 500	64	19	7	32, 479	56, 900	138, 500
Illinois	22	322, 050	140	59	7	81, 040	584, 010	827, 410
Indiana	15	43, 600	43	11	1	31, 300	55, 600	170, 200
Iowa	6	19, 200	36	11		16, 950	28, 765	63, 700
Kansas	2	40, 300	18	13	1	9, 666	15, 200	51, 000
Kentucky	12	144, 850	36	10	5	15, 320	168, 650	363, 400
Louisiana	2	1, 150	3			990	4, 237	8, 982
Maine	5	11, 800	10	9		3, 850	8, 300	25, 500
Maryland	34	222, 825	106	109	45	68, 867	438, 202	647, 893
Massachusetts	40	521, 350	247	132	7	187, 607	664, 486	1, 456, 376
Michigan	20	89, 800	52	38	6	28, 847	58, 180	158, 982
Minnesota	9	26, 550	17	8	5	3, 828	9, 700	32, 000
Missouri	27	1, 402, 700	207	90	15	139, 996	502, 735	1, 197, 090
Nebraska	1	5, 000	3			1, 200	12, 000	26, 000
New Hampshire	9	45, 350	21	11		14, 672	52, 028	135, 594
New Jersey	12	308, 500	113	50	5	62, 076	133, 550	639, 125
New York	108	3, 512, 430	584	339	180	485, 558	1, 932, 936	4, 339, 178
North Carolina	1	1, 000	5			600	1, 000	3, 000
Ohio	61	570, 600	157	18	14	78, 005	406, 804	608, 141
Pennsylvania	53	2, 076, 100	259	189	7	194, 524	734, 262	2, 006, 058
Rhode Island	24	474, 500	107	23	6	72, 609	330, 864	772, 942
South Carolina	1	200	3			300	600	1, 800
Tennessee	8	86, 500	38	7	6	18, 801	50, 250	120, 300
Texas	6	22, 000	21		2	11, 450	27, 500	64, 500
Vermont	10	246, 150	48	21		24, 495	136, 825	208, 275
Virginia	12	39, 425	41	1		11, 025	27, 975	58, 450
West Virginia	2	8, 500	2		2	502	10, 600	16, 200
Wisconsin	6	13, 050	10			2, 822	9, 019	30, 806

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

138.—PAVING MATERIALS.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	46	$745, 750	755	....	2	$244, 339	$576, 301	$1, 024, 243
Connecticut	1	1, 500	12	....	....	2, 500	700	4, 000
District of Columbia	5	56, 000	259	....	....	99, 500	171, 250	316, 500
Georgia	2	7, 500	13	....	....	3, 600	6, 000	13, 100
Illinois	4	59, 500	91	....	....	39, 037	247, 000	313, 000
Iowa	6	5, 900	17	....	....	6, 600	7, 325	19, 000
Massachusetts	12	34, 000	102	....	....	33, 242	38, 582	88, 544
Missouri	2	155, 000	21	....	2	4, 780	12, 500	30, 800
New Hampshire	2	2, 500	5	....	....	1, 227	551	3, 249
New Jersey	1	3, 000	6	....	....	3, 000	6, 000	30, 000
New York	5	58, 600	95	....	....	21, 097	17, 868	53, 856
Ohio	1	55, 000	50	....	....	4, 000	9, 000	15, 000
Pennsylvania	2	55, 000	24	....	....	5, 880	12, 400	38, 500
Rhode Island	2	252, 000	55	....	....	19, 500	47, 000	98, 000
Vermont	1	250	5	....	....	376	125	694

PENCILS, LEAD.

(See Table IV (B) for Massachusetts, New Jersey, and New York.)

PENS, GOLD.

(See Table IV (B) for Massachusetts, Michigan, New York, and Ohio.)

PENS, STEEL.

(See Table IV (B) for New Jersey, New York, and Pennsylvania.)

139.—PERFUMERY AND COSMETICS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	67	$813, 827	352	357	32	$238, 259	$1, 201, 409	$2, 203, 004
California	3	13, 000	11	11	16	12, 400	27, 300	61, 900
Connecticut	1	3, 000	1	....	....	400	4, 500	7, 500
District of Columbia	1	1, 200	4	3	....	1, 820	3, 750	7, 500
Georgia	1	5, 000	5	2	1	2, 600	4, 000	8, 000
Illinois	3	5, 500	6	3	....	3, 214	5, 800	14, 200
Kansas	1	15, 000	22	....	....	9, 185	15, 000	50, 000
Louisiana	2	26, 000	15	4	....	5, 777	8, 000	49, 000
Maryland	5	23, 410	11	27	1	7, 902	15, 251	42, 499
Massachusetts	11	83, 100	39	23	1	21, 990	187, 920	330, 600
Michigan	4	25, 500	20	9	5	12, 900	42, 000	94, 000
Missouri	1	2, 000	2	....	....	1, 252	600	2, 500
New York	22	462, 450	171	216	5	121, 484	724, 100	1, 280, 200
Ohio	2	10, 300	8	2	....	3, 120	5, 400	10, 800
Pennsylvania	8	132, 867	34	53	3	32, 515	148, 488	229, 305
Texas	1	500	1	....	....	500	300	1, 000
Wisconsin	1	5, 000	2	4	....	1, 200	9, 000	14, 000

PHOTOGRAPHIC APPARATUS.

(See Table IV (B) for California, Connecticut, Illinois, Massachusetts, Missouri, New Jersey, and New York.)

140.—PHOTOGRAPHING.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	1, 287	$3, 131, 895	2, 860	986	131	$1, 751, 118	$1, 671, 455	$5, 935, 311
Alabama	1	1, 500	....	1	....	600	1, 200	2, 500
Arkansas	2	800	3	1	....	325	1, 100	3, 100
California	42	146, 050	114	28	4	106, 932	87, 326	328, 086
Connecticut	48	76, 200	62	17	2	37, 597	44, 281	154, 395
Dakota	1	500	1	....	....	900	300	2, 700
District of Columbia	16	34, 750	34	5	....	16, 291	10, 515	55, 551
Georgia	2	2, 000	4	....	....	1, 900	4, 000	8, 500
Illinois	92	256, 325	177	74	7	132, 522	121, 615	455, 733
Indiana	43	47, 200	45	15	2	23, 160	24, 309	94, 785
Iowa	31	30, 350	42	13	5	25, 547	15, 353	71, 160
Kansas	11	8, 350	11	2	....	4, 585	4, 800	17, 050
Kentucky	15	32, 800	39	6	2	23, 556	31, 000	84, 485
Louisiana	12	39, 100	37	6	2	27, 390	19, 399	79, 765
Maine	18	37, 800	34	13	1	16, 500	16, 600	60, 250
Maryland	25	70, 150	51	15	2	25, 005	22, 426	95, 228
Massachusetts	126	310, 450	330	188	6	189, 319	179, 529	575, 952
Michigan	47	83, 300	71	22	4	39, 146	46, 305	152, 683
Minnesota	34	65, 275	44	10	4	24, 630	25, 640	100, 676
Mississippi	1	1, 000	1	1	....	400	500	1, 800
Missouri	40	100, 750	78	22	6	55, 538	62, 100	219, 694

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

140.—PHOTOGRAPHING—Continued.

States and Territories	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Nebraska	4	$20, 000	17	3		$7, 900	$25, 200	$60, 200
New Hampshire	23	53, 820	30	31		23, 267	24, 826	81, 022
New Jersey	45	86, 550	83	19	9	50, 047	50, 574	172, 682
New York	290	930, 875	935	278	46	553, 709	534, 458	1, 840, 191
Ohio	101	147, 500	178	38	11	92, 407	92, 371	332, 081
Pennsylvania	106	384, 200	285	127	11	175, 127	138, 577	541, 964
Rhode Island	29	53, 250	47	32	1	34, 200	30, 070	112, 163
South Carolina	7	8, 400	8	1		2, 950	2, 980	14, 200
Tennessee	2	3, 200	4			3, 500	4, 260	15, 660
Texas	12	13, 200	7	3	1	7, 155	4, 855	28, 415
Utah	5	6, 600	8	4	2	5, 663	3, 170	16, 300
Vermont	9	9, 700	9	3		6, 375	6, 175	21, 025
Virginia	17	25, 750	39	1	2	18, 712	14, 200	61, 600
Wisconsin	29	42, 200	30	7	1	17, 243	19, 441	67, 715
Wyoming	1	2, 000	2			1, 020	2, 000	6, 000

PHOTOGRAPHING MATERIALS.

(See Table IV (B) for Massachusetts, New Jersey, and Pennsylvania.)

141.—PICKLES, PRESERVES, AND SAUCES.

States and Territories	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	109	$841, 023	592	230	108	$259, 454	$1, 472, 639	$2, 407, 342
California	6	20, 300	11		2	6, 524	21, 675	43, 200
Colorado	1	10, 000	5			4, 000	8, 000	20, 000
Illinois	12	87, 500	94	10	12	38, 165	367, 970	518, 200
Iowa	1	2, 000	4			726	7, 000	12, 000
Kentucky	3	4, 500	9	5		1, 180	7, 520	10, 800
Louisiana	1	500	2			500	300	2, 500
Maine	1	1, 000	2	1		1, 000	1, 000	5, 000
Maryland	6	21, 850	7	14	6	5, 532	48, 250	71, 300
Massachusetts	8	50, 675	35	27	2	26, 452	146, 708	236, 852
Michigan	1	3, 000	3		3	2, 000	6, 000	12, 000
Minnesota	1	2, 000	2			1, 000	2, 500	5, 700
Missouri	3	48, 200	58	25	25	41, 999	134, 200	211, 200
New Hampshire	1	2, 000	3			1, 250	5, 000	8, 000
New Jersey	3	16, 000	17	8	3	6, 953	44, 460	62, 412
New York	40	387, 050	178	71	37	64, 597	351, 080	676, 916
Ohio	4	38, 000	62	12		17, 200	95, 400	135, 000
Pennsylvania	7	84, 248	55	15	1	25, 173	167, 096	268, 812
Rhode Island	2	13, 300	4	10	1	2, 213	7, 000	13, 650
Texas	1	800	1			480	1, 200	3, 650
Vermont	3	4, 100	9	1		360	3, 680	6, 250
Virginia	1	20, 000	5	25	10	5, 000	15, 000	35, 000
Wisconsin	3	24, 000	26	6	6	7, 150	31, 600	49, 500

142.—PIPES, TOBACCO.

States and Territories	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	37	$233, 800	500	65	80	$226, 306	$209, 518	$628, 688
California	1	500	1			936	720	2, 400
Illinois	6	7, 000	8		1	4, 850	3, 625	17, 200
Maryland	2	10, 200	11	16	5	7, 797	3, 555	15, 500
Michigan	2	1, 700	13	8	2	6, 460	2, 500	15, 400
Missouri	1	2, 000	12		9	4, 000	2, 000	12, 000
New Jersey	2	3, 400	17	2		3, 600	1, 100	7, 800
New York	16	101, 400	177	23	20	97, 208	110, 718	297, 188
Ohio	1	25, 000	40			12, 000	18, 000	50, 000
Pennsylvania	5	70, 600	219	13	42	89, 565	66, 800	209, 500
Virginia	1	12, 000	2	3	1	390	500	1, 700

143.—PLATED AND BRITANNIA WARE.

(See also Silverware.)

States and Territories	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	55	$5, 862, 025	3, 742	831	102	$2, 453, 361	$4, 100, 116	$8, 596, 181
Connecticut	22	3, 573, 225	2, 304	519	80	1, 636, 097	2, 878, 792	6, 080, 076
Illinois	1	150, 000	65	17		26, 885	43, 500	115, 500
Louisiana	1	20, 000	7			3, 000	10, 000	25, 000
Maine	4	64, 100	45	2		18, 125	15, 572	41, 300
Maryland	3	19 200	43			20, 780	18, 500	52, 000
Massachusetts	6	366, 000	578	151	10	366, 800	252, 110	672, 000
Missouri	1	40, 000	25			15, 000	7, 000	35, 000
New York	2	290, 000	115	53		55, 000	120 000	290, 000
Pennsylvania	11	246 500	183	59	12	82, 474	113, 342	238, 305
Rhode Island	2	1, 025, 000	310	15		189, 200	611, 300	972, 000
Vermont	1	8, 000	15			5, 000	10, 000	20, 000
Wisconsin	1	60, 000	52	15		35, 000	20, 000	55, 000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

144.—PLUMBING AND GASFITTING.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	2, 161	$5, 950, 512	9, 217	15	452	$4, 770, 389	$9, 095, 308	$18, 133, 250
Alabama	1	4, 000	4	....	....	2, 500	5, 000	10, 000
Arkansas	2	12, 500	13	....	2	7, 000	30, 000	51, 000
California	113	266, 450	342	1	26	229, 009	414, 504	829, 604
Colorado	2	3, 600	4	....	....	3, 000	12, 300	20, 800
Connecticut	37	146, 600	195	....	6	102, 745	215, 157	392, 600
District of Columbia	31	47, 750	129	....	6	66, 194	102, 799	225, 193
Georgia	8	18, 400	50	....	....	17, 171	37, 474	72, 100
Illinois	106	187, 251	414	3	65	242, 997	400, 585	813, 932
Indiana	25	87, 700	133	....	2	61, 229	136, 110	256, 120
Iowa	4	9, 000	20	....	....	9, 452	14, 728	27, 372
Kansas	2	6, 000	8	....	....	3, 400	13, 000	18, 000
Kentucky	18	38, 650	84	....	3	36, 060	54, 821	126, 475
Louisiana	9	16, 300	31	....	....	17, 441	40, 500	71, 600
Maine	10	38, 500	52	....	....	21, 950	64, 096	108, 800
Maryland	89	198, 185	194	....	9	82, 042	176, 186	412, 886
Massachusetts	210	485, 700	1, 005	4	22	492, 969	939, 539	1, 862, 071
Michigan	26	209, 700	222	....	3	113, 933	225, 572	449, 494
Minnesota	16	63, 850	87	....	....	44, 031	127, 400	213, 350
Mississippi	2	2, 800	7	....	....	5, 025	5, 000	17, 000
Missouri	63	126, 475	251	....	7	130, 599	227, 958	516, 683
Nebraska	2	4, 000	7	....	....	3, 300	10, 000	18, 000
Nevada	4	6, 415	5	....	1	4, 115	1, 012	10, 496
New Hampshire	7	28, 000	36	....	....	24, 720	64, 880	110, 128
New Jersey	125	404, 175	482	....	28	245, 492	448, 268	912, 352
New York	725	1, 823, 398	3, 188	1	178	1, 807, 153	3, 300, 282	6, 642, 401
North Carolina	3	2, 500	10	....	....	6, 660	17, 900	28, 270
Ohio	104	324, 868	459	6	29	191, 947	457, 901	850, 515
Pennsylvania	323	1, 059, 855	1, 267	....	36	539, 338	1, 043, 219	2, 070, 110
Rhode Island	34	102, 750	137	....	1	74, 265	143, 846	291, 916
South Carolina	7	4, 400	12	....	8	9, 436	19, 700	34, 876
Tennessee	12	37, 400	110	....	7	40, 225	94, 758	174, 950
Texas	3	21, 500	18	....	2	17, 050	24, 400	52, 900
Utah	2	3, 000	8	....	2	5, 400	13, 000	21, 053
Vermont	4	7, 900	12	....	....	5, 773	9, 400	19, 800
Virginia	15	38, 725	71	....	8	34, 780	65, 200	141, 550
West Virginia	6	54, 015	45	....	....	23, 288	58, 113	99, 453
Wisconsin	11	58, 200	105	....	1	48, 700	80, 700	159, 400

POCKET-BOOKS.

(See Table IV (B) for Illinois, Massachusetts, New Jersey, New York, Ohio, and Pennsylvania.)

POSTAL CARDS.

(See Table IV (B) for Massachusetts.)

145.—PRINTING AND PUBLISHING.

(See also Lithographing.)

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	3, 467	$62, 983, 704	45, 880	6, 759	5, 839	$30, 531, 657	$32, 460, 395	$90, 789, 341
Alabama	19	77, 100	84	3	4	40, 920	65, 546	141, 175
Arkansas	6	29, 800	51	2	6	23, 530	15, 750	77, 800
California	171	1, 838, 255	1, 408	107	114	1, 272, 412	1, 054, 355	3, 148, 978
Colorado	5	181, 450	157	12	19	135, 570	95, 750	307, 500
Connecticut	70	1, 445, 900	666	113	34	419, 835	341, 670	1, 111, 188
Delaware	2	18, 000	12	....	1	5, 580	6, 500	14, 500
District of Columbia	28	971, 800	1, 026	688	28	1, 478, 880	827, 519	2, 896, 312
Florida	3	8, 000	13	....	2	6, 000	5, 250	16, 000
Georgia	21	506, 800	405	21	57	213, 052	218, 306	579, 054
Illinois	243	3, 625, 400	3, 650	531	531	2, 401, 894	2, 807, 361	7, 114, 939
Indiana	99	1, 126, 320	1, 222	108	160	689, 590	703, 984	1, 832, 023
Iowa	146	1, 125, 086	833	79	78	498, 229	514, 380	1, 399, 289
Kansas	50	289, 565	353	75	79	197, 862	212, 359	519, 597
Kentucky	48	1, 401, 700	740	106	86	452, 113	476, 214	1, 289, 316
Louisiana	25	303, 050	503	4	17	407, 946	226, 600	764, 036
Maine	48	747, 600	410	216	14	297, 005	976, 317	1, 606, 098
Maryland	66	2, 045, 600	797	25	111	443, 989	585, 857	1, 477, 164
Massachusetts	280	3, 712, 869	3, 819	980	195	2, 774, 818	2, 621, 983	7, 757, 260
Michigan	114	1, 374, 625	1, 151	111	157	623, 175	503, 890	1, 576, 523
Minnesota	78	817, 845	599	33	107	409, 104	351, 941	1, 043, 664
Mississippi	11	96, 500	123	....	2	58, 721	38, 661	138, 500
Missouri	131	2, 949, 660	2, 380	250	161	1, 538, 564	1, 515, 048	4, 452, 962
Montana	1	2, 000	3	1	1	1, 800	1, 500	4, 500
Nebraska	22	191, 250	217	31	53	167, 438	167, 860	419, 461
Nevada	4	73, 500	48	....	9	84, 240	5, 250	108, 012
New Hampshire	29	270, 050	151	42	5	88, 088	91, 076	264, 750
New Jersey	93	865, 475	859	82	120	477, 224	418, 758	1, 224, 519
New York	712	20, 027, 989	11, 651	1, 678	1, 088	8, 059, 487	9, 518, 171	27, 885, 376
North Carolina	31	95, 600	158	10	34	63, 120	55, 392	179, 132
Ohio	237	4, 688, 535	3, 461	543	976	2, 067, 593	2, 382, 305	6, 579, 565

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

145.—PRINTING AND PUBLISHING—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Oregon	15	$65, 600	72	8	7	$65, 067	$37, 015	$133, 900
Pennsylvania	371	8, 962, 320	5, 897	625	1, 180	3, 274, 969	4, 157, 045	10, 229, 893
Rhode Island	32	361, 850	398	18	68	280, 900	218, 120	674, 025
South Carolina	14	132, 700	194	35	13	115, 947	89, 450	299, 520
Tennessee	30	625, 550	368	41	53	248, 356	213, 026	653, 645
Texas	39	447, 900	307	19	88	232, 924	207, 438	605, 000
Utah	7	159, 660	118	13	17	94, 861	72, 054	214, 625
Vermont	18	99, 600	101	21	8	42, 727	62, 086	131, 799
Virginia	45	344, 900	486	15	33	237, 918	211, 854	624, 975
Washington	3	9, 500	10	5		6, 000	2, 700	13, 500
West Virginia	18	137, 000	152	15	35	74, 432	46, 764	185, 756
Wisconsin	82	729, 800	827	93	88	429, 777	337, 290	1, 093, 510

146.—PRINTING MATERIALS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	27	$199, 900	164	7	20	$98, 878	$190, 353	$421, 316
Connecticut	1	1, 500	2			1, 200	500	2, 500
Illinois	4	20, 200	24		7	17, 452	26, 300	61, 000
Maryland	1	4, 500	2	5	1	2, 570	15, 000	25, 000
Massachusetts	4	15, 300	12	1	2	8, 460	12, 000	28, 050
New Hampshire	2	6, 500	6			2, 100	4, 250	13, 400
New Jersey	1	12, 000	12			5, 500	6, 300	30, 000
New York	8	91, 500	67	1	5	38, 658	100, 205	196, 000
Ohio	1	3, 200	1			468	7, 500	13, 000
Pennsylvania	5	45, 200	38		5	22, 470	18, 298	52, 366

147.—PUMPS, NOT INCLUDING STEAM PUMPS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	411	$2, 383, 482	1, 692	3	36	$652, 749	$2, 038, 634	$3, 644, 631
California	2	6, 500	2			945	5, 720	9, 500
Connecticut	5	40, 000	11		2	3, 616	12, 169	21, 727
Delaware	1	5, 000	4			2, 000	3, 000	8, 000
Illinois	27	348, 050	225	3	10	85, 443	272, 362	470, 729
Indiana	55	251, 400	300		3	112, 299	247, 925	533, 906
Iowa	10	23, 800	23		1	7, 531	22, 000	39, 900
Kansas	2	3, 000	3			1, 924	7, 000	13, 024
Kentucky	6	27, 250	32		2	15, 160	15, 010	43, 789
Louisiana	2	16, 000	4			750	1, 460	3, 060
Maine	9	31, 200	32		3	9, 700	19, 950	44, 250
Maryland	10	9, 075	17		1	8, 660	14, 700	39, 950
Massachusetts	15	38, 450	33			11, 893	18, 640	43, 895
Michigan	30	93, 137	55		1	20, 522	36, 546	103, 651
Minnesota	8	16, 500	33			14, 762	19, 650	51, 500
Missouri	11	530, 600	112		2	66, 680	703, 670	932, 550
New Hampshire	4	5, 800	13			2, 886	6, 498	16, 475
New Jersey	5	5, 500	11			3, 300	3, 650	11, 075
New York	72	250, 550	206		2	88, 313	158, 558	365, 153
Ohio	66	313, 875	300		3	114, 326	184, 650	384, 561
Oregon	2	4, 200	6			3, 600	2, 900	10, 000
Pennsylvania	29	131, 900	75		1	27, 858	99, 088	171, 191
Rhode Island	4	11, 500	7			3, 413	8, 062	15, 900
Tennessee	2	155, 000	102		3	19, 983	120, 000	184, 500
Texas	1	2, 000	3			900	4, 000	10, 000
Vermont	1	10, 000	12			2, 500	5, 000	10, 000
Virginia	3	570	3			900	1, 100	4, 100
West Virginia	2	13, 000	14		1	6, 300	9, 700	20, 000
Wisconsin	27	39, 625	54		1	16, 585	35, 626	82, 245

RACKING HOSE.

(See Table IV (B) for New York.)

148.—REFRIGERATORS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	71	$727, 220	975	14	64	$423, 680	$881, 842	$1, 739, 731
Illinois	1	800	6		4	2, 500	4, 000	9, 000
Indiana	2	36, 000	91			25, 000	52, 000	90, 000
Kentucky	2	7, 000	8		5	5, 800	6, 875	17, 800
Maine	1	5, 000	4			2, 500	3, 000	8, 000
Maryland	3	16, 200	24			7, 099	13, 040	27, 990
Massachusetts	7	56, 850	70			25, 425	48, 400	98, 400
Michigan	3	10, 600	17		1	11, 480	11, 100	27, 316
Missouri	4	43, 700	106		15	54, 950	203, 300	344, 500
New Hampshire	1	25, 000	25			10, 000	15, 000	50, 000
New Jersey	1	500	4			1, 000	1, 000	3, 000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

148.—REFRIGERATORS—Continued.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
New York	28	$346, 528	473	14	36	$215, 528	$396, 463	$801, 172
Ohio	6	84, 100	81		2	26, 803	30, 484	89, 540
Pennsylvania	7	76, 442	41		1	21, 495	69, 380	110, 463
Vermont	1	7, 500	3			2, 000	6, 000	18, 000
Wisconsin	4	11, 000	22			12, 100	21, 800	44, 550

149.—REGALIA AND SOCIETY BANNERS AND EMBLEMS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	47	$452, 590	175	376	38	$174, 097	$429, 227	$815, 638
California	1	6, 000	3	4		1, 500	3, 000	6, 000
Illinois	2	23, 500	5	16	1	5, 970	41, 260	60, 860
Indiana	2	3, 500	4	5		3, 348	6, 500	17, 048
Maine	1	1, 000	3			1, 200	5, 000	9, 000
Maryland	1	5, 000		9		1, 815	4, 300	8, 719
Massachusetts	2	700	3	4		1, 750	750	4, 500
Michigan	2	10, 000	5	11	1	4, 420	22, 000	42, 000
Minnesota	1	2, 000	1			300	2, 000	3, 000
Missouri	2	2, 100	1	3		900	5, 100	7, 000
New York	14	185, 200	66	52	3	45, 271	103, 701	209, 263
Ohio	6	118, 200	37	136	27	70, 550	150, 031	289, 414
Pennsylvania	12	93, 890	46	133	6	36, 073	82, 585	151, 834
Virginia	1	1, 500	1	3		1, 000	3, 000	7, 000

REGISTERS, CAR-FARE.

(See Table IV (B) for Pennsylvania.)

RICE CLEANING AND POLISHING.

(See Table IV (B) for Alabama, Florida, Georgia, Louisiana, North Carolina, and South Carolina.)

150.—ROOFING AND ROOFING MATERIALS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	493	$2, 329, 277	3, 019	22	41	$1, 411, 133	$3, 382, 354	$6, 227, 284
California	17	69, 650	151			91, 521	121, 320	273, 275
Colorado	1	2, 000	4			1, 600	7, 000	10, 500
Connecticut	3	11, 100	40			19, 292	83, 521	112, 500
Delaware	3	10, 500	16			8, 344	11, 500	29, 500
Illinois	20	199, 721	242			90, 187	437, 877	623, 681
Indiana	6	17, 700	21			9, 648	52, 675	90, 475
Iowa	3	10, 250	14			4, 460	37, 050	55, 210
Kentucky	8	16, 300	26		2	11, 687	32, 700	58, 350
Maine	1	500	2			500	800	1, 800
Maryland	6	89, 625	46		1	16, 769	30, 450	78, 917
Massachusetts	60	213, 925	317			147, 981	369, 529	657, 264
Michigan	11	43, 350	85		5	32, 562	98, 094	160, 790
Missouri	7	66, 200	84			52, 750	87, 450	189, 550
New Hampshire	2	3, 150	4			520	2, 200	4, 810
New Jersey	19	39, 260	69		1	28, 200	82, 141	149, 150
New York	147	411, 991	852		22	459, 098	783, 101	1, 695, 672
Ohio	46	333, 300	336	2	3	133, 276	592, 944	900, 141
Pennsylvania	116	451, 055	513	3	6	219, 958	394, 442	798, 999
Rhode Island	2	5, 000	7			2, 820	11, 000	16, 500
Texas	2	3, 500	8			1, 500	6, 500	13, 000
Vermont	6	220, 000	100	2		36, 600	60, 900	155, 000
West Virginia	3	1, 200	6		1	1, 400	6, 000	11, 100
Wisconsin	4	110, 000	76	15		40, 460	73, 160	141, 100

151.—RUBBER AND ELASTIC GOODS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	90	$6, 057, 987	3, 693	2, 281	294	$2, 295, 972	$9, 249, 967	$13, 751, 724
California	1	7, 500	3			2, 000	6, 600	10, 000
Connecticut	12	681, 600	328	262	32	233, 445	1, 203, 661	1, 710, 761
Delaware	1	150, 000	15		3	5, 000	40, 000	66, 662
Illinois	3	10, 500	8	10		4, 540	25, 750	35, 600
Maryland	1	300		1		125	539	1, 121
Massachusetts	22	1, 811, 000	881	897	63	649, 016	2, 722, 916	4, 206, 465
Nebraska	1	2, 000	1			300	1, 000	1, 500
New Hampshire	1	450	1			200	300	800
New Jersey	15	934, 000	713	282	94	347, 924	1, 597, 796	2, 231, 202
New York	24	1, 589, 037	972	469	89	697, 340	1, 769, 673	2, 914, 119
Ohio	4	107, 600	59	18	2	30, 867	233, 232	305, 494
Pennsylvania	3	54, 000	25	22	11	11, 500	31, 500	51, 000
Rhode Island	2	710, 000	687	320		313, 715	1, 617, 000	2, 217, 000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

RUBBER, VULCANIZED.

(See Table IV (B) for New Jersey.)

RULES, IVORY AND WOOD.

(See Table IV (B) for Connecticut, Maine, Massachusetts, Michigan, New Hampshire, and Ohio.)

152.—SADDLERY AND HARNESS.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	7,999	$16,568,019	20,024	561	861	$7,997,752	$19,968,716	$38,081,643
Alabama	19	39,450	53	1	2	24,065	68,680	130,290
Arizona	1	300	1			500	500	1,500
Arkansas	21	50,100	53			21,731	66,803	126,550
California	191	627,350	621	12	23	305,575	587,623	1,170,865
Colorado	20	119,870	94	2	12	67,745	149,000	320,850
Connecticut	100	183,860	343	43	17	178,673	396,370	727,352
Dakota	19	31,350	32			17,476	54,300	97,100
Delaware	17	30,500	34		2	14,570	34,400	68,700
District of Columbia	26	30,400	45			19,471	33,157	80,349
Florida	2	1,400	3			1,644	700	3,500
Georgia	37	100,595	107	10	16	44,219	113,925	211,545
Idaho	5	14,500	7			5,850	23,400	37,850
Illinois	718	1,246,281	1,459	163	172	589,250	1,645,270	3,095,322
Indiana	458	898,825	1,157	3	30	430,264	1,168,735	2,126,896
Iowa	451	964,728	988	3	16	380,552	1,173,862	2,068,486
Kansas	176	338,605	403	2	6	155,877	468,383	835,934
Kentucky	164	582,865	660	20	32	261,543	753,346	1,370,885
Louisiana	27	172,100	154	1	15	76,549	207,800	377,380
Maine	127	166,165	212	2	2	72,865	225,048	393,326
Maryland	154	374,075	556	2	84	249,313	459,683	1,004,851
Massachusetts	294	520,625	966	43	10	372,914	750,912	1,497,600
Michigan	335	509,336	660	2	12	254,461	662,314	1,276,616
Minnesota	194	325,389	405		3	169,839	459,185	859,955
Mississippi	21	63,150	48			20,767	47,269	114,838
Missouri	355	1,898,723	1,954	12	87	793,536	2,345,485	3,976,175
Montana	9	44,300	22			21,546	25,410	68,850
Nebraska	114	214,230	215	2	1	83,039	276,474	477,364
Nevada	2	12,000	5			6,244	6,500	25,200
New Hampshire	82	203,350	202	5	1	83,786	211,267	381,551
New Jersey	194	709,878	854	69	29	354,896	875,211	1,579,404
New Mexico	5	7,600	11			5,900	6,500	15,800
New York	1,123	1,725,782	2,192	62	65	905,371	1,734,498	3,792,955
North Carolina	37	54,235	85		10	22,457	53,517	108,583
Ohio	743	1,271,869	1,877	25	65	671,124	1,487,319	3,170,413
Oregon	46	190,050	111		2	63,767	222,350	385,350
Pennsylvania	781	1,301,402	1,542	54	35	540,772	1,265,482	2,505,850
Rhode Island	51	81,900	119	17	3	57,784	89,771	201,927
South Carolina	25	27,700	49		6	18,192	56,286	97,922
Tennessee	86	180,166	382	1	31	123,912	308,295	595,135
Texas	126	286,925	260	2	8	110,576	325,579	587,871
Utah	22	35,130	49		4	23,753	74,255	118,850
Vermont	101	107,295	127	2		38,008	119,583	230,185
Virginia	84	107,710	184		9	72,183	171,655	328,778
Washington	14	72,500	34			23,950	83,600	156,880
West Virginia	74	73,870	95		1	28,494	88,210	170,825
Wisconsin	344	494,085	573	1	50	197,249	574,384	1,064,235
Wyoming	4	15,500	21			15,500	16,720	43,000

153.—SAFES, DOORS, AND VAULTS, FIRE-PROOF.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	40	$2,201,600	2,173		33	$1,096,504	$1,431,083	$3,352,396
California	3	36,500	14			8,590	13,808	32,835
Illinois	2	28,000	27			10,250	13,650	29,250
Indiana	1	300	2			470	200	1,300
Maryland	1	35,000	30			13,000	10,000	35,000
Massachusetts	3	52,000	170			69,800	186,000	310,000
Michigan	1	195,000	150			55,600	95,000	165,400
Missouri	2	5,800	12			6,060	6,000	19,000
Nebraska	1	1,000	7			3,000	2,000	6,000
New York	9	561,400	450		20	233,276	399,210	807,516
Ohio	5	964,000	1,125		12	587,428	580,000	1,635,000
Pennsylvania	7	176,000	159		1	93,850	106,015	259,505
Rhode Island	2	132,000	14			8,480	10,100	29,090
Texas	1	600	1			850	500	3,500
Wisconsin	2	14,000	12			5,850	8,600	19,000

SALT.

(See Table VII.)

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

SALT, GROUND.

(See Table VII.)

SAND AND EMERY PAPER AND CLOTH.

(See Table IV (B) for Massachusetts, New Jersey, New York, and Pennsylvania.)

154.—SASH, DOORS, AND BLINDS.

(See also Lumber, planed; Wood, turned and carved.)

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	1,288	$20,457,670	20,544	79	1,275	$8,540 930	$20,790 919	$36,621,325
Alabama	8	84,500	85		1	26,840	47,209	99,100
California	33	944,050	862		45	442,560	831,466	1,541,266
Colorado	1	90,000	135			67,000	350,000	580,000
Connecticut	34	578,700	535	1	8	224,193	577,392	929,451
Dakota	3	9,000	11			8,400	10,100	28,000
Florida	1	25,000	12		8	5,000	30,000	40,000
Georgia	14	160,500	326		22	79,274	158,000	366,000
Idaho	1	6,000	1			300	1,200	3,000
Illinois	70	1,589,313	2,185	17	212	968,621	1,904,089	3,500,993
Indiana	40	744,850	583	5	40	236,304	908,133	1,437,350
Iowa	27	713,200	526		95	238,592	847,002	1,286,072
Kansas	5	11,500	22			10,438	19,300	36,100
Kentucky	4	148,350	71		3	27,300	121,200	166,595
Louisiana	7	295,000	177			87,200	254,250	451,000
Maine	34	264,350	230		2	92,550	199,350	380,350
Maryland	17	463,125	446		38	222,235	411,963	813,005
Massachusetts	56	740,345	777	4	30	353,951	816,398	1,389,326
Michigan	126	1,624,257	1,474		97	566,004	1,278,996	2,440,492
Minnesota	29	562,000	592	1	42	265,896	734,125	1,344,618
Mississippi	2	14,500	30			10,715	12,500	29,850
Missouri	15	600,795	677		43	279,911	696,671	1,232,670
Montana	2	3,200	2			1,650	3,000	6,700
Nebraska	1	3,000	4			1,800	1,200	4,000
Nevada	1	20,000	21			10,000	10,000	40,000
New Hampshire	28	263,700	366		7	141,530	237,402	444,119
New Jersey	67	806,925	763	31	28	322,674	622,071	1,150,115
New York	244	2,639,775	2,890		133	1,170,394	2,628,837	4,879,894
North Carolina	12	71,600	184		9	55,593	66,024	179,120
Ohio	102	2,147,537	2,146	1	164	883,910	2,429,480	4,043,844
Oregon	20	230,400	94			71,031	143,980	253,692
Pennsylvania	109	1,989,198	1,601	1	45	627,674	1,480,004	2,513,607
Rhode Island	11	156,500	130		10	59,057	184,080	296,449
South Carolina	1	2,000	6			1,872	1,040	4,000
Tennessee	8	183,500	103	1	3	80,100	132,930	268,930
Texas	8	106,400	81		1	49,800	305,200	416,500
Utah	5	42,600	26		1	14,670	22,350	45,500
Vermont	35	263,050	282		60	98,445	278,835	447,185
Virginia	15	130,000	183			67,909	249,667	400,835
Washington	5	58,500	25			16,700	16,730	61,500
West Virginia	3	43,750	38			11,556	23,600	54,500
Wisconsin	83	1,616,700	1,837	17	128	636,281	1,715,145	2,975,687
Wyoming	1	10,000	5			5,000	30,000	40,000

155.—SAWS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	89	$3,281,135	2,288	23	255	$1,226,370	$1,744,083	$3,943,105
California	6	87,185	29		4	22,348	40,390	83,026
Connecticut	2	1,000	5			2,350	900	5,500
Delaware	1	60,000	5		15	6,000	10,000	23,000
Illinois	9	58,400	42			25,118	32,500	92,000
Indiana	3	112,000	64			56,050	161,000	291,000
Kentucky	1	8,000	4			2,566	1,000	8,500
Maine	2	25,500	13			4,500	10,075	25,650
Maryland	3	6,500	8			2,321	2,744	10,281
Massachusetts	8	135,800	108			50,861	112,496	205,951
Michigan	7	40,900	24		4	15,116	34,200	64,480
Minnesota	1	300	2			1,500	2,000	5,000
Missouri	2	245,000	80			56,000	130,000	281,000
New Hampshire	1	200	1	1		500	800	1,500
New Jersey	3	235,000	197	6	58	120,643	114,462	279,909
New York	18	435,800	382	10	26	157,250	319,059	606,851
Ohio	11	272,750	190		14	75,118	129,573	281,867
Pennsylvania	7	1,518,000	1,115	6	134	620,140	634,897	1,654,209
Rhode Island	2	26,500	4			2,669	5,137	10,850
Utah	1	300					50	600
Virginia	1	12,000	15			5,320	2,800	12,000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

156.—SCALES AND BALANCES.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	64	$3, 814, 981	1, 527	1	26	$783, 019	$654, 711	$3, 252, 460
Alabama	1	100	1	....	....	156	300	800
Connecticut	1	3, 000	2	....	....	600	1, 000	2, 500
Illinois	6	71, 600	88	....	....	49, 350	123, 340	244, 750
Indiana	1	2, 000	5	....	....	2, 400	3, 000	8, 500
Iowa	3	21, 000	12	....	....	3, 080	9, 150	13, 600
Kentucky	1	10, 000	7	....	....	3, 000	6, 000	16, 500
Maryland	3	9, 200	7	....	....	4, 181	2, 819	11, 077
Massachusetts	5	70, 000	55	1	4	30, 570	26, 440	77, 613
Michigan	2	1, 200	8	....	1	6, 170	2, 300	9, 200
Minnesota	1	400	2	....	....	1, 000	1, 000	2, 500
New York	19	369, 800	320	....	8	155, 735	165, 957	456, 147
Ohio	4	22, 200	22	....	2	9, 350	6, 300	30, 000
Pennsylvania	10	153, 000	180	....	9	94, 081	73, 490	238, 699
Tennessee	1	500	3	....	....	1, 960	1, 500	3, 500
Vermont	3	3, 051, 481	783	....	....	410, 786	215, 215	2, 080, 474
Wisconsin	3	29, 500	32	....	2	10, 600	16, 900	56, 660

SCREWS.

(See Table IV (B) for Connecticut, Illinois, Massachusetts, New Jersey, Ohio, Rhode Island, and Vermont.)

SEWING-MACHINE CASES.

(See Table IV (B) for Illinois, Indiana, New York, Ohio, and Pennsylvania.)

157.—SEWING MACHINES AND ATTACHMENTS.

(See Report by Special Agent C. H. Fitch, *post.*)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	106	$12, 501, 830	8, 632	248	673	$4, 636, 099	$4, 829, 106	$13, 863, 188
Connecticut	5	6, 490, 650	2, 055	27	6	1, 158, 000	802, 959	2, 969, 741
Illinois	17	1, 187, 600	584	4	8	332, 776	379, 534	1, 387, 911
Iowa	1	44, 000	60	50	3	36, 000	74, 000	122, 000
Kansas	3	1, 700	2	....	....	425	650	2, 700
Maryland	6	20, 500	22	1	2	11, 620	9, 450	35, 595
Massachusetts	12	1, 052, 200	976	18	17	445, 377	634, 229	1, 366, 696
Michigan	2	2, 800	6	....	....	3, 600	3, 500	11, 000
New Hampshire	1	5, 000	4	....	....	1, 500	2, 000	5, 000
New Jersey	8	1, 152, 755	2, 836	75	400	1, 519, 947	1, 484, 902	4, 640, 852
New York	26	919, 725	944	56	43	483, 039	386, 111	1, 168, 758
North Carolina	1	4, 000	3	....	....	350	700	1, 700
Ohio	12	358, 100	640	9	143	389, 805	774, 281	1, 370, 025
Pennsylvania	7	1, 175, 800	440	8	51	226, 000	225, 190	625, 550
Rhode Island	2	61, 000	17	....	....	11, 560	37, 000	112, 960
Tennessee	2	1, 000	3	....	....	1, 100	600	2, 700
Vermont	1	25, 000	40	....	....	15, 000	14, 000	40, 000

158.—SHINGLES, SPLIT.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	45	$17, 770	162	11	20	$11, 394	$20, 470	$47, 952
Indiana	9	745	24	2	1	1, 375	2, 445	6, 725
Kentucky	25	10, 350	100	9	19	5, 975	13, 375	27, 452
Mississippi	1	125	10	....	....	900	400	2, 000
Missouri	1	600	2	....	....	144	200	900
New York	3	1, 750	5	....	....	825	1, 625	3, 200
Ohio	1	600	2	....	....	250	475	725
Pennsylvania	1	1, 200	3	....	....	200	600	1, 000
South Carolina	1	250	1	....	....	75	250	550
Tennessee	1	1, 000	4	....	....	600	400	1, 500
Texas	2	1, 150	11	....	....	1, 050	700	3, 900

SHIPBUILDING.

(See Table VII.)

159.—SHIRTS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	549	$6, 841, 778	2, 878	22, 186	623	$5, 403, 696	$11, 306, 444	$20, 130, 031
Arkansas	1	750	....	8	....	2, 080	500	5, 000
California	26	88, 300	182	173	1	85, 338	154, 990	304, 850
Connecticut	18	515, 700	89	982	....	276, 054	330, 677	699, 605
Delaware	1	2, 000	2	5	1	1, 800	6, 000	12, 000
District of Columbia	2	4, 310	3	19	....	9, 740	15, 850	36, 350

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

159.—SHIRTS—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Illinois	32	$162, 150	112	458	9	$141, 800	$427, 957	$746, 117
Indiana	9	19, 400	14	70	8	31, 460	42, 642	95, 800
Iowa	6	17, 600	20	85	4	26, 908	43, 000	84, 000
Kansas	2	5, 000	10	28	3	5, 500	9, 215	18, 570
Kentucky	8	64, 300	9	100		19, 594	30, 774	65, 315
Maine	4	53, 000	11	85		26, 300	57, 000	86, 000
Maryland	38	313, 930	328	1, 284	84	307, 867	425, 947	949, 524
Massachusetts	20	150, 050	66	428	9	111, 519	326, 554	564, 500
Michigan	12	16, 000	40	85	1	26, 785	36, 445	79, 871
Minnesota	6	13, 700	10	63		21, 800	28, 700	67, 500
Missouri	20	130, 700	56	357	1	110, 136	146, 700	332, 852
Nebraska	2	8, 600	12	14		8, 600	18, 000	33, 000
New Jersey	34	516, 300	439	2, 180	204	662, 086	1, 196, 329	2, 111, 069
New York	195	3, 732, 694	1, 133	12, 453	205	2, 730, 571	6, 410, 261	11, 014, 820
Ohio	35	220, 300	84	516	7	139, 224	335, 637	575, 422
Pennsylvania	61	785, 094	242	2, 597	85	614, 924	1, 182, 154	2, 095, 761
Rhode Island	1	2, 500		20	1	3, 900	4, 532	11, 215
Texas	1	500		5		2, 000	2, 750	8, 250
Vermont	6	14, 000	8	97		19, 200	44, 500	72, 100
Virginia	1	100	1	5		320	300	1, 000
West Virginia	4	1, 200		40		9, 200	20, 240	33, 890
Wisconsin	4	3, 600	7	29		8, 990	8, 790	25, 650

160.—SHODDY.

(See also Mixed textiles.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	73	$1,165, 100	695	496	91	$400, 326	$3, 366, 650	$4, 989, 615
Connecticut	8	86, 000	93	38	8	35, 345	261, 200	347, 500
Illinois	2	22, 000	16	12	3	12, 300	74, 500	100, 000
Maine	1	6, 000	4	1	3	1, 905	7, 200	12, 000
Maryland	1	5, 000	5	4	6	3, 100	14, 150	22, 500
Massachusetts	30	460, 500	334	105	32	173, 439	1, 308, 715	2, 305, 985
New Hampshire	3	17, 300	13	8	2	5, 700	38, 900	49, 600
New Jersey	1	35, 000	10	5	15	25, 000	80, 734	137, 500
New York	7	32, 700	43	32	3	33, 610	321, 220	407, 590
Ohio	1	250, 000	30	216		40, 000	575, 000	700, 000
Pennsylvania	11	186, 000	90	40	13	47, 441	510, 977	655, 895
Rhode Island	6	49, 600	51	26	6	18, 590	137, 054	195, 045
Vermont	2	15, 000	6	9		3, 896	37, 000	56, 000

161.—SHOW-CASES.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	93	$341, 970	640	4	48	$329, 230	$519, 585	$1, 172, 172
California	6	4, 320	8			5, 088	10, 875	23, 800
Illinois	14	62, 100	119		9	65, 276	125, 900	263, 700
Indiana	2	2, 300	3		1	1, 620	5, 500	9, 250
Iowa	2	12, 600	8		1	2, 600	6, 000	11, 000
Kentucky	3	2, 100	6		2	1, 950	2, 650	6, 900
Maine	1	1, 000	2			1, 000	3, 000	6, 000
Maryland	5	14, 300	38		1	15, 785	27, 389	74, 320
Massachusetts	6	11, 800	18		1	9, 200	11, 360	32, 380
Michigan	3	34, 200	30		1	12, 453	16, 770	40, 060
Minnesota	2	5, 000	12		1	6, 600	9, 100	18, 300
Missouri	6	29, 100	90	4	1	37, 235	19, 750	109, 450
Nebraska	2	3, 300	3			1, 700	3, 700	7, 000
New York	17	51, 800	101		1	58, 873	80, 850	181, 580
Ohio	6	38, 200	118		21	60, 316	83, 019	171, 637
Pennsylvania	12	58, 950	70		7	40, 134	97, 392	178, 815
Tennessee	2	1, 650	2		1	1, 350	3, 930	7, 480
Texas	2	2, 500	4			3, 500	5, 000	16, 500
Wisconsin	2	6, 750	8			4, 550	7, 400	14, 000

SILK AND SILK GOODS.

(See Mixed textiles; also Report by Special Agent W. C. Wyckoff, *post.*)

162.—SILVERSMITHING.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	38	$257, 198	123	8		$76, 640	$102, 058	$263, 931
California	1	800					150	900
Georgia	1	800					250	1, 885
Kansas	3	1, 100	1			400	600	2, 700
Maryland	5	101, 528	38			26, 979	49, 792	113, 061
Massachusetts	5	4, 250	11	2		5, 811	4, 176	16, 235

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

162.—SILVERSMITHING—Continued.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Michigan	1	$3, 000	2			$400	$1, 500	$2, 900
Minnesota	1	2, 500	3			1, 000	1, 000	3, 000
Missouri	4	22, 350	16			7, 300	24, 450	43, 050
New Jersey	2	108, 000	41	4		30, 000	13, 000	60, 000
New York	1	8, 000	4	2		1, 700	4, 000	7, 000
North Carolina	1	50					25	500
Ohio	3	725	4			1, 900	500	3, 850
Tennessee	5	2, 750	2			1, 100	1, 125	5, 250
Texas	3	495	1			50	850	2, 300
Virginia	2	850					640	1, 300

SILVERWARE.

(See Plated and britannia ware; also Table IV (B) for California, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, and Rhode Island.)

SLAUGHTERING AND MEAT-PACKING, NOT INCLUDING RETAIL BUTCHERING ESTABLISHMENTS.

(See Table VII.)

SMELTING AND REFINING (BASE SCRAP METAL, NOT FROM THE ORE).

(See Table IV (B) for Massachusetts, New Jersey, and Ohio.)

163.—SOAP AND CANDLES.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	629	$14, 541, 294	4, 368	388	533	$2, 219, 513	$19, 907, 444	$26, 552, 627
California	32	547, 600	226	14	16	129, 780	886, 706	1, 193, 494
Colorado	2	53, 000	15	3	3	14, 315	37, 500	64, 320
Connecticut	21	140, 450	76	14	4	34, 547	210, 415	309, 578
Delaware	3	14, 800	12		1	5, 180	13, 400	22, 070
District of Columbia	5	60, 966	22		1	7, 735	41, 678	66, 563
Florida	1	300	2			315	500	1, 000
Illinois	35	1, 407, 750	469	33	80	224, 874	3, 341, 777	3, 930, 322
Indiana	8	39, 300	37			13, 176	73, 530	102, 622
Iowa	15	135, 500	56	5	3	23, 418	195, 800	259, 960
Kansas	10	51, 200	37	2	1	14, 175	125, 800	174, 158
Kentucky	5	333, 740	72	27		29, 700	324, 881	393, 325
Louisiana	12	118, 450	45		6	19, 790	89, 990	142, 495
Maine	16	62, 530	54	1		14, 736	77, 799	124, 443
Maryland	11	271, 732	93		6	52, 495	254, 006	385, 790
Massachusetts	119	2 005, 325	655	29	30	306, 539	3, 492, 604	4, 489, 555
Michigan	15	62, 742	54	2		20, 610	74, 060	124, 738
Minnesota	6	92, 900	30	9		14, 050	72, 000	128, 640
Missouri	19	766, 927	273	2	3	104, 061	1, 336, 376	1, 704, 941
Nebraska	4	10, 000	11		2	2, 900	10, 520	20, 700
Nevada	1	9, 500	3			3, 286	8, 806	14, 540
New Hampshire	22	54, 700	41			17, 289	61, 170	104, 541
New Jersey	15	1, 197, 700	246	8	176	187, 383	1, 116, 321	1, 743, 380
New York	97	4, 462, 775	937	131	129	494, 903	4, 889, 625	6, 574, 939
Ohio	27	422, 650	229	39	16	78, 245	852, 483	1, 028, 778
Oregon	1	50	2			500	1, 000	2, 000
Pennsylvania	78	1, 873, 971	490	62	35	331, 677	1, 809, 904	2, 715, 771
Rhode Island	8	39, 136	15			5, 398	83, 325	100, 850
South Carolina	1	300	1			418	1, 500	2, 000
Tennessee	5	36, 200	16			4, 645	28, 200	43, 400
Texas	7	33, 200	18		1	7, 700	35, 000	54, 940
Utah	2	18, 200	4		1	2, 498	51, 142	58, 360
Vermont	4	10, 000	8			1, 950	5, 500	11, 950
Virginia	4	28, 000	21	1		8, 300	25, 400	48, 000
Washington	1	1, 200	2			500	4, 000	5, 600
West Virginia	2	5, 000	7		7	3, 460	2, 626	8, 124
Wisconsin	15	173, 500	89	6	12	38, 965	272, 100	396, 740

SODA-WATER APPARATUS.

(See Table IV (B) for Illinois, Massachusetts, New York, and Pennsylvania.)

164.—SPECTACLES AND EYEGLASSES.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	62	$643, 825	872	113	103	$450, 897	$417, 472	$1, 182, 142
California	2	350					630	2, 000
District of Columbia	2	1, 000	2			570	900	5, 700
Indiana	1	2, 000	2	1		1, 000	1, 000	3, 000
Maryland	2	1, 400	6			2, 874	1, 700	7, 500
Massachusetts	13	96, 200	237	18	16	124, 675	147, 778	330, 859
Michigan	3	15, 000	53	5	19	23, 400	24, 500	71, 000
New Hampshire	1	25, 000	35			15, 000	30, 000	50, 000
New Jersey	2	5, 000	6	6	5	4, 400	4, 695	13, 000
New York	30	264, 750	362	30	56	191, 918	152, 769	500, 583
Ohio	3	1, 125	2			460	500	2, 500
Pennsylvania	3	202, 000	167	53	7	86, 600	53, 000	196, 000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

165.—SPORTING GOODS.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	86	$1,444,750	565	734	102	$411,854	$692,616	$1,556,258
California	1	200	1	....	....	150	135	500
Connecticut	8	249,500	59	30	....	33,950	50,560	123,500
Delaware	1	10,000	10	5	2	5,000	15,000	25,000
Illinois	2	6,500	4	2	2	3,000	4,500	19,000
Iowa	1	300	1	....	....	312	200	800
Kentucky	4	15,200	17	70	5	12,700	10,650	37,075
Maine	2	12,200	10	1	....	6,825	2,400	17,900
Maryland	1	1,000	....	25	....	900	600	2,000
Massachusetts	13	303,000	41	245	25	69,125	268,552	398,890
Michigan	2	23,000	59	12	11	27,000	18,000	59,000
Missouri	1	3,000	....	13	....	1,404	7,000	15,000
New Jersey	2	16,000	24	11	....	15,000	7,100	45,600
New York	36	733,750	259	298	49	201,102	263,619	682,043
Pennsylvania	8	35,000	40	11	6	21,786	21,600	61,600
Rhode Island	2	2,300	3	1	....	1,200	1,700	5,350
Vermont	2	33,800	37	10	2	12,400	21,000	63,000

166.—SPRINGS, STEEL, CAR, AND CARRIAGE.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	59	$1,769,293	1,487	1	42	$699,412	$2,346,818	$3,654,862
California	1	40,600	12	....	....	7,000	11,000	24,000
Connecticut	[illegible]	250,750	298	....	....	167,116	341,698	622,841
Delaware	2	15,000	36	....	2	11,600	45,500	65,500
Illinois	6	46,000	67	....	1	38,240	152,500	227,500
Maine	1	25,000	34	1	....	11,238	3,528	49,722
Massachusetts	6	7,450	21	....	....	6,750	21,500	40,509
Michigan	2	100,000	90	....	5	30,000	168,000	230,000
New Hampshire	1	8,000	7	....	....	3,500	10,000	17,000
New Jersey	3	66,393	87	....	1	44,050	125,250	191,100
New York	9	360,000	178	....	5	64,821	424,958	548,890
Ohio	5	240,000	285	....	....	128,784	269,325	477,905
Pennsylvania	12	600,100	361	....	28	180,613	768,059	1,138,895
Vermont	1	6,000	3	....	....	1,200	2,000	10,000
Wisconsin	1	4,000	8	....	....	4,500	3,500	11,000

167.—STAMPED WARE.

(See also Tinware, copperware, and sheet-iron ware.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	26	$2,175,940	1,831	331	220	$868,043	$2,104,141	$3,512,423
California	1	1,000	....	....	....	....	120	720
Connecticut	1	100,000	75	30	80	55,000	200,000	300,000
Illinois	2	4,000	11	....	3	7,400	5,500	20,000
Massachusetts	2	185,000	262	73	6	141,000	193,000	378,000
Michigan	1	600	....	....	....	....	300	1,200
Missouri	1	800,000	403	87	....	170,000	550,000	850,000
New York	16	1,070,340	1,068	141	128	489,259	1,147,721	1,945,009
Pennsylvania	2	15,000	12	....	3	5,384	7,500	17,494

168.—STARCH.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	139	$5,328,256	2,710	301	108	$919,197	$4,911,060	$7,477,742
Connecticut	1	1,500	4	....	....	450	3,375	5,000
Florida	1	3,500	6	....	....	1,800	2,000	6,000
Illinois	2	391,500	152	24	13	33,000	141,000	219,500
Indiana	6	625,000	310	16	21	145,880	959,740	1,276,880
Iowa	2	99,350	32	15	....	17,500	66,560	93,130
Maine	23	294,200	254	....	....	23,280	339,611	442,700
Massachusetts	2	50,000	22	....	....	12,175	81,553	109,710
New Hampshire	20	56,256	76	....	....	4,499	49,977	66,800
New York	60	2,260,750	1,270	174	25	480,574	2,045,148	3,328,102
Ohio	5	1,400,000	505	60	40	179,030	1,099,292	1,754,710
Pennsylvania	1	45,000	8	....	....	2,500	6,750	11,000
Rhode Island	1	30,000	4	....	....	2,000	60,000	75,000
Vermont	13	31,200	35	....	....	2,509	21,554	32,660
Wisconsin	2	40,000	32	12	9	14,000	34,500	56,550

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

169.—STATIONERY GOODS.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	*Females above 15 years.	Children and youths.			
The United States	159	$3,286,325	1,871	1,028	218	$1,159,893	$3,501,426	$5,898,322
California	1	300,000	40	2		25,000	47,500	135,960
Connecticut	3	20,900	9	2		3,486	4,092	10,058
District of Columbia	2	2,300	3		1	2,485	2,856	10,311
Illinois	3	5,600	6	4	3	4,100	17,050	25,500
Indiana	1	7,500	12			3,000	1,500	7,600
Iowa	1	4,000	3	10		3,500	5,000	10,000
Kentucky	1	1,000	1		2	700	2,000	3,000
Maine	1	2,500	4	1		750	2,200	5,000
Maryland	1	1,000	1	10		300	500	2,500
Massachusetts	11	53,800	76	11	3	43,935	110,848	221,703
Missouri	1	150,000	45	5		30,000	40,000	100,000
New Hampshire	4	204,800	62	18	3	37,050	266,897	355,015
New Jersey	9	60,500	74	4	18	29,048	21,740	78,900
New York	85	2,208,725	1,160	915	120	839,931	2,596,013	4,281,877
Ohio	3	27,400	21	4	7	5,700	14,400	26,000
Pennsylvania	26	203,500	324	34	61	111,310	338,920	556,473
Rhode Island	4	24,300	21	6		16,898	23,910	56,425
Virginia	2	8,500	9	2		2,700	6,000	12,000

170.—STEAM FITTINGS AND HEATING APPARATUS.

(See also Foundery and machine-shop products.)

The United States	95	$3,075,751	2,425		49	$1,305,739	$2,857,000	$5,127,842
California	1	700	1			500	450	1,500
Connecticut	8	541,500	352			201,492	410,351	757,422
Illinois	13	182,700	265		13	143,390	462,780	680,530
Indiana	1	15,000	10			4,000	48,000	60,000
Iowa	1	57,400	75			49,000	63,000	130,800
Maine	3	4,000	13			3,900	12,500	22,000
Massachusetts	18	1,068,000	717		17	369,556	536,984	1,196,544
Michigan	1	651	2			634	4,586	6,039
Minnesota	2	16,000	32			25,000	35,000	90,000
Missouri	1	60,000	55			25,750	45,500	100,780
New Jersey	1	40,000	72			24,300	22,000	60,000
New York	23	832,000	549		6	336,393	951,871	1,488,678
Ohio	4	5,500	19		2	7,800	5,000	21,000
Pennsylvania	14	251,300	259		11	112,980	255,833	506,962
Wisconsin	1	1,000	4			1,044	3,145	5,587

171.—STENCILS AND BRANDS.

The United States	104	$224,525	261	11	33	$139,639	$144,554	$472,514
California	6	6,425	10	1		5,894	2,960	17,592
Colorado	2	6,650	22			12,500	16,000	51,000
Connecticut	1	5,000	2			468	320	1,300
Georgia	3	2,900	4			1,468	1,450	5,000
Illinois	2	8,600	19	2	4	10,200	10,400	28,000
Indiana	6	2,750	11		2	5,700	5,825	21,100
Kentucky	2	7,100	12			7,176	4,175	13,000
Louisiana	2	900	3		1	320	800	3,000
Maine	1	400					200	1,000
Maryland	3	2,800	6		1	3,526	2,200	9,500
Massachusetts	16	33,300	30	4	4	16,975	16,060	58,294
Michigan	7	10,200	19			11,000	11,000	35,600
Minnesota	2	1,900	2			1,500	1,100	4,600
Missouri	6	4,750	11		2	5,925	5,565	21,425
New York	7	17,600	3	2		1,704	3,787	13,930
Ohio	10	17,650	32		8	19,849	7,550	42,020
Pennsylvania	14	75,700	57	2	7	27,589	39,157	103,923
Rhode Island	3	9,000	7		2	2,665	8,730	18,580
South Carolina	1	1,000	3			1,000	200	1,800
Tennessee	2	3,500	1			350	700	3,450
Texas	2	1,400	1		1	1,250	2,200	6,200
Utah	1	500					150	800
Vermont	1	500	1			400	600	2,000
Virginia	2	800	3		1	980	1,300	3,150
West Virginia	1	2,000	1			600	1,125	3,550
Wisconsin	1	1,200	1			600	1,000	2,700

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
172.—STEREOTYPING AND ELECTROTYPING. (See also Type founding.)								
The United States	45	$536, 000	562	44	36	$312, 208	$200, 491	$724, 689
California	1	10, 000	4	....	....	3, 000	2, 318	8, 682
Colorado	1	2, 000	4	....	....	3, 000	2, 000	8, 500
Connecticut	3	20, 000	15	....	1	5, 840	7, 245	20, 068
District of Columbia	1	1, 500	7	....	....	2, 458	800	5, 682
Illinois	4	26, 200	54	....	12	27, 272	18, 800	69, 554
Indiana	1	5, 000	5	....	3	4, 000	2, 500	8, 000
Iowa	1	2, 000	2	....	....	1, 600	2, 000	6, 000
Kentucky	1	5, 000	7	....	....	3, 900	2, 500	7, 000
Massachusetts	6	43, 000	98	2	....	61, 721	36, 408	122, 630
Minnesota	2	7, 500	8	....	....	3, 850	3, 010	12, 700
Missouri	1	10, 000	15	....	7	6, 616	4, 890	18, 060
New Jersey	1	50, 000	7	....	....	3, 000	4, 000	20, 000
New York	9	111, 350	133	25	8	62, 624	52, 710	153, 965
Ohio	7	16, 050	28	....	3	17, 745	9, 860	38, 348
Pennsylvania	5	226, 000	172	17	2	104, 982	51, 050	223, 500
Wisconsin	1	400	3	....	....	600	400	2, 000
173.—STONE- AND EARTHEN-WARE.								
The United States	686	$6, 380, 610	7, 205	948	1, 341	$3, 279, 535	$2, 564, 359	$7, 942, 729
Alabama	13	5, 095	41	....	4	7, 261	3, 098	19, 850
Arkansas	4	2, 700	4	....	....	350	440	2, 800
California	7	62, 500	29	1	....	17, 025	15, 750	54, 500
Connecticut	7	79, 800	91	....	6	42, 075	17, 500	101, 700
Delaware	3	12, 000	[illegible]	....	1	1, 100	2, 350	8, 500
District of Columbia	1	200	1	....	....	150	150	650
Florida	1	1, 000	2	....	2	350	150	850
Georgia	5	1, 175	17	....	3	1, 850	1, 050	5, 225
Illinois	41	168, 090	272	3	24	101, 281	74, 306	246, 305
Indiana	27	64, 550	89	2	1	26, 255	14, 535	71, 340
Iowa	28	64, 250	172	....	11	64, 406	32, 642	139, 195
Kansas	5	8, 150	19	1	....	3, 200	1, 561	8, 780
Kentucky	13	18, 100	52	....	7	13, 610	8, 950	33, 850
Louisiana	2	2, 000	7	....	....	2, 950	3, 100	10, 500
Maine	5	21, 100	20	....	....	9, 700	7, 861	28, 500
Maryland	17	142, 950	213	10	63	120, 234	80, 273	271, 944
Massachusetts	18	187, 000	194	13	4	94, 825	50, 740	244, 336
Michigan	8	26, 500	34	....	....	12, 900	6, 678	30, 950
Minnesota	3	28, 000	24	....	....	11, 962	8, 525	31, 000
Mississippi	2	4, 700	28	....	....	8, 800	2, 810	19, 500
Missouri	32	82, 000	169	1	13	65, 350	46, 490	159, 518
Nebraska	1	4, 500	13	....	....	2, 724	1, 000	4, 815
New Hampshire	5	61, 000	61	2	4	28, 825	12, 640	61, 000
New Jersey	49	2, 057, 200	2, 054	458	668	1, 101, 511	1, 030, 598	2, 598, 757
New York	53	703, 500	649	142	36	319, 336	241, 385	788, 694
North Carolina	2	1, 600	2	....	....	100	600	1, 650
Ohio	179	1, 675, 055	2, 042	226	391	894, 322	628, 273	2, 106, 474
Pennsylvania	97	670, 545	634	85	93	254, 082	202, 011	655, 169
Rhode Island	1	3, 500	9	....	....	3, 300	2, 300	15, 000
South Carolina	3	6, 500	18	....	....	2, 200	8, 500	16, 200
Tennessee	8	16, 900	24	2	3	5, 294	2, 115	12, 260
Texas	6	5, 600	19	....	....	4, 830	2, 550	13, 270
Utah	2	4, 000	5	....	....	1, 800	800	5, 000
Vermont	2	60, 000	24	....	....	12, 200	11, 000	35, 000
Virginia	15	16, 850	29	....	3	6, 155	6, 515	26, 597
Washington	1	1, 000	2	....	....	500	500	1, 500
West Virginia	[illegible]	25, 100	56	2	....	16, 111	9, 208	32, 700
Wisconsin	14	85, 900	80	....	4	20, 611	25, 405	78, 850
174.—STRAW GOODS.								
The United States	77	$3, 333, 560	3, 278	7, 501	169	$2, 556, 197	$5, 455, 559	$9, 345, 759
California	8	33, 500	33	72	3	38, 600	26, 450	85, 200
Connecticut	3	230, 000	239	371	....	137, 338	203, 387	419, 270
Georgia	2	21, 000	8	115	9	21, 000	16, 200	75, 000
Illinois	8	144, 000	85	335	19	119, 514	297, 744	484, 609
Iowa	1	1, 000	....	2	....	300	700	2, 000
Maine	1	8, 000	15	36	....	7, 015	6, 000	15, 600
Maryland	3	160, 800	107	422	15	57, 761	264, 507	362, 9[illegible]2
Massachusetts	33	2, 361, 960	2, 531	5, 185	93	1, 968, 232	4, 117, 162	6, 898, 6[illegible]8
New Jersey	3	54, 800	33	192	....	30, 150	145, 800	251, 900
New York	4	183, 000	49	290	23	72, 734	145, 858	264, 692
Pennsylvania	7	48, 200	48	195	7	48, 000	106, 204	225, 718
Rhode Island	3	2, 300	5	11	....	5, 553	547	10, 160
Wisconsin	1	85, 000	125	275	....	50, 000	125, 000	250, 000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

SUGAR AND MOLASSES, BEET.

(See Table IV (B) for California, Delaware, and Maine.)

175.—SUGAR AND MOLASSES, REFINED.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	49	$27, 432, 500	5, 832		25	$2, 875, 032	$144, 698, 499	$155, 484, 915
California	2	1, 600, 000	280			190, 000	5, 517, 000	5, 932, 000
Louisiana	4	385, 000	190			50, 000	1, 340, 000	1, 483, 000
Maine	2	460, 000	90			34, 457	1, 416, 414	1, 499, 512
Maryland	3	260, 000	106			31, 000	756, 703	840, 986
Massachusetts	5	1, 979, 500	525			288, 860	21, 482, 764	22, 880, 439
Missouri	1	840, 000	250		2	112, 270	4, 173, 100	4, 475, 740
New Jersey	4	2, 110, 000	692		5	476, 216	20, 794, 961	22, 841, 258
New York	17	13, 726, 000	2, 626		13	1, 218, 212	67, 273, 614	71, 237, 051
Pennsylvania	11	6, 072, 000	1, 073		5	474. 017	21, 943, 943	24, 294, 929

176.—SURGICAL APPLIANCES.

(See also Artificial limbs.)

The United States	71	$843, 142	308	154	15	$265, 372	$286, 720	$906, 303
California	5	4, 925	2			1, 976	2, 400	11, 672
Connecticut	1	500	2			1, 445	500	2, 325
Georgia	1	1, 000	2	1		600	1, 000	2, 000
Illinois	4	20, 500	16	12		10, 700	17, 200	48,800
Indiana	1	500, 000	40	10		86, 000	25, 000	150, 000
Iowa	1	7, 000	3	5		6, 000	5, 000	25, 000
Louisiana	3	1, 550	5			2, 070	1, 675	6, 000
Maryland	3	5, 700	35	5		17, 000	15, 600	61, 500
Massachusetts	9	33, 200	40	21	3	36, 230	50, 430	126, 900
Michigan	1	500	2			600	500	2, 220
Missouri	2	10, 250	4	3	1	3, 939	2, 780	17, 100
New Hampshire	3	17, 150	19	2		6, 900	4, 100	25, 000
New Jersey	2	4, 000	4	5		4, 624	3, 500	16, 100
New York	20	77, 767	47	20	7	27, 357	63, 379	182, 216
Ohio	8	37, 600	22	26		16, 117	23, 635	77, 197
Pennsylvania	6	120, 500	63	44	4	43, 314	69, 821	149, 273
Vermont	1	1, 000	2			500	200	3, 000

TAR AND TURPENTINE, NOT INCLUDING FARM PRODUCTS.

(See Table IV (B) for Alabama, Florida, Georgia, Mississippi, Missouri, North Carolina, and South Carolina.)

177.—TAXIDERMY.

The United States	16	$25, 750	27	102	21	$22, 000	$21, 850	$82, 500
California	2	500					1, 850	3, 800
District of Columbia	1	5, 000	6			6, 100	2, 000	25, 000
Florida	1	2, 000	4			1, 200	1, 000	4, 000
Massachusetts	4	2, 300	8	2		3, 500	5, 900	15, 800
New Jersey	1	10, 000	5	100	20	9, 000	10, 000	25, 000
New York	4	3, 200	4		1	2, 200	600	6, 600
Ohio	1	250					100	1, 000
Pennsylvania	1	1, 000					300	500
Rhode Island	1	1, 500					100	800

178.—TELEGRAPH AND TELEPHONE APPARATUS.

(See also Electrical apparatus and supplies.)

The United States	40	$636, 458	797	37	59	$458, 406	$755, 891	$1, 580, 648
Illinois	1	2, 000	16			1, 750	2, 250	5, 700
Indiana	1	80, 000	77	6	30	44, 000	90, 000	180, 000
Maryland	1	17, 500	29		1	12, 680	37, 006	53, 239
Massachusetts	2	112, 000	185		15	90, 600	239, 625	409, 930
Michigan	1	6, 000	9			4, 299	20, 000	35, 000
Missouri	2	25, 000	14			9, 000	14, 400	36, 000
New York	25	333, 558	413	31	10	278, 801	321, 066	798, 939
Ohio	3	3, 400	13			4, 503	7, 100	16, 000
Pennsylvania	4	57, 000	41		3	12, 773	24, 444	45, 840

TERRA-COTTA WARE.

(See Brick and tile; Drain and sewer pipe; also Table IV (B) for California, Illinois, Kansas, Massachusetts, Missouri, Ohio, and Pennsylvania.)

THREAD, LINEN.

(See Table IV (B) for New Jersey.)

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

179.—TINWARE, COPPERWARE, AND SHEET-IRON WARE.

(See also Coppersmithing; Stamped ware.)

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	7, 595	$22, 252, 290	23, 903	853	1, 492	$10, 722, 974	$25, 232, 281	$48, 096, 038
Alabama	24	28, 200	62		1	24, 459	48, 100	99, 125
Arizona	3	3, 100	3			2, 950	4, 450	13, 800
Arkansas	20	29, 075	54			22, 952	55, 020	106, 650
California	186	797 675	632	1	75	402, 996	852, 051	1, 622, 632
Colorado	22	60, 450	74		10	49, 040	114, 150	242, 100
Connecticut	112	369, 590	420	31	2	205, 687	438, 839	827, 162
Dakota	20	39, 150	35			19, 500	46, 800	98, 400
Delaware	21	134, 600	71		9	34, 658	95, 463	180, 152
District of Columbia	42	66, 965	87		3	44, 857	96, 472	192, 081
Florida	2	700	4			1, 400	900	3, 600
Georgia	56	155, 350	204		8	67, 560	181, 710	329, 624
Idaho	8	29, 300	10			7, 460	21, 100	41, 300
Illinois	561	1, 491, 278	1, 760	108	172	870, 807	2, 071, 345	3, 894, 655
Indiana	319	634, 418	805	3	32	325, 447	798, 079	1, 553, 484
Iowa	321	520, 150	614		6	256, 266	583, 786	1, 198, 804
Kansas	143	299, 675	296		3	135, 939	332, 617	629, 603
Kentucky	127	320, 965	344	1	12	149, 656	402, 866	772, 488
Louisiana	41	107, 250	145		5	61, 371	114, 790	227, 759
Maine	99	259, 300	227		1	90, 304	192, 455	400, 195
Maryland	226	1, 179, 267	1, 369	124	302	609, 113	2, 332, 687	3, 564, 994
Massachusetts	375	1, 323, 253	1, 559	84	19	731, 647	1, 426, 392	2, 901, 133
Michigan	291	470, 020	652	1	32	290, 004	515, 677	1, 114, 874
Minnesota	145	201, 131	312		5	157, 836	334, 814	665, 999
Mississippi	24	58, 900	56		3	28, 655	60, 825	125, 800
Missouri	297	656, 860	772	18	62	338, 597	864, 643	1, 687, 320
Montana	6	14, 500	13			14, 503	44, 500	69, 500
Nebraska	71	132, 675	151		2	64, 228	165, 050	320, 680
Nevada	4	154, 300	22		4	16, 900	69, 000	107, 800
New Hampshire	89	220, 050	251	4		108, 873	225, 924	463, 997
New Jersey	165	656, 310	808	38	88	361, 274	796, 999	1, 404, 655
New Mexico	2	30, 000	12			10, 100	22, 000	40, 000
New York	1, 190	4, 756, 079	4, 707	280	309	2, 151, 397	5, 217, 864	9, 858, 768
North Carolina	23	32, 000	64		3	19, 520	39, 450	77, 706
Ohio	704	1, 456, 313	1, 826	10	87	699, 108	1, 626, 346	3, 230, 208
Oregon	46	233, 150	94		1	64, 006	151, 475	311, 650
Pennsylvania	1, 010	3, 223, 836	3, 093	128	185	1, 325, 010	2, 735, 514	5, 442, 555
Rhode Island	75	224, 150	282	3	3	153, 674	261, 473	561, 515
South Carolina	20	37, 850	70		3	18, 597	43, 396	81, 858
Tennessee	70	365, 750	374	10	7	134, 367	346, 290	710, 813
Texas	86	236, 730	211		6	105, 174	259, 300	491, 420
Utah	8	35, 400	29		5	22, 550	51, 200	93, 470
Vermont	95	291, 300	253	6	3	94, 966	216, 690	429, 715
Virginia	104	223, 215	370	1	7	134, 078	315, 598	608, 150
Washington	9	56, 500	24			19, 677	29, 900	65, 100
West Virginia	51	100, 185	122		5	46, 423	118, 086	219, 136
Wisconsin	279	533, 075	556	2	12	226, 628	498, 195	996, 608
Wyoming	2	2, 300	4			2, 760	12, 000	17, 000

TINFOIL.

(See Table IV (B) for New York and Pennsylvania.)

180.—TOBACCO, CHEWING, SMOKING, AND SNUFF.

(See also Tobacco, cigars and cigarettes.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	477	$17, 207, 401	14, 886	10, 776	7, 094	$6, 419, 024	$34, 397, 072	$52, 793, 056
California	1	10, 000	4			2, 500	4, 500	10, 000
Connecticut	1	3, 000	3			400	1, 500	2, 400
Georgia	1	10, 000	15	2	13	3, 000	10, 000	15, 000
Illinois	10	1, 129, 750	458	197	393	355, 135	2, 955, 741	4, 197, 400
Indiana	1	2, 000	5		1	500	400	1, 800
Iowa	1	25, 000	6	8		8, 000	82, 670	96, 485
Kansas	1	3, 500	4		3	1, 200	3, 500	5, 700
Kentucky	28	1, 069, 800	1, 059	530	382	344, 219	2, 232, 030	3, 734, 835
Louisiana	8	348, 000	127	5	88	70, 540	242, 100	424, 085
Maryland	10	602, 600	187	740	128	165, 107	1, 152, 906	1, 531, 424
Massachusetts	7	257, 400	60	158	9	46, 131	118, 139	217, 778
Michigan	6	545, 000	238	175	130	126, 725	964, 554	1, 519, 146
Missouri	43	1, 440, 200	1, 008	231	515	493, 559	4, 243, 614	5, 286, 338
New Jersey	6	1, 293, 000	990	1, 994	181	923, 350	3, 492, 949	5, 063, 949
New York	45	3, 236, 830	1, 343	1, 519	232	1, 103, 435	5, 337, 075	8, 907, 737
North Carolina	118	1, 512, 900	1, 544	949	1, 090	362, 859	1, 252, 830	2, 215, 154
Ohio	26	1, 332, 345	734	456	367	393, 083	3, 198, 926	4, 378, 302
Pennsylvania	11	398, 676	136	122	16	71, 084	572 456	910, 204
Tennessee	7	105, 300	36	12	12	10, 250	38, 820	66, 800
Virginia	143	3, 551, 100	6, 729	3, 671	3, 514	1, 859, 447	7, 705, 717	13, 231, 038
Wisconsin	3	331, 000	200	6	20	78, 500	786, 645	978, 281

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

181.—TOBACCO, CIGARS AND CIGARETTES.

(See also Tobacco, chewing, smoking, and snuff.)

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	7, 145	$21, 698, 549	40, 099	9, 108	4, 090	$18, 464, 562	$29, 577, 833	$63, 979, 575
Alabama	7	9, 300	20		2	10, 416	8, 650	22, 500
Arkansas	4	10, 750	24	2	6	16, 371	40, 400	78, 992
California	176	1, 831, 503	3, 238	110	203	956, 639	2, 060, 275	3, 947, 353
Colorado	9	14, 150	23	3		16, 578	33, 500	77, 025
Connecticut	125	266, 525	407	53	23	218, 148	326, 815	787, 383
Dakota	1	3, 000	13			6, 000	10, 000	18, 000
Delaware	23	32, 300	50	13	14	24, 420	34, 840	78, 453
District of Columbia	43	25, 950	81		8	31, 628	45, 692	118, 318
Florida	51	461, 750	1, 495	497	261	409, 616	555, 107	1, 347, 555
Georgia	21	37, 000	68	7	13	38, 751	46, 587	104, 364
Illinois	532	1, 050, 871	2, 382	215	232	1, 101, 786	1, 702, 458	3, 764, 990
Indiana	208	298, 837	820	24	85	318, 158	542, 475	1, 226, 325
Iowa	133	263, 675	490	39	59	226, 961	376, 621	830, 097
Kansas	55	170, 100	266	4	35	124, 007	246, 732	479, 089
Kentucky	107	356, 964	560	69	160	220, 949	389, 007	982, 514
Louisiana	47	175, 674	680	187	87	179, 999	152, 156	506, 612
Maine	26	53, 635	108	22	3	45, 382	59, 000	152, 206
Maryland	369	623, 607	1, 184	118	104	499, 666	711, 680	1, 730, 604
Massachusetts	271	675, 111	1, 000	408	27	595, 355	1, 111, 135	2, 074, 219
Michigan	162	694, 392	1, 298	156	156	541, 727	968, 410	2, 146, 089
Minnesota	54	142, 362	221	2	42	142, 368	211, 250	562, 234
Mississippi	1	500	1			250	600	1, 400
Missouri	284	443, 562	886	15	136	424, 363	612, 393	1, 524, 381
Nebraska	21	56, 350	77	5	14	46, 002	81, 104	183, 317
Nevada	1	1, 000					500	1, 000
New Hampshire	22	19, 285	41	12	1	18, 169	24, 912	65, 940
New Jersey	283	479, 595	761	71	70	332, 276	800, 706	1, 508, 810
New Mexico	1	1, 000	1			550	500	2, 000
New York	1, 683	8, 274, 917	13, 098	5, 039	995	7, 671, 831	11, 942, 043	24, 767, 504
North Carolina	8	13, 500	37	3	2	12, 628	21, 725	46, 200
Ohio	652	1, 341, 070	3, 589	552	571	1, 495, 859	2, 004, 439	5, 018, 638
Oregon	3	2, 925	7		1	4, 060	2, 850	11, 000
Pennsylvania	1, 377	2, 934, 819	5, 064	1, 329	564	1, 885, 530	3, 144, 977	6, 906, 603
Rhode Island	49	51, 675	113	70	2	53, 974	90, 247	191, 752
South Carolina	9	11, 600	40		1	14, 391	12, 572	38, 462
Tennessee	7	14, 600	31	4	4	6, 210	10, 180	25, 210
Texas	31	31, 300	104	5	1	67, 556	99, 200	263, 810
Utah	2	13, 500	10		1	6, 940	3, 500	12, 400
Vermont	10	32, 150	47	4	1	23, 825	43, 720	83, 955
Virginia	56	182, 080	385	21	83	115, 230	210, 468	483, 953
Washington	2	2, 200	5		1	2, 750	4, 200	8, 400
West Virginia	67	167, 815	300	5	27	111, 739	258, 830	452, 993
Wisconsin	152	424, 750	1, 074	44	95	445, 504	575, 377	1, 346, 925

TOBACCO STEMMING.

(See Table IV (B) for Kentucky, Tennessee, and Virginia.)

182.—TOOLS.

(See also Cutlery and edge tools; Hardware.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	145	$4, 384, 109	3, 042	29	80	$1, 489, 531	$1, 532, 556	$4, 236, 568
California	4	13, 100	11			9, 365	17, 300	38, 150
Connecticut	25	1, 217, 500	945	15	47	500, 710	673, 660	1, 631, 295
Delaware	1	160, 000	100			52, 000	65, 000	130, 000
Illinois	7	35, 300	70			32, 200	39, 850	99, 224
Iowa	3	2, 500	9			4, 525	4, 180	12, 500
Maine	2	9, 000	11			6, 800	7, 800	16, 000
Massachusetts	49	614, 527	484	11	10	252, 244	204, 936	625, 709
Michigan	4	11, 100	10			4, 103	5, 462	16, 549
Minnesota	1	500	4			2, 500	1, 200	5, 500
Missouri	2	20, 150	11			8, 500	8, 400	31, 500
New Hampshire	1	12, 000	20			7, 104	5, 621	16, 368
New Jersey	3	31, 550	46			23, 450	10, 950	38, 700
New York	5	270, 650	256		15	114, 870	99, 520	320, 200
Ohio	10	297, 250	273	3	8	115, 804	87, 500	328, 550
Pennsylvania	22	1, 657, 182	752			339, 656	291, 452	883, 973
Rhode Island	2	11, 200	5			3, 000	2, 025	7, 750
Texas	1	600					100	600
Vermont	1	4, 000	3			1, 200	500	4, 000
Wisconsin	2	16, 000	32			11, 500	7, 100	30, 000

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

188.—UPHOLSTERING MATERIALS—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Michigan	3	$13, 500	7	....	4	$4, 200	$7, 806	$18, 425
Missouri	1	14, 100	3	....	....	900	5, 400	10, 000
New Hampshire	12	51, 800	47	....	....	16, 646	13, 084	47, 175
New Jersey	3	62, 500	45	76	15	39, 600	75, 000	126, 000
New York	10	57, 200	71	7	4	16, 474	35, 699	70, 655
Ohio	7	39, 200	31	....	1	8, 500	24, 375	45, 500
Pennsylvania	5	123, 000	31	56	....	33, 600	103, 500	176, 000
Rhode Island	2	28, 000	77	6	32	25, 781	36, 000	69, 500
Vermont	2	3, 000	4	1	....	1, 700	2, 500	7, 500
Virginia	1	2, 000	13	....	....	1, 200	5, 100	7, 300
Wisconsin	1	6, 000	7	....	....	2, 000	3, 400	7, 200

189.—VARNISH.

(See also Paints.)

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	81	$3, 778, 100	550	....	23	$366, 716	$3, 699, 684	$5, 721, 174
California	2	42, 500	12	....	....	8, 300	45, 000	67, 000
Connecticut	2	105, 000	12	....	....	18, 850	85, 000	162, 000
Illinois	4	207, 000	32	....	1	24, 646	302, 600	389, 000
Indiana	2	85, 000	13	....	....	7, 716	95, 000	112, 000
Maine	1	20, 000	5	....	....	3, 000	42, 000	55, 000
Massachusetts	7	85, 500	24	....	....	14, 239	230, 350	306, 500
Michigan	3	504, 000	62	....	6	43, 100	304, 500	452, 000
Missouri	3	26, 500	10	....	....	8, 962	35, 000	54, 600
New Jersey	17	430, 000	84	....	3	56, 630	551, 007	840, 774
New York	17	1, 395, 800	137	....	6	91, 638	1, 028, 705	1, 867, 155
Ohio	12	635, 000	90	....	....	54, 770	779, 247	1, 042, 835
Pennsylvania	11	241, 800	69	....	7	34, 865	201, 275	372, 310

VAULT LIGHTS AND VENTILATORS.

(See Table IV (B) for Illinois and New York.)

VENEERING.

(See Table IV (B) for Massachusetts, Michigan, New Hampshire, Ohio, and Vermont.)

190.—VINEGAR.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	306	$2, 151, 766	1, 160	44	53	$413, 451	$1, 888, 173	$3, 418, 038
California	2	65, 000	22	3	....	18, 800	53, 250	92, 000
Colorado	4	13, 750	10	....	3	4, 300	13, 300	25, 500
Connecticut	3	15, 000	3	....	....	500	825	3, 700
District of Columbia	1	6, 000	4	....	....	2, 500	4, 000	13, 000
Illinois	26	230, 920	94	3	9	44, 410	202, 630	376, 583
Indiana	9	17, 410	24	....	....	5, 895	30, 170	63, 250
Iowa	10	101, 250	45	....	....	19, 870	78, 835	171, 780
Kansas	3	9, 700	8	....	....	3, 178	11, 400	17, 942
Kentucky	5	47, 000	24	....	....	8, 510	76, 805	112, 000
Louisiana	1	2, 000	5	....	....	1, 575	2, 500	8, 000
Maine	5	5, 370	10	....	....	935	2, 259	5, 700
Maryland	9	51, 750	19	1	1	7, 312	62, 112	97, 012
Massachusetts	23	166, 200	86	....	2	27, 976	124, 150	186, 920
Michigan	12	36, 900	36	....	1	6, 745	9, 205	42, 910
Minnesota	4	27, 000	14	....	....	6, 160	16, 640	57, 500
Missouri	20	307, 150	145	21	17	86, 420	344, 500	675, 400
Nebraska	2	2, 000	3	....	....	1, 400	2, 990	7, 250
New Hampshire	4	7, 700	12	....	....	1, 012	9, 000	17, 500
New Jersey	6	16, 225	13	....	1	3, 440	29, 750	42, 390
New York	107	699, 181	406	15	15	85, 280	552, 026	840, 968
Ohio	21	153, 775	79	....	1	26, 238	115, 482	235, 288
Pennsylvania	12	57, 185	28	1	3	19, 780	86, 244	128, 500
Rhode Island	1	1, 800	2	....	....	800	500	1, 500
Utah	1	10, 000	6	....	....	3, 000	2, 000	10, 000
Vermont	2	7, 000	8	....	....	550	2, 400	6, 000
West Virginia	1	500	1	....	....	150	300	500
Wisconsin	12	94, 000	53	....	....	26, 715	54, 900	178, 945

191.—WASHING-MACHINES AND CLOTHES-WRINGERS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	61	$652, 549	398	18	60	$176, 287	$587, 643	$1, 182, 714
Connecticut	2	201, 000	62	5	....	40, 500	100, 640	251, 600
Illinois	9	12, 275	13	....	....	3, 273	8, 681	18, 524
Indiana	3	13, 100	22	5	....	10, 450	26, 300	62, 800
Iowa	7	4, 850	11	1	1	3, 940	9, 185	21, 350
Kansas	1	120	....	....	....	....	225	500

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

191.—WASHING-MACHINES AND CLOTHES-WRINGERS—Continued.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Massachusetts	2	$40, 150	17			$9, 600	$61, 200	$123, 000
Michigan	8	46, 375	67	4	1	18, 199	22, 525	58, 400
Minnesota	2	1, 500	5			2, 530	1, 000	6, 000
Missouri	2	300	2			450	450	1, 900
Nebraska	1	900	1			100	400	900
New Hampshire	1	1, 000	1			624	500	2, 444
New York	4	69, 600	34	3	10	21, 100	31, 150	84, 460
Ohio	8	18, 279	26			9, 702	29, 969	60, 600
Pennsylvania	8	137, 600	62		45	33, 550	134, 237	220, 600
Rhode Island	1	75, 000	62		3	17, 685	124, 024	220, 986
Vermont	1	28, 000	8			3, 984	36, 157	46, 650
Virginia	1	2, 500	5			600	1, 000	2, 000

WATCH AND CLOCK MATERIALS.

(See Clock cases and materials; also Table IV (B) for Connecticut, Rhode Island, Massachusetts, New Hampshire, New Jersey, and New York.)

192.—WATCH AND CLOCK REPAIRING.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	1, 202	$1, 704, 571	1, 547	32	78	$866, 996	$763, 249	$2, 712, 819
Alabama	3	1, 600			1	150	970	2, 900
Arkansas	7	16, 680	8			3, 900	7, 000	17, 200
California	121	114, 310	92	2	5	71, 913	61, 939	260, 140
Colorado	10	25, 550	13		1	11, 130	18, 800	50, 880
Connecticut	13	52, 900	26			14, 318	5, 000	30, 300
Dakota	1	10, 000	4			4, 500	500	6, 000
Delaware	1	400					100	600
District of Columbia	32	17, 460	40		5	24, 361	6, 345	42, 360
Florida	3	19, 000	15		1	9, 244	8, 300	27, 000
Georgia	10	8, 450	10		2	5, 674	6, 150	22, 100
Idaho	2	2, 200					350	2, 200
Illinois	77	97, 928	104	1	3	57, 144	27, 322	139, 155
Indiana	37	42, 775	54	1	4	29, 640	19, 545	85, 248
Iowa	38	38, 310	42	1	1	23, 426	10, 935	61, 106
Kansas	10	74, 300	18		2	5, 880	6, 990	22, 100
Kentucky	12	7, 130	6			3, 500	2, 175	17, 790
Louisiana	17	13, 200	24			15, 095	9, 021	36, 479
Maine	13	16, 050	14			5, 240	9, 100	27, 000
Maryland	24	18, 750	25		4	14, 883	6, 604	42, 115
Massachusetts	63	71, 900	78	1		40, 029	30, 012	123, 720
Michigan	37	48, 050	46	1		24, 559	11, 807	63, 124
Minnesota	51	55, 375	61		2	32, 761	18, 795	94, 050
Mississippi	6	2, 350					1, 150	4, 200
Missouri	37	51, 445	34		1	16, 867	19, 850	68, 351
Montana	4	6, 250	5			4, 500	4, 200	13, 750
Nebraska	7	3, 350	7			3, 725	2, 150	10, 850
Nevada	4	1, 700	1			1, 132	2, 000	7, 500
New Hampshire	10	11, 650	10			4, 086	2, 580	11, 398
New Jersey	23	29, 750	30		1	17, 701	18, 900	74, 060
New York	261	378, 923	415	12	17	231, 032	304, 222	773, 067
North Carolina	3	2, 500	4			2, 300	1, 175	5, 800
Ohio	85	152, 195	140	12	13	65, 484	47, 127	216, 916
Oregon	7	3, 700	2			1, 278	1, 425	7, 750
Pennsylvania	62	148, 240	89	1	8	46, 997	31, 655	128, 138
Rhode Island	5	13, 700	7			4, 095	1, 100	6, 375
South Carolina	12	6, 750	13		3	11, 221	3, 430	22, 100
Tennessee	10	13, 300	14			12, 365	12, 795	37, 580
Texas	14	42, 200	15			6, 450	6, 000	22, 192
Utah	2	350	2			1, 100	250	1, 800
Vermont	11	13, 800	15			6, 100	5, 000	21, 350
Virginia	24	41, 200	39		3	21, 987	14, 330	58, 525
West Virginia	2	2, 200	1			225	800	1, 500
Wisconsin	31	26, 700	24		1	11, 004	15, 350	46, 050

193.—WATCH CASES.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	27	$1, 584, 740	1, 418	139	201	$976, 041	$2, 812, 922	$4, 589, 314
Connecticut	1	3, 000	2			1, 000	4, 000	6, 000
Illinois	1	50, 000	50	10	40	70, 000	16, 000	150, 000
Kentucky	1	500, 000	200	20	55	150, 000	500, 000	800, 000
Massachusetts	5	65, 000	103	16	3	86, 142	274, 480	427, 371
Missouri	1	4, 000	15			12, 000	200, 000	300, 000
New Jersey	2	153, 000	326	17	77	137, 342	517, 225	659, 817
New York	4	156, 565	261	22	12	249, 816	717, 177	1, 109, 046
Pennsylvania	11	553, 175	433	54	12	243, 722	534, 480	1, 013, 180
Rhode Island	1	100, 000	28		2	26, 019	49, 560	123, 900

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

WATCHES.

(See Table IV (B) for Illinois, Massachusetts, Ohio, and Pennsylvania; also Report by Special Agent C. H. Fitch, *post.*)

WHALEBONE AND RATTAN.

(See Table IV (B) for Massachusetts and New York.)

194.—WHEELBARROWS.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	22	$266, 200	220	....	19	$72, 489	$101, 853	$227, 392
Kentucky	1	1, 200	1	....	2	624	1, 000	3, 000
Maine	1	5, 000	2	....	....	600	600	2, 200
Massachusetts	1	1, 000	2	....	....	575	700	1, 500
Michigan	2	22, 000	23	....	....	7, 000	12, 000	28, 500
New Jersey	1	100, 000	48	....	....	17, 000	14, 000	36, 000
New York	11	117, 300	99	....	10	33, 390	52, 553	112, 742
Ohio	4	12, 700	39	....	7	10, 800	15, 200	34, 660
Pennsylvania	1	7, 000	6	....	....	2, 500	5, 800	8, 790

195.—WHEELWRIGHTING.

(See also Blacksmithing; Carriages and wagons.)

The United States	10,701	$10, 641, 080	15, 821	17	270	$5, 074, 799	$6, 703, 677	$18, 892, 858
Alabama	62	30, 630	73	....	1	16, 360	24, 050	73, 525
Arkansas	29	28, 375	54	....	....	14, 681	22, 825	56, 650
California	146	177, 100	245	....	3	117, 146	145, 965	412, 967
Colorado	10	10, 850	31	....	....	17, 784	10, 600	43, 600
Connecticut	136	166, 225	187	....	....	65, 901	87, 595	246, 024
Dakota	9	10, 700	13	....	....	9, 010	8, 933	30, 127
Delaware	49	70, 300	127	....	6	44, 346	35, 750	114, 350
District of Columbia	10	6, 565	7	....	1	2, 252	3, 230	11, 323
Florida	5	4, 300	11	....	....	2, 925	4, 000	11, 300
Georgia	118	87, 155	233	....	4	63, 065	64, 860	207, 367
Idaho	4	3, 500	4	....	....	1, 250	3, 100	8, 000
Illinois	876	979, 862	1, 424	....	34	555, 605	662, 399	1, 890, 614
Indiana	539	418, 425	669	....	12	207, 077	288, 112	811, 336
Iowa	328	221, 035	311	....	12	103, 537	167, 982	455, 723
Kansas	160	108, 675	177	....	6	56, 835	99, 042	264, 909
Kentucky	199	142, 140	252	1	6	78, 659	110, 192	336, 120
Louisiana	28	29, 650	50	....	1	15, 029	18, 575	54, 382
Maine	249	222, 800	324	....	2	85, 753	137, 870	347, 964
Maryland	309	248, 805	446	....	5	127, 109	167, 802	494, 274
Massachusetts	378	418, 456	647	....	2	264, 638	288, 020	861, 165
Michigan	416	462, 875	615	....	13	197, 746	258, 378	754, 242
Minnesota	179	240, 035	314	....	2	126, 080	160, 861	440, 414
Mississippi	29	19, 500	47	....	2	14, 180	15, 150	47, 380
Missouri	331	243, 760	435	1	4	153, 437	233, 729	620, 287
Montana	2	3, 400	4	....	....	2. 500	2, 300	6, 700
Nebraska	76	70, 750	121	....	....	46, 053	67, 020	176, 049
Nevada	6	5, 050	6	....	....	5, 685	3, 700	21, 700
New Hampshire	110	128, 400	138	1	1	42, 576	60, 162	175, 699
New Jersey	364	386, 673	569	3	24	205, 127	260, 302	697, 470
New Mexico	6	3, 450	16	....	....	12, 806	15, 000	34, 250
New York	1, 672	1, 832, 722	2, 386	2	34	806, 302	1, 080, 983	3, 025, 788
North Carolina	107	65, 675	161	....	5	34, 145	47, 700	136, 729
Ohio	946	1, 178, 790	1, 818	1	24	552, 308	637, 463	1, 831, 955
Oregon	32	28, 400	25	....	1	8, 008	16, 923	51, 950
Pennsylvania	1, 353	1, 344, 055	1, 940	8	20	530, 881	773, 823	2, 087, 659
Rhode Island	51	58, 175	77	....	2	35, 520	37, 142	102, 975
South Carolina	67	72. 640	195	....	23	50, 021	47, 290	141, 226
Tennessee	173	84, 545	180	....	2	32, 589	51, 275	171, 323
Texas	83	58, 100	94	....	....	23. 124	44, 690	117, 475
Utah	3	3, 875	8	....	....	2, 015	1, 450	5, 645
Vermont	186	230, 690	227	....	....	60, 205	89, 215	251, 672
Virginia	328	207, 722	506	....	10	90, 963	146, 432	407, 768
Washington	6	5, 600	3	....	....	1, 310	3, 750	9, 500
West Virginia	64	41, 915	87	....	1	20, 383	27, 210	78. 400
Wisconsin	466	472, 735	562	....	7	169, 873	267, 827	729, 872
Wyoming	1	6, 000	4	....	....	2, 000	3, 000	7, 000

196.—WHIPS.

The United States	88	$1, 078, 070	742	266	48	$415, 007	$701, 225	$1, 698, 633
California	1	12, 000	11	2	7	7, 000	8, 000	25, 000
Colorado	1	2, 000	2	1	2	2, 600	3, 650	12, 000
Illinois	4	2, 300	8	3	1	3, 325	3. 950	11, 369
Maryland	3	21, 300	31	6	1	13, 936	25, 800	52. 925
Massachusetts	47	630, 410	333	153	8	226, 784	381, 293	962, 892

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

196.—WHIPS—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Michigan	3	$7,000	8	4	5	$3,900	$3,540	$11,350
Missouri	6	11,660	43			11,139	19,960	39,414
New Jersey	1	70,000	32	11		24,000	25,000	90,000
New York	8	192,500	96	68	10	71,223	113,632	270,483
Ohio	1	10,000	6		2	7,000	20,000	30,000
Pennsylvania	10	84,700	78	12	12	25,550	49,400	121,000
West Virginia	1	30,000	90			16,000	40,000	60,000
Wisconsin	2	4,200	4	6		2,550	7,000	12,200

197.—WINDMILLS.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	69	$697,100	585	3	8	$244,197	$523,594	$1,010,512
California	11	70,300	53		2	18,800	36,100	73,410
Illinois	23	293,500	196	1	5	104,157	205,694	392,967
Indiana	1	38,000	28			10,300	43,500	64,000
Iowa	5	7,750	8	1	1	3,380	7,300	15,600
Michigan	11	89,750	85	1		26,455	94,300	159,340
Minnesota	2	2,000	4			1,200	3,300	7,200
Nebraska	3	7,000	7			1,700	4,400	9,900
New York	1	60,000	15			7,000	20,000	40,000
Ohio	1	400	1			275	500	1,000
Rhode Island	1	2,000	1			375	1,000	1,800
Virginia	1	7,000	15			5,000	20,000	30,000
Wisconsin	9	119,400	172			65,555	87,500	215,325

198.—WINDOW BLINDS AND SHADES.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	131	$1,385,515	1,015	143	121	$470,133	$1,635,700	$2,826,518
California	10	92,100	43	2		23,909	74,200	141,840
Connecticut	4	54,365	26	5	3	12,035	47,254	74,031
Illinois	4	11,500	12	8	9	6,550	32,600	51,250
Indiana	3	22,000	28	1		10,900	32,000	59,000
Iowa	2	18,500	12	1		6,700	7,500	18,500
Maine	2	6,000	16	2		3,500	9,000	17,000
Maryland	3	5,500	24			3,200	11,500	18,900
Massachusetts	19	171,750	161	45	12	66,650	209,377	335,932
Michigan	5	39,200	73	20	28	23,100	49,750	85,000
Missouri	1	1,500	3		2	1,400	6,500	10,000
Nebraska	1	250		1		54	1,200	1,600
New Jersey	4	154,300	70	3	20	36,300	104,000	226,500
New York	28	611,800	348	25	20	201,933	760,772	1,279,625
Ohio	16	39,600	45	12	1	17,169	83,400	141,099
Pennsylvania	24	96,150	106	17	16	40,433	133,997	231,416
Rhode Island	1	2,000	2	1		700	1,650	3,625
Vermont	3	55,000	38		10	21,000	67,000	123,000
Wisconsin	1	4,000	8			3,600	4,000	8,200

199.—WIRE.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	40	$4,230,071	5,544	172	453	$1,982,731	$7,034,065	$10,836,605
Connecticut	4	232,000	252	89		142,664	285,439	565,981
Illinois	3	45,000	55	2	22	20,800	37,600	82,749
Iowa	3	131,000	46			35,135	319,350	447,500
Kansas	2	10,500	10			2,698	19,400	28,400
Maine	1	3,000	18			7,200	15,000	24,000
Massachusetts	8	1,742,000	2,442	22	12	961,400	2,987,900	4,539,399
Missouri	3	378,600	494		51	229,480	651,000	973,000
New Jersey	3	260,000	430	6	100	273,350	718,000	1,093,500
New York	4	325,000	383		11	176,666	435,038	735,418
Ohio	3	527,471	1,298		257	60,230	1,251,000	1,895,000
Pennsylvania	5	560,500	106	13		58,108	269,338	378,658
Rhode Island	1	15,000	10	40		15,000	45,000	73,000

200.—WIREWORK.

States and Territories.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The United States	305	$3,681,893	3,595	300	564	$1,708,165	$5,410,084	$9,127,818
California	7	275,308	72		7	42,665	196,910	298,776
Connecticut	10	268,400	237	33	17	103,147	160,960	324,500
District of Columbia	1	300	1		2	360	360	1,170
Illinois	38	572,722	558		42	242,279	1,889,781	2,664,710
Indiana	1	7,000	3		4	1,800	15,000	25,600

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

200.—WIREWORK—Continued.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Iowa	30	$73, 760	102	1	10	$36, 041	$129, 115	$208, 110
Kansas	5	11, 200	46		20	17, 416	64, 982	108, 208
Kentucky	4	56, 200	107	10	7	31, 790	70, 764	126, 785
Maryland	5	90, 500	104		2	56, 000	226, 000	322, 000
Massachusetts	26	328, 375	299	130	19	172, 928	452, 454	761, 881
Michigan	7	88, 100	136	10	22	70, 600	99, 400	196, 624
Minnesota	2	3, 300	2			1, 200	701	3, 454
Missouri	8	153, 700	134	4	38	60, 890	112, 620	371, 600
Nebraska	5	9, 600	13			4, 960	12, 748	21, 530
Nevada	1	6, 000					500	3, 000
New Hampshire	3	2, 900	9			2, 000	1, 100	6, 700
New Jersey	6	248, 800	185	32	8	87, 649	172, 880	308, 000
New York	73	968, 303	912	76	248	553, 441	924, 923	1, 958, 398
Ohio	22	235, 725	295	3	62	83, 035	339, 380	561, 600
Oregon	1	2, 000	2			1, 100	300	4, 000
Pennsylvania	35	246, 650	302	1	55	119, 090	500, 241	763, 832
Rhode Island	2	1, 800	7			2, 384	3, 260	7, 955
Texas	1	2, 000	10			1, 600	2, 500	5, 000
Virginia	2	1, 500	3		1	630	2, 775	5, 200
West Virginia	1	900					1, 000	1, 500
Wisconsin	[illegible]	26, 850	56			15, 160	29, 690	68, 285

WOOD-PRESERVING.

(See Table IV (B) for New York.)

201.—WOOD PULP.

The United States	50	$1, 898, 450	1, 184	8	17	$444, 778	$910, 835	$2, 256, 946
California	1	40, 000	13			1, 000	225	1, 825
Connecticut	1	4, 000	8			2, 384	1, 200	5, 000
Indiana	1	6, 000	15			1, 350	390	5, 850
Maine	7	439, 000	212	8		80, 075	160, 595	306, 490
Massachusetts	6	100, 350	66			19, 760	93, 128	167, 683
Michigan	3	90, 000	69		3	25, 400	118, 000	175, 000
New Hampshire	7	298, 600	338		11	138, 350	256, 900	759, 853
New York	12	265, 500	153		2	43, 800	48, 100	229, 200
Ohio	1	2, 000	5			1, 500	1, 000	5. 000
Pennsylvania	2	510, 000	205			97, 000	206, 006	463, 195
Vermont	6	79, 000	53			17, 595	3, 343	61, 850
Wisconsin	3	64. 000	47		1	16, 564	21, 948	76, 000

202.—WOOD, TURNED AND CARVED.

(See also Lumber, planed; Sash, doors, and blinds.)

The United States	710	$3, 450, 710	4, 933	131	601	$2, 148, 914	$2, 940, 630	$6, 770, 119
Alabama	1	150					100	600
California	18	16, 025	30		3	21, 006	29, 290	75, 876
Colorado	1	500	1			468	500	2, 500
Connecticut	39	158, 300	227	5	19	100, 214	97, 974	274, 643
Delaware	1	800	5			1, 500	750	4, 000
District of Columbia	1	100					250	800
Georgia	2	5, 000	6		1	2, 800	3, 500	9, 500
Illinois	24	136, 510	124	10	21	61, 977	86, 527	200, 315
Indiana	12	36, 250	97	1	14	41, 352	65, 312	148, 036
Kansas	2	1, 400	3			1, 400	2, 150	5, 500
Kentucky	8	93, 700	62		36	36, 299	51, 456	116, 967
Louisiana	3	5, 400	11			6, 225	21, 542	39, 404
Maine	19	141, 700	153	2	11	61, 007	98, 980	206, 390
Maryland	9	2, 910	17		4	8, 203	9, 220	27, 036
Massachusetts	118	666, 360	969	21	37	413, 236	637, 795	1, 350, 018
Michigan	18	36, 850	45		8	20, 736	18, 800	70, 064
Minnesota	4	10, 650	22			6, 350	11, 350	22, 300
Missouri	19	29, 225	42		2	19, 183	19, 995	84, 707
New Hampshire	36	255, 625	484	2	125	167, 055	189, 464	468, 943
New Jersey	34	114, 525	211	8	34	86, 094	102, 525	231, 420
New York	182	982, 170	1, 323	29	95	671, 906	1, 000, 380	2, 163, 511
Ohio	51	148, 120	250	23	19	100 357	138, 185	355, 177
Oregon	2	5 300	2			425	1, 050	2, 700
Pennsylvania	55	324, 650	449	18	63	173, 524	199, 797	496, 100
Rhode Island	10	68, 500	112		25	52, 651	55, 230	139, 900
Tennessee	1	150					100	500
Utah	2	1, 200	1			200	400	2, 100
Vermont	30	194, 440	261	12	79	87, 600	87, 126	240, 882
West Virginia	1	1, 000	3			200	100	800
Wisconsin	7	13, 200	23		5	6, 946	10, 782	29, 430

TABLE III.—GENERAL STATISTICS FOR EACH SPECIFIED INDUSTRY, ETC.: 1880.

203.—WOODEN WARE.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The United States	287	$3, 606, 794	4, 268	144	621	$1, 539, 571	$2, 635, 720	$5, 235, 474
California	2	55, 000	70	....	2	17, 000	35, 000	65, 000
Connecticut	1	300	1	....	....	250	200	900
Delaware	1	300	1	....	....	375	500	1, 500
Illinois	8	102, 500	123	1	9	46, 296	127, 960	216, 736
Indiana	5	128, 700	115	32	38	58, 250	65, 250	189, 200
Iowa	9	26, 800	25	9	16	10, 667	36, 600	60, 700
Kansas	1	15, 000	12	....	6	3, 500	5, 000	16, 000
Maine	11	67, 100	108	7	....	31, 750	52, 875	110, 475
Maryland	2	86, 000	86	....	....	27, 500	62, 500	114, 260
Massachusetts	26	342, 550	385	13	39	156, 541	269, 937	524, 680
Michigan	21	839, 550	918	45	135	329, 933	398, 250	869, 933
Minnesota	1	15, 000	12	....	....	1, 500	2, 000	4, 000
Missouri	3	187, 100	211	....	53	85, 300	227, 100	376, 600
New Hampshire	49	322, 950	421	2	26	132, 260	206, 163	431, 290
New Jersey	1	1, 500	3	....	3	2, 000	3, 500	6, 500
New York	68	380, 700	595	7	18	159, 800	248, 729	552, 301
North Carolina	1	15, 000	25	....	20	10, 000	5, 000	20, 000
Ohio	28	353, 364	434	16	129	179, 890	379, 623	714, 432
Pennsylvania	22	358, 500	268	....	65	126, 750	178, 448	387, 302
Tennessee	3	99, 430	134	....	32	41, 900	154, 300	247, 350
Utah	1	50	1	....	....	312	435	875
Vermont	17	52, 900	88	12	5	24, 897	32, 350	75, 180
Virginia	1	50, 000	60	....	15	23, 000	38, 000	71, 000
Wisconsin	5	106, 500	172	....	10	69, 900	106, 000	219, 200

WOOL HATS; WOOLEN GOODS; WORSTED GOODS.

(See Report by Special Agent G. W. Bond, *post.*)

ZINC.

(See Table IV (B) for California, Illinois, Kansas, Massachusetts, New Jersey, New York, and Pennsylvania.)

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—ALABAMA, BY TOTALS OF COUNTIES.

Counties.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The State	2,070	$9,668,008	8,368	842	809	$2,500,504	$8,545,520	$13,565,504
Autauga	44	330,675	217	50	72	96,460	352,517	576,606
Baldwin	23	198,205	449	45	25	131 660	109,250	344,450
Barbour	60	227,822	253	1	24	61,378	372,824	409,183
Bibb	17	175,500	147	....	12	39,812	59,678	141,109
Blount	35	45,500	57	....	....	6,420	78,602	103,791
Bullock	18	35,600	61	....	6	10,006	46,345	60,558
Butler	50	116,700	106	....	3	25,245	164,130	233,522
Calhoun	55	682,741	640	....	27	215,279	283,424	528,644
Chambers	38	65,240	71	....	4	13,610	126,547	158,189
Cherokee	59	614,370	570	....	3	121,728	182,758	342,813
Chilton	10	58,800	97	....	....	36,500	167,500	241,400
Choctaw	22	31,982	26	....	1	4,505	29,184	42,716
Clarke	38	32,500	39	....	3	5,170	58,407	75,216
Clay	31	36,450	28	....	....	4,089	83,281	101,414
Cleburne	23	23,250	18	....	1	3,601	42,002	52,711
Coffee	23	20,700	37	....	....	4,051	64,096	77,781
Colbert	37	107,700	66	13	24	16,624	60,307	96,188
Conecuh	15	19,300	25	....	4	2,775	24,071	32,922
Coosa	31	59,900	51	....	....	5,790	40,963	57,276
Covington	7	8,120	5	....	....	1,200	17,993	21,802
Crenshaw	19	20,825	30	....	....	4,555	38,812	51,275
Cullman	16	31,950	59	2	....	12,755	20,171	41,758
Dale	16	35,850	40	5	1	7,799	71,520	98,680
Dallas	32	270,860	263	58	40	82,779	309,085	468,032
De Kalb	21	57,220	31	....	....	3,905	38,879	47,170
Elmore	38	502,750	203	200	150	91,550	469,698	656,997
Escambia	11	37,000	45	....	1	13,850	64,500	118,560
Etowah	30	155,340	170	....	5	48,790	239,943	375,165
Fayette	5	8,700	5	....	....	595	19,115	23,232
Franklin	5	4,850	7	....	....	601	2,050	5,150
Geneva	12	10,300	24	....	....	6,915	25,950	41,471
Greene	10	17,350	23	....	....	4,139	35,650	43,996
Hale	38	32,690	56	....	....	8,063	64,718	91,915
Henry	35	44,355	64	....	....	6,705	24,399	38,032
Jackson	34	54,900	63	....	....	11,271	89,171	122,800
Jefferson	36	1,420,125	301	....	....	96,314	361,879	757,741
Lamar	30	40,450	40	....	....	5,580	72,035	85,033
Lauderdale	47	107,720	108	51	26	23,172	123,068	177,785
Lawrence	32	39,220	34	....	....	5,865	63,430	82,876
Lee	37	101,800	103	12	5	23,010	114,112	157,386
Limestone	60	75,575	93	1	13	13,185	85,758	126,484
Lowndes	22	32,050	55	....	....	8,479	56,335	78,213
Macon	15	37,425	39	....	....	5,113	62,143	75,608
Madison	100	310,550	194	67	20	61,726	271,004	422,145
Marengo	32	56,700	73	....	19	17,557	81,505	118,137
Marion	9	41,850	21	28	15	9,979	43,320	64,840
Marshall	9	14,075	10	....	....	1,340	50,055	63,914
Mobile	125	960,658	950	66	77	343,413	987,502	1,655,437
Monroe	20	17,800	32	....	....	6,371	21,850	39,405
Montgomery	88	392,650	601	7	30	187,091	720,089	1,130,248
Morgan	34	62,950	76	....	2	13,365	119,885	165,349
Perry	16	30,350	73	2	12	10,187	48,673	70,135
Pickens	19	27,675	41	10	7	9,211	39,099	53,766
Pike	35	45,195	71	2	....	15,555	120,749	163,262
Randolph	48	111,625	97	22	48	30,469	132,068	190,960
Russell	27	49,900	130	....	6	25,098	48,196	96,751
Saint Clair	28	26,385	39	....	....	5,770	29,987	44,183
Shelby	45	801,505	395	....	23	209,408	269,782	361,500
Sumter	27	32,975	47	....	....	10,987	65,545	95,820
Talladega	41	234,500	254	....	10	86,826	223,134	327,501
Tallapoosa	17	36,445	27	....	1	7,150	54,266	71,610
Tuscaloosa	34	255,310	160	200	84	100,045	193,683	363,419
Walker	24	34,650	32	....	2	4,104	33,842	45,760
Washington	10	24,300	176	....	2	40,915	92,127	162,392
Wilcox	37	58,775	61	....	1	11,840	69,081	90,590
Winston	8	10,825	9	....	....	1,144	13,778	14,730

B—ALABAMA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	2,070	$9,668,008	8,368	842	809	$2,500,504	$8,545,520	$13,565,504
Agricultural implements	20	13,075	35	....	1	7,510	8,806	29,014
Blacksmithing (see also Wheelwrighting)	210	72,760	274	....	9	62,152	63,118	224,011
Bookbinding and blank-book making	2	2,300	2	....	....	1,100	2,000	5,000
Boots and shoes, including custom work and repairing	80	43,445	118	2	2	37,323	55,327	142,856
Bread and other bakery products	11	26,025	29	4	4	9,908	42,820	76,300

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—ALABAMA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Brick and tile	38	$78, 525	428		139	$68, 397	$53, 225	$159, 952
Brooms and brushes	3	2, 500	14			3, 870	7, 885	15, 055
Carpentering	51	56, 720	287			93, 770	165, 590	337, 450
Carriages and wagons (see also Wheelwrighting)	22	69, 600	157	1	2	61, 593	82, 347	200, 100
Clothing, men's	4	3, 600	13	5		9, 555	15, 400	35, 000
Coffins, burial cases, and undertakers' goods	3	8, 500	4			1, 268	7, 900	12, 300
Coke	4	135, 500	64			38, 500	76, 618	148, 026
Confectionery	5	12, 200	27	1	1	10, 045	57, 550	98, 500
Cooperage	5	1, 780	10			3, 350	4, 875	8, 547
Cotton goods	18	1, 386, 500	444	731	467	283, 198	848, 511	1, 352, 099
Dentistry, mechanical	2	2, 500	1			200	700	4, 200
Flouring- and grist-mill products	807	1, 803, 514	1, 337	4	25	211, 243	3, 787, 711	4, 315, 174
Foundery and machine-shop products	18	297, 358	241		14	101, 869	107, 605	293, 691
Furniture (see also Mattresses and spring beds; Upholstering)	14	42, 850	90	7	8	26, 450	36, 050	84, 100
Furniture, chairs	2	775	3	1		415	400	2, 200
Ice, artificial	3	39, 200	15			3, 965	1, 575	13, 659
Iron and steel	14	3, 309, 196	1, 581		45	571, 713	601, 073	1, 452, 856
Kaolin and ground earths	1	2, 400	6			1, 400	2, 400	4, 800
Leather, curried	63	32, 354	48		2	8, 291	88, 033	130, 123
Leather, tanned	82	86, 876	129		7	24, 658	127, 742	212, 545
Lime	2	7, 000	75			22, 200	18, 500	56, 000
Liquors, distilled	1	3, 000	3			510	3, 221	5, 170
Lock- and gun-smithing	7	3, 550	1		1	430	2, 000	8, 200
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	5	30, 000	29		2	8, 950	47, 700	62, 800
Lumber, sawed	354	1, 545, 655	1, 611		36	424, 156	1, 608, 635	2, 649, 634
Marble and stone work	5	17, 475	29			10, 250	13, 050	34, 500
Mattresses and spring beds (see also Furniture)	4	1, 800	9			2, 401	6, 764	14, 000
Mineral and soda waters	1	5, 000	4			1, 500	4, 800	10, 000
Oil, cottonseed and cake	2	82, 000	150			42, 500	158, 000	247, 982
Painting and paperhanging	4	5, 850	16			5, 400	7, 000	18, 000
Photographing	1	1, 500		1		600	1, 200	2, 500
Plumbing and gasfitting	1	4, 000	4			2, 500	5, 000	10, 000
Printing and publishing	19	77, 100	84	3	4	40, 920	65, 546	141, 175
Rice cleaning and polishing	2	300	1			300	800	2, 000
Saddlery and harness	19	39, 450	53	1	2	24, 065	68, 680	130, 290
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	8	84, 500	85		1	26, 840	47, 209	99, 100
Scales and balances	1	100	1			156	300	800
Shipbuilding	1	25, 000	25			22, 500	25, 000	60, 000
Stone- and earthen-ware	13	5, 095	41		4	7, 261	3, 098	19, 850
Tar and turpentine, not including farm products	26	100, 300	622	74	28	160, 500	85, 225	372, 050
Tinware, copperware, and sheet-iron ware	24	28, 200	62		1	24, 459	48, 100	99, 125
Tobacco, cigars and cigarettes	7	9, 300	20		2	10, 416	8, 650	22, 500
Upholstering (see also Furniture)	1	500		2		400	300	1, 500
Watch and clock repairing	3	1, 600			1	150	970	2, 900
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	62	30, 630	73		1	16, 360	24, 050	73, 525
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	1	150					100	600
Woolen goods	14	28, 900	13	5		3, 037	49, 361	63, 745

A—ARIZONA TERRITORY, BY TOTALS OF COUNTIES.

	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The Territory	66	$272, 600	216	2	2	$111, 180	$380, 023	$618, 365
COUNTIES.								
Apache	3	4, 600	7	2		978	7, 805	12, 655
Maricopa	5	60, 000	23			10, 830	93, 252	108, 180
Mohave (*a*)								
Pima	28	89, 650	110			62, 970	149, 886	271, 378
Pinal	19	61, 700	49		1	25, 787	70, 615	132, 367
Yavapai	11	56, 650	27		1	10, 615	58, 465	93, 785
Yuma (*a*)								

a Returned as having no manufactures.

B—ARIZONA TERRITORY, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	66	$272, 600	216	2	2	$111, 180	$380, 023	$618, 365
Blacksmithing	16	21, 500	38			28, 400	19, 550	72, 300
Boots and shoes, including custom work and repairing	3	6, 100	4			3, 100	10, 000	18, 000
Bread and other bakery products	2	1, 200	2			1, 000	1, 550	3, 700
Brick and tile	1	2, 500	10			4, 500	2, 250	9, 600
Carpentering	7	3, 500	43			24, 250	56, 750	92, 800
Cheese and butter (factory)	2	2, 100	4	2		600	2, 760	6, 395
Confectionery	1	300	1			750	1, 500	3, 650
Flouring- and grist-mill products	8	94, 000	27			9, 615	141, 103	165, 357
Liquors, malt	9	35, 550	6			2, 140	7, 824	34, 345
Lumber, sawed	13	102, 450	77		2	33, 375	131, 756	215, 915
Saddlery and harness	1	300	1			500	500	1, 500
Tinware, copperware, and sheet-iron ware	3	3, 100	3			2, 950	4, 450	13, 800

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—ARKANSAS, BY TOTALS OF COUNTIES.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	1, 202	$2, 953, 130	4, 307	90	160	$925, 358	$4, 392, 080	$6, 756, 159
Arkansas	6	10, 050	14	......	......	1, 280	5, 540	9, 600
Ashley	14	31, 125	42	......	......	4, 365	60, 005	71, 297
Baxter	16	15, 325	31	......	......	3, 005	13, 915	24, 210
Benton	35	56, 150	72	......	8	11, 179	205, 409	235, 399
Boone	29	36, 805	66	......	......	9, 623	204, 968	242, 344
Bradley	9	9, 555	17	......	1	2, 224	24, 962	40, 812
Calhoun	3	2, 600	3	......	......	500	2, 000	3, 500
Carroll	10	12, 995	18	......	......	1, 200	11, 785	16, 310
Chicot	2	15, 000	22	......	......	4, 675	18, 500	31, 500
Clark	30	49, 800	97	......	4	12, 006	90, 759	129, 315
Clay	15	35, 875	73	2	5	14, 590	68, 345	102, 770
Columbia	12	16, 850	16	......	1	1, 404	10, 991	15, 665
Conway	14	25, 300	61	......	9	7, 931	29, 535	47, 612
Craighead	5	16, 000	20	......	......	1, 725	12, 925	16, 400
Crawford	12	27, 900	24	1	......	2, 771	28, 025	37, 672
Crittenden	4	7, 100	14	......	......	1, 750	5, 215	9, 175
Cross	4	7, 200	5	......	......	375	7, 600	8, 772
Dallas	9	10, 150	16	......	......	545	11, 995	14, 344
Desha	1	3, 000	2	......	......	100	550	1, 000
Dorsey	12	9, 300	21	......	......	2, 105	19, 845	28, 300
Drew	20	42, 600	49	......	6	7, 698	21, 464	41, 317
Faulkner	8	12, 700	18	......	......	2, 300	62, 250	74, 590
Franklin	9	19, 050	20	......	......	3, 292	28, 535	38, 405
Fulton	6	17, 350	8	......	......	550	29, 700	34, 610
Garland	18	53, 300	67	1	1	7, 882	39, 387	61, 900
Grant	3	5, 800	12	......	2	450	2, 575	4, 250
Greene	23	26, 525	57	......	2	4, 260	21, 685	35, 860
Hempstead	26	53, 275	98	......	10	16, 298	79, 055	115, 477
Hot Spring	14	32, 950	43	......	......	5, 461	32, 395	50, 810
Howard	8	19, 450	42	......	1	8, 807	54, 625	79, 194
Independence	22	62, [illegible]	60	6	......	10, 085	74, [illegible]	94, 605
Izard	21	17, [illegible]	49	......	2	5, 759	34, [illegible]	51, 146
Jackson	9	23, 100	41	......	2	4, 610	12, 100	17, 250
Jefferson	21	84, 350	157	......	......	46, 680	96, 755	228, 434
Johnson	24	32, 525	62	......	......	10, 865	46, 382	72, 331
La Fayette	7	6, 950	11	......	......	1, 132	7, 044	10, 198
Lawrence	12	66, 100	58	2	......	9, 611	43, 486	66, 082
Lee	9	47, 550	28	......	......	4, 135	33, 121	50, 233
Lincoln	7	8, 750	11	......	1	1, 880	7, 619	12, 875
Little River	4	9, 500	30	......	2	1, 550	7, 150	14, 250
Logan	18	25, 300	44	......	......	5, 612	53, 722	84, 837
Lonoke	5	20, 400	10	......	......	3, 015	18, 130	25, 300
Madison	24	27, 925	49	......	......	6, 020	105, 892	125, 678
Marion	11	20, 800	26	......	......	2, 627	22, 120	33, 863
Miller	11	39, 650	52	......	......	17, 002	121, 790	166, 300
Mississippi	9	14, 325	26	......	......	1, 350	7, 175	13, 345
Monroe	11	62, 490	40	......	4	9, 225	38, 830	64, 525
Montgomery	8	17, 000	12	......	......	825	4, 686	7, 292
Nevada	18	23, 100	63	......	......	13, 346	33, 513	67, 384
Newton	6	9, 525	4	......	......	272	4, 227	5, 244
Ouachita	5	11, 500	20	3	3	6, 025	28, 650	41, 085
Perry	9	21, 800	40	......	......	4, 932	28, 300	38, 272
Phillips	56	151, 035	256	1	1	64, 125	196, 950	372, 003
Pike	8	58, 150	25	9	12	5, 451	26, 826	41, 901
Poinsett	1	2, 000	2	......	......	100	750	1, 000
Polk	15	13, 800	51	......	......	4, 342	51, 710	66, 554
Pope	38	60, 975	94	......	1	9, 806	70, 298	108, 481
Prairie	11	23, 300	38	......	......	7, 225	14, 570	28, 670
Pulaski	98	602, 499	958	56	50	378, 058	1, 057, 978	1, 859, 198
Randolph	16	39, 300	30	......	......	3, 416	52, 835	63, 965
Saint Francis	12	11, 600	51	......	8	5, 359	23, 882	39, 277
Saline	17	75, 850	87	......	......	16, 624	57, 545	94, 767
Scott	9	15, 425	29	......	......	4, 135	37, 555	49, 833
Searcy	4	4, 100	9	......	......	924	22, 625	27, 575
Sebastian	45	95, 325	177	2	9	35, 269	132, 131	210, 030
Sevier	6	6, 300	9	......	......	850	4, 339	7, 250
Sharp	13	21, 700	27	......	......	2, 774	15, 986	25, 006
Stone	5	3, 750	7	......	......	303	5, 110	6, 421
Union	17	18, 100	21	......	......	1, 825	22, 898	29, 288
Van Buren	16	54, 650	27	......	......	3, 269	39, 133	49, 470
Washington	103	197, 990	229	4	4	44, 122	339, 337	476, 752
White	40	79, 950	122	3	10	13, 776	87, 561	134, 844
Woodruff	1	5, 000	8	......	......	700	2, 350	4, 000
Yell	43	78, 680	109	......	1	15, 996	96, 274	146, 935

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—ARKANSAS, BY SPECIFIED INDUSTRIES.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries :	1, 202	$2, 953, 130	4, 307	90	160	$925, 358	$4, 392, 080	$6, 756, 159
Agricultural implements	11	9, 985	24			5, 541	8, 414	23, 860
Baking and yeast powders	2	4, 500	[illegible]		1	2, 450	5, 000	15, 500
Blacksmithing (see also Wheelwrighting)	181	76, 621	216		1	49, 330	67, 067	210, 195
Bookbinding and blank-book making	1	5, 000	3	5		2, 500	3, 500	7, 000
Boots and shoes, including custom work and repairing	30	13, 735	32			11, 790	18, 304	50, 057
Brass castings	1	2, 500	1			160	550	1, 200
Bread and other bakery products	3	2, 650	4			1, 590	5, 300	8, 700
Brick and tile	32	38, 700	339		36	53, 775	36, 000	117, 370
Brooms and brushes	2	1, 184	11	15	12	765	928	1, 978
Carpentering	34	21, 195	171			56, 455	86, 945	199, 625
Carriage and wagon materials	1	3, 000	13			2, 000	500	3, 000
Carriages and wagons (see also Wheelwrighting)	14	56, 450	100			40, 855	71, 250	145, 075
Clothing, men's	7	7, 800	19	3		11, 000	12, 700	35, 500
Clothing, women's	1	5, 000	2	10		2, 000	5, 000	10, 000
Coffins, burial cases, and undertakers' goods	1	800	1			700	1, 550	3, 000
Confectionery	3	1, 900	4			1, 600	6, 300	11, 800
Cooperage	5	8, 800	27			13, 450	7, 600	29, 000
Corsets	1	150		3		550	850	1, 600
Cotton goods	2	75, 000	16	17	27	7, 339	33, 305	50, 000
Dentistry, mechanical	2	550	2			400	600	2, 400
Flouring- and grist-mill products	350	810, 915	740		4	97, 614	1, 979, 317	2, 249, 289
Foundery and machine-shop products	12	67, 650	109			43, 725	52, 400	152, 500
Furniture (see also Mattresses and spring beds)	18	42, 360	59	2	3	20, 800	31, 445	85, 305
Hones and whetstones	2	6, 500	11			1, 750	2, 421	5, 550
Ice, artificial	1	25, 000	5			5, 000	5, 500	12, 000
Leather, curried	4	2, 417	3			942	5, 470	7, 650
Leather, tanned	6	7, 683	8			2, 097	5, 797	12, 300
Liquors, distilled	11	22, 100	16			1, 965	14, 202	22, 105
Lock- and gun-smithing	1	1, 000	2			1, 200	560	3, 500
Lumber, planed	3	3, 175	18		1	5, 300	20, 885	33, 100
Lumber, sawed	319	1, 067, 840	1, 690		54	237, 394	1, 070, 395	1, 793, 848
Marble and stone work	3	790	2			225	900	2, 600
Masonry, brick and stone	2	2, 500	35			19, 000	20, 500	49, 000
Mattresses and spring beds (see also Furniture)	1	1, 000	3	1		2, 500	2, 500	6, 000
Mineral and soda waters	2	3, 100	6			1, 750	4, 500	7, 700
Oil, cottonseed and cake	4	275, 000	237			79, 400	378, 000	590, 000
Patent medicines and compounds	2	3, 500	7			4, 500	7, 500	15, 000
Photographing	2	800	3	1		325	1, 100	3, 100
Plumbing and gasfitting	2	12, 500	13		2	7, 000	30, 000	51, 000
Printing and publishing	6	29, 800	51	2	6	23, 530	15, 750	77, 800
Saddlery and harness	21	50, 100	53			21, 731	66, 803	126, 550
Shipbuilding	3	2, 500	25			3, 600	21, 700	28, 000
Shirts	1	750		8		2, 080	500	5, 000
Slaughtering and meat-packing, not including retail butchering establishments.	2	4, 500	10			3, 800	61, 175	85, 680
Stone- and earthen-ware	4	2, 700	4			350	440	2, 800
Tinware, copperware, and sheet-iron ware	20	29, 075	54			22, 952	55, 020	106, 650
Tobacco, cigars and cigarettes	4	10, 750	24	2	6	16, 371	40, 400	78, 992
Trunks and valises	1	1, 000	4			2, 400	9, 500	15, 000
Watch and clock repairing	7	16, 680	8			3, 900	7, 000	17, 200
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	29	28, 375	54			14, 681	22, 825	56, 650
Woolen goods	25	85, 550	62	21	7	13, 226	85, 972	127, 430

A—CALIFORNIA, BY TOTALS OF COUNTIES.

The State	5, 885	$61, 243, 784	38, 327	3, 922	1, 460	$21, 065, 905	$72, 607, 709	$116, 218, 973
COUNTIES.								
Alameda	177	2, 401, 332	2, 245	13	22	1, 066, 472	3, 536, 348	5, 338, 975
Alpine	6	2, 950	7			6, 200	6, 450	17, 500
Amador	43	158, 100	132			80, 623	166, 217	341, 535
Butte	102	606, 160	398		9	150, 993	481, 656	853, 531
Calaveras	25	54, 350	32			13, 852	44, 032	83, 950
Colusa	71	188, 335	139		1	64, 099	269, 793	445, 009
Contra Costa	24	902, 300	154		5	59, 576	293, 029	511, 026
Del Norte	20	158, 200	63		1	27, 760	82, 153	149, 125
El Dorado	15	79, 400	35			16, 813	51, 222	95, 686
Fresno	26	228, 944	146	2		31, 519	148, 590	234, 087
Humboldt	72	1, 198, 825	777			257, 916	527, 485	996, 127
Inyo	16	52, 750	33			11, 776	60, 207	90, 320
Kern	13	79, 850	33		1	24, 157	112, 000	154, 960
Lake	35	100, 043	76	1		20, 380	132, 443	196, 460
Lassen	21	37, 650	45			12, 688	41, 490	74, 820
Los Angeles	172	941, 780	656	9	41	285, 338	1, 011, 379	1, 668, 450
Marin	135	410, 950	796		9	172, 652	504, 796	924, 666
Mariposa	11	53, 050	53			12, 139	16, 957	39, 500
Mendocino	60	1, 614, 993	972		2	253, 564	425, 695	1, 004, 488
Merced	24	156, 300	94	6	1	41, 266	148, 204	239, 577

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—CALIFORNIA, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Modoc	32	$94, 050	166	....	1	$26, 648	$91, 314	$162, 454
Mono	34	204, 495	247	....	....	130, 716	281, 161	569, 707
Monterey	8	20, 200	18	....	....	4, 778	38, 539	57, 863
Napa	117	969, 760	424	5	11	155, 192	790, 407	1, 227, 463
Nevada	50	379, 100	231	....	2	110, 936	306, 165	543, 531
Placer	45	456, 450	250	....	....	97, 939	219, 990	414, 142
Plumas	54	154, 350	97	....	1	26, 526	68, 903	149, 448
Sacramento	171	1, 758, 500	916	10	46	565, 340	2, 982, 639	4, 204, 174
San Benito	24	199, 940	79	1	....	22, 409	164, 374	219, 283
San Bernardino	36	161, 750	93	3	3	29, 255	76, 869	171, 889
San Diego	36	79, 977	67	1	....	24, 183	75, 280	138, 330
San Francisco	2, 971	35, 368, 139	23, 662	3, 588	1, 192	14, 928, 534	47, 978, 072	77, 824, 299
San Joaquin	93	1, 784, 175	737	7	55	406, 430	2, 372, 134	3, 203, 030
San Luis Obispo	28	65, 325	39	....	....	23, 909	122, 400	178, 272
San Mateo	24	304, 875	131	....	....	26, 545	66, 113	125, 117
Santa Barbara	25	140, 350	53	1	....	13, 551	133, 192	177, 246
Santa Clara	302	2, 157, 866	1, 332	237	25	621, 082	1, 548, 909	2, 886, 312
Santa Cruz	113	2, 341, 925	734	10	2	299, 680	1, 053, 796	1, 925, 370
Shasta	46	236, 450	112	1	3	36, 000	125, 073	229, 271
Sierra	48	172, 600	149	....	....	49, 068	135, 972	252, 670
Siskiyou	56	158, 350	103	....	1	41, 261	140, 557	253, 630
Solano	60	965, 800	296	....	....	179, 735	2, 227, 885	2, 760, 530
Sonoma	212	1, 140, 695	556	17	11	208, 163	753, 725	1, 252, 745
Stanislaus	5	39, 500	21	....	....	6, 364	42, 205	59, 262
Sutter	8	8, 250	6	....	....	1, 150	3, 873	8, 840
Tehama	12	1, 273, 700	245	....	10	106, 252	804, 334	1, 078, 431
Trinity	22	49, 600	40	....	....	11, 946	43, 300	85, 116
Tulare	33	131, 500	76	1	....	32, 740	250, 598	350, 069
Tuolumne	36	200, 300	101	....	2	54, 301	188, 313	304, 915
Ventura	17	72, 250	40	2	1	12, 205	73, 088	110, 734
Yolo	62	200, 250	163	....	1	53, 025	307, 293	449, 414
Yuba	37	527, 050	317	7	1	150, 259	1, 081, 090	1, 385, 624

B—CALIFORNIA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	5, 885	$61, 243, 784	38, 311	3, 922	1, 460	$21, 065, 905	$72, 607, 709	$116, 218, 973
Agricultural implements	21	389, 500	286	....	9	149, 995	334, 035	586, 338
Artificial feathers and flowers (see also Millinery and lace goods)	4	2, 550	2	1	....	962	2, 700	5, 850
Awnings and tents	6	34, 300	7	7	3	8, 175	19, 750	37, 242
Axle-grease	2	11, 500	7	....	....	4, 080	18, 800	33, 000
Babbitt metal and solder	1	3, 000	1	....	....	320	15, 000	18, 000
Bags, other than paper	5	600, 000	672	50	14	233, 585	1, 715, 000	2, 102, 500
Bags, paper	2	27, 500	10	....	....	5, 524	60, 300	83, 528
Baking and yeast powders (see also Drugs and chemicals)	4	48, 000	24	3	....	16, 575	97, 490	142, 345
Baskets, rattan and willow ware	9	9, 325	20	5	3	6, 560	4, 865	21, 200
Bells	1	2, 000	2	....	....	1, 800	2, 000	6, 500
Belting and hose, leather	4	85, 000	31	....	....	18, 565	73, 100	117, 780
Billiard tables and materials	5	102, 000	39	....	....	24, 632	45, 618	98, 360
Blacking	3	3, 500	3	....	....	1, 809	2, 250	7, 400
Blacksmithing, (see also Wheelwrighting)	632	742, 853	1, 066	1	20	519, 082	632, 138	1, 908, 969
Bookbinding and blank-book making	15	111, 000	122	55	33	112, 578	173, 730	386, 140
Boot and shoe cut stock	2	1, 600	4	8	....	2, 500	3, 140	8, 985
Boot and shoe findings	4	10, 700	11	1	....	8, 080	30, 800	44, 750
Boot and shoe uppers	5	6, 700	9	1	....	5, 536	15, 030	31, 980
Boots and shoes, including custom work and repairing	535	1, 296, 685	2, 704	189	101	1, 303, 426	2, 351, 470	4, 581, 099
Boxes, cigar	6	130, 635	149	35	10	72, 940	75, 165	206, 200
Boxes, fancy and paper	4	24, 500	18	42	9	20, 165	20, 450	50, 550
Boxes, wooden, packing	14	206, 250	291	30	42	137, 100	315, 300	600, 700
Brass castings	10	155, 200	191	2	6	121, 400	235, 520	384, 850
Bread and other bakery products	160	534, 655	529	16	49	372, 171	1, 611, 080	2, 416, 398
Brick and tile (see also Drain and sewer pipe; Terra-cotta ware)	50	378, 650	838	....	1	210, 035	157, 625	516, 261
Bridges	8	99, 000	344	....	....	172, 970	374, 000	694, 000
Brooms and brushes	24	78, 300	132	1	3	49, 151	87, 850	173, 300
Calcium lights	1	1, 000	2	....	....	1, 000	200	2, 200
Carpentering	261	497, 850	1, 372	1	2	985, 664	1, 888, 508	3, 533, 131
Carpets, rag	2	1, 100	....	....	....	....	500	1, 200
Carriage and wagon materials	2	40, 000	14	....	....	13, 000	59, 000	85, 000
Carriages and wagons (see also Blacksmithing; Wheelwrighting)	87	594, 523	600	1	2	379, 629	460, 095	1, 163, 618
Cars, railroad, street, and repairs	1	2, 000	25	....	....	1, 500	25, 000	30, 000
Cement	2	31, 000	13	....	....	3, 000	3, 700	11, 000
Cheese and butter (factory)	216	1, 039, 365	357	20	14	70, 434	339, 934	590, 434
Clothing, men's	146	1, 177, 604	1, 155	623	21	959, 534	2, 318, 655	3, 992, 209
Clothing, women's	29	425, 270	35	633	7	221, 267	660, 232	1, 152, 600
Coffee and spices, roasted and ground	28	504, 896	230	6	10	113, 032	1, 123, 153	1, 424, 878
Coffins, burial cases, and undertakers' goods	18	101, 150	63	....	....	45, 153	65, 225	189, 560
Confectionery	48	241, 400	130	38	18	83, 723	472, 876	721, 797
Cooperage	49	485, 375	316	....	20	213, 656	354, 170	721, 034
Cordage and twine	3	500, 700	145	....	18	57, 215	402, 115	545, 230
Cordials and sirups	9	72, 200	44	....	....	28, 610	134, 590	208, 000
Corsets	4	4, 300	....	9	1	3, 000	3, 550	12, 200
Cutlery and edge tools (see also Hardware; Tools)	11	104, 500	54	....	1	39, 623	37, 150	119, 339

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—CALIFORNIA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths	Total amount paid in wages during the year.	Value of materials.	Value of products.
Dentistry, mechanical	39	$19,980	18	....	....	$9,470	$14,535	$69,725
Drain and sewer pipe (see also Brick and tile; Terra-cotta ware)	2	15,800	6	....	....	2,800	2,800	15,200
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	39	399,625	150	2	3	91,639	296,601	[illegible]
Dyeing and cleaning	13	32,925	29	15	1	21,871	17,719	[illegible]
Electrical apparatus and supplies	3	82,100	22	....	....	20,600	17,162	52,149
Electric lights	1	25,000	4	....	....	2,500	650	[illegible]
Electroplating	11	21,750	11	3	1	6,542	13,773	55,985
Engraving and die-sinking	13	4,320	5	....	....	3,288	2,430	20,340
Engraving, wood	8	995	2	....	....	425	3,340	17,100
Explosives and fireworks	3	80,000	14	6	....	12,280	45,000	80,500
Fancy articles	2	5,600	5	....	1	2,890	3,480	11,200
Fertilizers	3	145,000	35	....	....	21,568	66,600	106,100
Files (see also Saws)	2	6,000	5	....	....	4,200	1,550	9,100
Flags and banners	3	16,000	5	11	2	7,000	13,200	35,000
Flavoring extracts	7	20,500	16	7	1	8,664	38,100	59,300
Flouring- and grist-mill products	150	4,363,285	877	4	7	514,602	11,067,847	12,701,477
Food preparations (see page 39)	9	54,275	36	1	4	22,698	84,292	169,875
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	105	3,040,189	2,346	....	38	1,528,523	2,403,229	4,797,232
Foundery supplies	1	3,000	1	....	....	320	1,860	2,480
Fruits and vegetables, canned and preserved	12	1,152,000	585	507	81	291,413	832,952	1,389,798
Furnishing goods, men's	12	362,350	121	189	....	126,265	509,540	744,245
Furniture (see also Mattresses and spring beds; Upholstering)	89	1,266,800	956	21	22	505,089	1,603,555	1,857,010
Furniture, chairs	6	4,400	25	....	2	7,420	7,375	20,100
Furs, dressed	6	102,250	17	101	....	31,429	158,600	224,400
Galvanizing	1	750	3	....	....	1,470	3,900	[illegible]
Glass	1	75,000	80	....	33	45,924	48,070	140,000
Glass, cut, stained, and ornamented	5	77,450	36	....	....	22,100	66,900	103,000
Gloves and mittens (see also Woolen goods)	12	132,800	85	185	....	77,250	134,225	265,100
Glue	5	25,000	27	....	2	13,612	23,040	56,000
Gold and silver, reduced and refined, not from the ore	1	2,000	5	....	....	2,500	4,500	8,000
Grease and tallow	3	107,000	19	....	....	14,240	364,400	417,200
Gunpowder (see also High explosives)	1	1,000,000	76	....	....	37,200	137,800	390,000
Hairwork	13	15,750	11	20	....	12,517	17,250	[illegible]
Handles, wooden	1	1,500	2	....	1	585	300	1,500
Hand-stamps	5	13,000	16	....	....	14,830	13,532	51,430
Hardware (see also Cutlery and edge tools; Tools)	1	10,000	3	....	....	2,000	2,000	5,000
Hardware, saddlery	1	150	....	....	....	....	115	550
Hats and caps (not including wool hats)	19	48,925	25	40	....	33,816	42,117	95,078
High explosives (see also Gunpowder)	7	1,434,000	190	....	....	86,506	780,416	[illegible]
Housefurnishing goods	2	13,800	13	....	....	8,265	14,500	36,995
Ice, artificial	5	77,000	24	....	....	12,750	16,432	44,294
Ink	3	61,000	15	....	....	9,450	59,000	97,500
Instruments, professional and scientific	8	18,050	17	....	1	9,948	17,088	44,712
Iron and steel	1	1,000,000	284	....	35	177,722	535,500	780,000
Iron bolts, nuts, washers, and rivets	2	107,000	25	....	1	19,000	40,000	75,000
Iron forgings	4	42,000	40	....	1	27,702	47,081	91,310
Iron pipe, wrought	2	10,500	10	....	....	5,604	10,200	[illegible]
Iron railing, wrought	2	2,000	2	....	....	1,550	5,400	14,100
Ivory and bone work	2	3,100	8	....	....	7,225	12,475	26,200
Jewelry	12	283,500	128	....	11	100,597	159,753	315,115
Jewelry and instrument cases	1	10,000	12	....	....	6,500	5,000	15,000
Kindling wood	2	600	7	....	4	1,650	1,500	8,000
Lamps and reflectors	1	20,000	3	....	....	3,000	6,000	12,000
Lapidary work	7	4,425	9	1	3	11,035	16,670	39,120
Lasts	2	6,500	8	....	....	7,100	2,160	13,150
Lead, bar, pipe, sheet, and shot	2	100,000	130	....	....	87,952	826,500	948,000
Leather, curried	63	427,350	229	....	2	132,629	1,683,021	2,001,850
Leather, dressed skins	2	78,000	52	....	....	21,248	401,500	453,000
Leather, tanned	77	1,746,750	615	1	11	344,017	2,746,263	3,738,723
Lime	4	210,000	83	....	....	34,200	54,250	137,350
Liquors, distilled	37	1,223,024	104	....	8	51,653	424,252	637,294
Liquors, malt	185	2,800,515	1,201	....	....	570,624	2,144,119	3,862,451
Liquors, vinous (see also Liquors, distilled)	45	639,600	383	....	26	72,367	292,075	622,087
Lithographing (see also Printing and publishing)	7	122,000	84	....	9	63,391	77,200	193,712
Lock- and gun-smithing	46	43,625	38	....	1	21,814	20,696	82,859
Looking-glass and picture frames	23	231,200	80	2	11	59,150	137,553	285,703
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	26	352,385	268	....	....	164,848	530,228	850,495
Lumber, sawed	251	6,454,718	3,423	....	11	1,095,736	2,242,503	4,428,950
Malt	2	55,000	17	....	....	14,500	58,800	84,400
Mantels, slate, marble, and marbleized	1	20,000	23	....	....	11,700	10,000	25,000
Marble and stone work	67	332,650	339	....	1	231,817	319,904	710,546
Masonry, brick and stone	25	76,150	192	....	1	136,127	182,708	[illegible]
Matches	4	35,600	58	....	5	23,000	164,800	[illegible]
Mattresses and spring beds (see also Furniture)	13	126,300	64	2	2	37,076	98,475	168,837
Millinery and lace goods (see also Artificial feathers and flowers)	19	137,600	13	198	2	[illegible]	305,900	456,800
Millstones	1	30,000	30	....	....	37,440	65,000	120,000
Mineral and soda waters	18	69,875	46	....	1	29,315	50,307	[illegible]
Mirrors	2	120,000	12	....	....	10,400	55,000	70,000
Mixed textiles (see also Silk and silk goods; Woolen goods)	2	9,500	11	14	10	9,700	11,395	22,550
Models and patterns	7	8,900	15	....	1	9,532	3,856	23,906

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—CALIFORNIA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Mucilage and paste	1	$1,500	3			$1,440	$2,770	$6,000
Musical instruments and materials (not specified)	4	2,550	7			3,660	1,150	8,400
Musical instruments, organs and materials	2	7,000	3			5,000	3,000	12,000
Musical instruments, pianos and materials	6	50,000	27			18,425	41,725	92,700
Oil, essential	1	1,000			2	300	1,000	4,000
Oil, linseed	1	400,000	60			30,000	400,000	461,000
Painting and paperhanging	155	109,750	490	1	16	294,870	244,949	760,596
Paints (see also Varnish)	6	320,300	92	1		41,576	300,239	406,326
Paper (see also Wood pulp)	6	610,000	156	5	3	87,622	241,015	386,197
Patent medicines and compounds (see also Drugs and chemicals)	22	69,800	59	6	13	22,487	97,350	198,900
Perfumeries and cosmetics	3	13,000	11	11	16	12,400	27,300	61,900
Photographic apparatus	1	300					200	1,000
Photographing	42	146,050	114	28	4	106,932	87,326	328,086
Pickles, preserves, and sauces	6	20,300	11		2	6,524	21,675	43,200
Pipes, tobacco	1	500	1			936	720	2,400
Plumbing and gasfitting	113	266,450	342	1	26	229,009	414,504	829,604
Printing and publihsing (see also Lithographing)	171	1,838,255	1,408	107	114	1,272,412	1,054,355	3,148,978
Pumps, not including steam pumps	2	6,500	2			945	5,720	9,500
Regalia and society banners and emblems	1	6,000	3	4		1,500	3,000	6,000
Roofing and roofing materials	17	69,650	151			91,521	121,320	273,275
Rubber and elastic goods	1	7,500	3			2,000	6,600	10,000
Saddlery and harness	191	627,350	621	12	23	305,575	587,623	1,170,865
Safes, doors, and vaults, fire-proof	3	36,500	14			8,590	13,808	32,835
Salt	25	375,650	188			50,620	19,495	121,650
Salt, ground	1	85,000	8	2	2	6,800	40,000	60,000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	33	944,050	862		45	442,560	831,466	1,541,266
Saws	6	87,185	29		4	22,348	40,390	83,026
Shipbuilding	62	1,806,923	534			589,564	959,349	1,797,639
Shirts	26	83,300	182	173	1	85,338	154,990	304,850
Show-cases	6	4,320	8			5,088	10,875	23,800
Silk and silk goods (see also Mixed textiles)	5	164,300	20	106	25	41,400	80,995	159,175
Silversmithing	1	800					150	900
Silverware	3	116,000	24		6	20,550	37,500	87,000
Slaughtering and meat-packing, not including retail butchering establishments.	51	2,130,200	467		20	341,488	6,149,623	7,953,914
Soap and candles	32	547,600	226	14	16	129,780	886,706	1,193,494
Spectacles and eyeglasses	2	350					630	2,000
Sporting goods	1	200	1			150	135	500
Springs, steel, car and carriage	1	40,600	12			7,000	11,000	24,000
Stamped ware (see also Tinware, copperware, and sheet-iron ware)	1	1,000					120	720
Stationery goods	1	300,000	40	2		25,000	47,500	135,960
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	700	1			500	450	1,500
Stencils and brands	6	6,425	10	1		5,894	2,960	17,592
Stereotyping and electrotyping (see also Type founding)	1	10,000	4			3,000	2,318	8,682
Stone- and earthen-ware	7	62,500	29	1		17,025	15,750	54,500
Straw goods	8	33,500	33	72	3	38,600	26,450	85,200
Sugar and molasses, beet	2	215,000	150			39,131	104,724	162,988
Sugar and molasses, refined	2	1,600,000	280			190,000	5,517,000	5,932,000
Surgical appliances	5	4,925	2			1,976	2,400	11,672
Taxidermy	2	500					1,850	3,800
Terra-cotta ware (see Brick and tile; Drain and sewer pipe)	1	25,000	75			75,000	10,000	98,000
Tinware, copperware, and sheet-iron ware (see also Stamped ware)	186	797,675	632	1	75	402,996	852,051	1,622,632
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	10,000	4			2,500	4,500	10,000
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	176	1,831,503	3,238	110	203	956,639	2,060,275	3,947,353
Tools (see also Cutlery and edge tools; Hardware)	4	13,100	11			9,365	17,300	38,150
Toys and games	1	600					600	3,100
Trunks and valises	7	106,631	43		4	29,312	84,500	166,568
Type founding (see also Stereotyping and electrotyping)	2	109,000	21	9	10	16,409	32,455	56,321
Umbrellas and canes	5	21,000	5	11		9,616	26,800	54,550
Upholstering (see also Furniture)	66	211,177	141	9	1	96,037	256,507	459,042
Upholstering materials	5	48,750	30	10	4	13,385	33,550	66,550
Varnish (see also Paints)	2	42,500	12			8,300	45,000	67,000
Vinegar	2	65,000	22	3		18,800	53,250	92,000
Watch and clock repairing	121	114,310	92	2	5	71,913	61,939	260,140
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	146	177,100	245		3	117,146	145,965	412,967
Whips	1	12,000	11	2	7	7,000	8,000	25,000
Windmills	11	70,300	53		2	18,800	36,100	73,410
Window blinds and shades	10	92,100	43	2		23,909	74,200	141,840
Wirework	7	275,368	72		7	42,665	196,910	298,776
Wooden ware	2	55,000	70		2	17,000	35,000	65,000
Wood pulp	1	40,000	13			1,000	225	1,825
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds.)	18	16,025	30		3	21,006	29,290	75,876
Woolen goods (see also Gloves and mittens; Mixed textiles)	9	1,676,500	708	108	19	334,318	997,539	1,634,858
Zinc	1	100	1			225	900	1,800

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—COLORADO, BY TOTALS OF COUNTIES.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The State	599	$4, 311, 714	4, 652	266	156	$2, 314, 427	$8, 806, 762	$14, 260, 159
Arapahoe	259	2, 301, 850	2, 550	264	130	1, 574, 438	5, 715, 215	9, 367, 749
Bent	1	1, 000	1	....	....	650	950	3, 000
Boulder	31	171, 050	116	....	1	58, 243	532, 320	681, 358
Chaffee	6	23, 800	21	....	3	4, 340	23, 450	34, 725
Clear Creek	23	63, 875	72	....	....	30, 600	138, 762	205, 267
Conejos	2	21, 000	17	....	....	5, 200	41, 920	57, 300
Costilla	2	4, 800	18	....	....	885	22, 860	29, 000
Custer	22	71, 300	135	....	4	32, 617	212, 538	297, 075
Douglas	4	48, 400	51	....	....	6, 200	35, 210	52, 850
Elbert	5	6, 200	7	....	....	750	4, 150	8, 400
El Paso	22	152, 700	161	1	3	32, 483	134, 908	215, 640
Fremont	10	85, 000	145	....	....	36, 568	140, 300	322, 252
Gilpin	12	61, 950	48	....	....	43, 011	94, 262	173, 325
Grand	1	2, 000	2	....	....	80	575	800
Gunnison	8	26, 500	77	....	....	3, 210	23, 115	35, 300
Hinsdale	4	22, 000	30	....	....	10, 368	27, 473	52, 450
Huerfano	12	26, 650	57	....	....	4, 300	42, 285	62, 510
Jefferson	22	395, 950	366	1	9	151, 118	436, 480	744, 600
Lake	82	328, 689	439	....	2	227, 814	481, 361	1, 015, 648
La Plata (*a*)	....	....	....	....	....	....	....	....
Larimer	25	87, 250	70	....	3	17, 314	350, 015	443, 495
Las Animas	17	234, 000	156	....	....	48, 756	154, 237	293, 395
Ouray	6	9, 350	23	....	....	3, 300	11, 425	23, 450
Park	7	57, 600	35	....	....	5, 626	29, 444	42, 995
Pueblo	5	41, 300	17	....	....	8, 488	92, 566	115, 190
Rio Grande	2	26, 000	3	....	1	1, 593	20, 140	27, 075
Routt (*a*)	....	....	....	....	....	....	....	....
Saguache	4	15, 000	11	....	....	2, 725	22, 120	28, 550
San Juan	2	5, 500	4	....	....	600	3, 031	4, 280
Summit	3	21, 000	20	....	....	3, 150	15, 650	22, 450
Weld (*a*)	....	....	....	....	....	....	....	....

a Returned as having no manufactures.

B—COLORADO, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	599	$4, 311, 714	4, 652	266	156	$2, 314, 427	$8, 806, 762	$14, 260, 159
Awnings and tents	2	19, 500	13	62	....	15, 000	95, 000	135, 000
Baking and yeast powders (see also Drugs and chemicals)	1	200	1	1	1	626	500	1, 200
Blacksmithing (see also Wheelwrighting)	47	92, 805	155	....	5	99, 895	79, 725	287, 085
Boots and shoes, including custom work and repairing	44	84, 825	156	....	2	61, 796	123, 925	262, 518
Brass castings	1	500	3	....	....	2, 700	3, 000	7, 500
Bread and other bakery products	16	97, 200	100	6	11	82, 800	355, 900	574, 552
Brick and tile	46	362, 600	797	....	33	267, 410	194, 003	605, 023
Brooms and brushes	1	3, 800	3	....	1	1, 800	15, 000	30, 000
Carpentering	40	90, 400	261	....	1	243, 920	585, 800	1, 056, 400
Carriages and wagons (see also Wheelwrighting)	10	281, 000	133	....	2	112, 000	209, 000	475, 000
Charcoal	25	17, 864	75	....	....	23, 930	27, 096	81, 873
Cheese and butter (factory)	2	11, 000	6	....	....	1, 050	5, 902	9, 225
Clothing, men's	9	6, 900	14	16	....	21, 225	34, 850	76, 350
Clothing, women's	3	18, 300	....	130	5	60, 200	92, 150	176, 500
Coffee and spices, roasted and ground	1	30, 000	3	5	....	4, 500	17, 500	27, 000
Coke	1	150, 000	75	....	....	13, 500	30, 100	90, 000
Confectionery	6	7, 900	23	1	4	17, 250	20, 700	49, 550
Cutlery and edge tools	1	200	1	....	....	750	500	2, 000
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	3	10, 800	8	1	....	5, 900	15, 500	38, 500
Dyeing and cleaning	2	1, 450	2	....	....	500	1, 025	3, 200
Fertilizers	1	500	2	....	....	900	600	2, 500
Flavoring extracts	1	2, 000	3	....	....	180	500	1, 300
Flouring- and grist-mill products	34	496, 500	193	....	....	94, 351	2, 126, 522	2, 534, 644
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	17	242, 000	332	....	10	226, 020	564, 330	1, 007, 522
Fruits and vegetables, canned and preserved	1	10, 000	8	2	5	8, 000	60, 000	100, 000
Furniture (see also Mattresses and spring beds; Upholstering)	8	71, 400	52	3	2	42, 300	48, 000	158, 850
Furs, dressed	1	1, 000	3	2	....	3, 500	3, 000	8, 000
Gloves and mittens	1	500	2	1	....	2, 000	1, 500	4, 500
Hairwork	3	3, 300	....	10	....	4, 125	6, 600	15, 200
Iron and steel	1	100, 000	125	....	....	7, 000	131, 700	225, 000
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	1	5, 000	8	....	....	3, 600	6, 000	15, 000
Jewelry and instrument cases	1	5, 000	2	....	....	1, 800	2, 000	5, 000
Kaolin and ground earths	1	10, 000	8	....	....	2, 000	1, 750	6, 000
Leather, curried	3	16, 700	13	1	....	8, 500	53, 250	90, 550
Leather, dressed skins	1	2, 500	3	....	....	300	3, 000	4, 175
Leather, tanned	3	16, 700	13	1	....	9, 000	38, 300	55, 800
Lime	5	6, 300	17	....	....	8, 200	11, 500	27, 600
Lithographing (see also Printing and publishing)	1	10, 000	23	....	....	12, 222	18, 000	40, 000
Liquors, malt	23	527, 100	134	....	5	62, 096	230, 695	418, 902
Lock- and gun-smithing	3	2, 600	11	....	....	3, 700	2, 200	10, 500

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—COLORADO, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Looking-glass and picture frames	1	$1, 000	2	....	....	$1, 800	$1, 500	$3, 500
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	5	168, 500	178	....	....	124, 500	997, 000	1, 276, 000
Lumber, sawed	96	481, 200	870	....	7	112, 931	700, 294	1, 051, 295
Marble and stone work	6	22, 500	66	....	....	25, 200	23, 750	66, 200
Masonry, brick and stone	1	800	6	....	....	6, 000	3, 500	12, 800
Mattresses and spring beds (see also Furniture)	1	1, 000	2	....	....	2, 100	1, 000	6, 500
Mineral and soda waters	6	22, 100	20	....	....	12, 130	20, 380	55, 575
Painting and paperhanging	1	250	3	....	....	1, 000	250	2, 500
Paper	1	25, 000	14	1	5	6, 000	10, 350	27, 300
Patent medicines and compounds (see also Drugs and chemicals)	1	700	2	1	1	2, 000	1, 000	4, 200
Pickles, preserves, and sauces	1	10, 000	5	....	....	4, 000	8, 000	20, 000
Plumbing and gasfitting	2	3, 600	4	....	....	3, 000	12, 300	20, 800
Printing and publishing (see also Lithographing)	5	181, 450	157	12	19	135, 570	95, 750	307, 500
Roofing and roofing materials	1	2, 000	4	....	....	1, 600	7, 000	10, 500
Saddlery and harness	20	119, 870	94	2	12	67, 745	149, 000	320, 850
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	1	90, 000	135	....	....	67, 000	350, 000	580, 000
Slaughtering and meat-packing, not including retail butchering establishments.	14	166, 000	82	....	5	51, 190	926, 065	1, 082, 690
Soap and candles	2	53, 000	15	3	3	14, 315	37, 500	64, 320
Stencils and brands	2	6, 650	22	....	....	12, 500	16, 000	51, 000
Stereotyping and electrotyping	1	2, 000	4	....	....	3, 000	2, 000	8, 500
Tinware, copperware, and sheet-iron ware	22	60, 450	74	....	10	49, 040	114, 150	242, 100
Tobacco, cigars and cigarettes	9	14, 150	23	3	....	16, 578	33, 500	77, 025
Trunks and valises	2	7, 500	13	....	1	12, 000	23, 000	60, 000
Upholstering (see also Furniture)	1	3, 000	19	1	....	10, 400	10, 000	25, 000
Vinegar	4	13, 750	10	....	3	4, 300	13, 300	25, 500
Watch and clock repairing	10	25, 550	13	....	1	11, 130	18, 800	50, 880
Wheelwrighting (see also Blacksmithing; Carriages, and wagons)	10	10, 850	31	....	....	17, 784	10, 600	43, 600
Whips	1	2, 000	2	1	2	2, 600	3, 650	12, 000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	1	500	1	....	....	468	500	2, 500

A—CONNECTICUT, BY TOTALS OF COUNTIES.

The State	4, 488	$120, 480, 275	75, 619	28, 851	8, 445	$43, 501, 518	$102, 183, 341	$185, 697, 211
COUNTIES.								
Fairfield	745	17, 702, 544	13, 198	4, 547	645	7, 627, 224	14, 532, 142	28, 426, 883
Hartford	880	27, 690, 534	14, 286	4, 978	1, 687	8, 456, 684	18, 501, 403	34, 608, 909
Litchfield	413	5, 988, 254	4, 126	829	542	2, 190, 516	5, 363, 539	9, 433, 075
Middlesex	267	5, 871, 711	3, 490	787	400	1, 750, 072	3, 589, 772	6, 979, 847
New Haven	1, 174	30, 275, 692	24, 703	9, 511	1, 508	15, 074, 297	33, 416, 360	59, 536, 504
New London	508	13, 330, 800	7, 621	2, 885	1, 287	3, 969, 101	10, 627, 184	18, 782, 130
Tolland	213	5, 593, 765	3, 406	2, 018	733	1, 826, 206	8, 201, 538	13, 907, 573
Windham	288	14, 026, 975	4, 789	3, 296	1, 643	2, 607, 418	7, 951, 403	14, 022, 290

B—CONNECTICUT, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	4, 488	$120, 480, 275	75, 619	28, 851	8, 445	$43, 501, 518	$102, 183, 341	$185, 697, 211
Agricultural implements	21	832, 500	552	2	11	218, 514	317, 644	719, 627
Ammunition	3	724, 000	418	453	....	303, 519	1, 108, 852	1, 706, 852
Artificial limbs (see also Surgical appliances)	1	250	....	....	....	....	100	850
Awnings and tents	4	4, 200	9	2	....	3, 260	9, 700	17, 000
Bags, paper	3	92, 500	16	75	5	33, 594	141, 500	208, 800
Baking and yeast powders (see also Drugs and chemicals)	1	5, 000	3	....	....	375	400	1, 000
Baskets, rattan and willow ware	9	32, 150	26	6	....	7, 868	6, 810	23, 975
Bells	6	115, 870	137	14	9	55, 515	91, 765	251, 024
Belting and hose, leather	6	548, 500	178	15	....	84, 200	778, 000	944, 000
Belting and hose, rubber	1	200, 000	240	2	2	110, 000	663, 000	850, 000
Billiard tables and materials	1	100, 000	200	....	....	62, 266	100, 000	400, 000
Blacking	1	2, 000	2	1	....	450	1, 500	3, 000
Blacksmithing (see also Wheelwrighting)	381	284, 375	528	....	5	223, 674	219, 063	730, 114
Bone-, ivory-, and lamp-black	1	6, 000	4	....	....	2, 400	3, 200	6, 500
Bookbinding and blank-book making	15	115, 500	119	49	4	69, 440	87, 762	209, 322
Boot and shoe findings	1	1, 000	1	....	....	50	500	1, 200
Boot and shoe uppers	1	1, 000	1	....	....	520	850	2, 500
Boots and shoes	128	689, 390	1, 130	390	20	574, 250	1, 394, 828	2, 372, 293
Boots and shoes, rubber	3	1, 000, 000	1, 060	965	87	671, 574	2, 527, 501	4, 175, 997
Boxes, cigar	7	10, 700	16	4	1	5, 475	14, 250	33, 020
Boxes, fancy and paper	34	224, 600	206	734	32	265, 737	389, 788	840, 645
Boxes, wooden, packing	15	63, 400	72	4	....	28, 242	126, 150	174, 216
Brass and copper, rolled	15	6, 712, 000	3, 302	673	251	2, 137, 674	7, 041, 091	10, 985, 471
Brass castings	17	337, 600	484	172	12	289, 445	572, 722	1, 077, 700
Brass ware	10	479, 782	501	301	129	348, 682	684, 475	1, 134, 884
Bread and other bakery products	91	327, 275	526	69	34	298, 741	1, 031, 093	1, 585, 987
Brick and tile (see also Drain and sewer pipe)	48	328, 350	511	9	21	132, 476	91, 022	299, 194
Bridges	2	51, 500	46	....	....	13, 900	32, 000	70, 700
Brooms and brushes	20	47, 940	59	12	6	26, 980	71, 530	143, 065
Buttons	26	512, 500	471	651	115	376, 332	498, 451	1, 110, 653

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—CONNECTICUT, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Carpentering	250	$555, 444	1, 929	1	6	$838, 353	$1, 832, 418	$3, 191, 452
Carpets, other than rag (see also Woolen goods)	2	3, 085, 000	695	703	256	565, 654	1, 446, 199	2, 560, 559
Carpets, rag	3	3, 950	6	4	....	3, 499	2, 061	7, 660
Carriage and wagon materials	32	667, 099	439	29	20	244, 714	346, 288	824, 611
Carriages and sleds, children's	3	16, 600	14	....	....	6, 624	7, 822	20, 246
Carriages and wagons (see also Wheelwrighting)	124	1, 367, 900	1, 621	14	13	853, 602	1, 191, 016	2, 605, 591
Charcoal	15	2, 805	32	....	2	6, 940	7, 885	23, 005
Cheese and butter (factory)	16	36, 775	29	4	....	11, 360	87, 820	134, 440
Cleansing and polishing preparations	1	1, 500	4	....	....	400	300	930
Clock cases and materials (see also Watch and clock materials)	2	6, 000	44	2	....	15, 000	19, 000	50, 500
Clocks	15	1, 816, 400	1, 994	301	281	1, 206, 073	1, 386, 361	3, 016, 717
Clothing, men's	121	763, 002	803	735	67	546, 624	1, 161, 112	2, 210, 159
Clothing, women's	10	2, 500	25	15	....	6, 960	42, 240	54, 960
Cloth finishing	1	7, 500	5	5	3	2, 100	7, 518	12, 810
Coffee and spices, roasted and ground	9	145, 000	45	12	2	29, 800	302, 000	383, 500
Coffins, burial cases, and undertakers' goods	17	243, 017	150	42	3	82, 199	162, 627	390, 339
Combs	1	10, 000	10	8	....	8, 000	6, 500	17, 000
Confectionery	28	75, 150	81	32	15	45, 737	174, 345	308, 203
Cooperage	13	24, 100	50	....	....	18, 773	29, 951	60, 850
Cordage and twine	4	18, 000	13	4	4	4, 250	23, 488	32. 680
Cork cutting	1	10, 000	2	3	....	1, 200	10, 000	14, 000
Corsets	22	906, 900	394	3, 844	136	827, 400	1, 949, 159	3, 322, 359
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	97	21, 104, 200	6, 363	5, 619	2, 956	3, 750, 017	8, 757, 022	17, 050, 126
Cutlery and edge tools (see also Hardware; Tools)	54	1, 610, 000	2, 362	171	126	1, 232, 013	907, 147	2, 704 708
Dentistry, mechanical	17	21, 400	16	....	1	8, 248	14. 525	49, 075
Drain and sewer pipe (see also Brick and tile)	3	47, 063	22	....	....	8, 500	13, 000	26, 500
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	9	227, 400	115	1	....	53, 340	219, 440	344, 164
Dyeing and cleaning	12	29, 100	30	20	....	17, 328	11, 160	43, 626
Dyeing and finishing textiles	2	230, 000	242	34	26	120, 270	364, 490	464, 800
Dyestuffs and extracts	4	307, 000	232	....	....	144, 900	1, 294, 140	1, 560, 900
Electrical apparatus and supplies	2	230, 000	28	....	....	18, 500	40, 000	100, 000
Electroplating	6	183, 200	167	16	10	100, 400	116, 900	320, 100
Emery wheels	1	10, 000	4	....	....	1, 200	3, 500	10, 000
Engraving and die-sinking	4	7, 300	17	....	3	7, 200	4, 350	18, 300
Engraving, steel	1	2, 500	1	1	....	807	534	1, 967
Engraving, wood	3	45, 700	31	10	....	23, 219	4, 611	37, 714
Envelopes	2	325, 000	65	155	8	88, 000	685, 000	821, 000
Explosives and fireworks	3	62, 000	35	35	18	34, 938	138, 100	222, 600
Fancy articles	7	27, 600	26	10	3	17, 309	34, 550	74, 300
Felt goods (see also Woolen goods)	2	405, 754	135	39	....	53, 535	313, 325	429, 496
Fertilizers	17	365, 000	179	1	....	78, 222	306, 225	446, 450
Files (see also Saws)	10	23, 150	41	....	6	20, 805	11, 595	49, 675
Fire-arms	12	3, 485, 834	2, 202	85	102	1, 309, 367	753, 386	2, 470, 398
Flavoring extracts	2	8, 500	7	....	5	1, 750	4, 500	12, 000
Flouring- and grist-mill products	234	1, 092, 824	361	....	....	117, 722	2, 540, 908	2, 964, 134
Food preparations (see page 39)	2	28, 000	11	9	....	10, 000	67, 000	135, 000
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	146	4, 878, 826	4, 620	47	114	2, 313, 379	2, 812, 902	6, 339, 599
Fruits and vegetables, canned and preserved	2	55, 000	25	55	15	9, 550	52, 700	72, 400
Furniture (see also Mattresses and spring beds; Upholstering)	53	506, 675	486	14	12	219, 385	310, 604	686, 168
Furs, dressed	5	33, 000	12	63	....	13, 386	37, 474	66, 782
Gas and lamp fixtures	2	620, 000	745	150	20	407, 500	450, 000	1, 000, 000
Glass	1	130, 000	130	2	28	65, 000	70, 000	160, 000
Glass, cut, stained, and ornamented	1	5, 000	5	5	10	1, 800	1, 500	3, 800
Gold and silver leaf and foil	2	38, 000	19	7	....	10, 500	83. 538	106, 445
Grease and tallow	7	21, 800	20	....	....	8, 516	123, 720	156, 500
Gunpowder	2	635, 000	102	....	....	55, 119	300, 815	381, 625
Hairwork	2	2, 500	1	4	....	1, 850	2, 300	6, 000
Handles, wooden	5	14, 700	18	....	1	6, 300	6, 700	25, 300
Hand-stamps	1	1, 000	3	....	....	1, 000	1, 000	3, 000
Hardware (see also Cutlery and edge tools; Tools)	93	7, 852, 622	7, 073	648	523	3, 569, 494	4, 410, 709	10, 374, 293
Hardware, saddlery	4	129, 000	152	103	15	116, 600	257, 500	570, 000
Hat and cap materials	10	262, 500	325	71	20	140, 809	501, 403	753, 551
Hats and caps, not including wool hats	33	842, 400	2, 299	852	34	1, 423, 981	1, 949, 520	4, 407, 993
Hones and whetstones	1	1, 000	1	....	....	300	300	1, 500
Hooks and eyes	3	170, 000	99	32	18	61, 583	120, 900	251, 800
Hosiery and knit goods (see also Cotton goods; Woolen goods)	14	1, 966, 431	659	1, 187	365	664, 293	1, 013, 949	2, 432, 271
Housefurnishing goods	3	40, 000	22	3	....	13, 886	30, 000	55, 000
Ink	1	500	1	....	....	234	635	1, 200
Iron and steel	19	2, 682, 000	663	....	22	331, 184	1, 341, 225	1, 998, 698
Iron bolts, nuts, washers, and rivets	17	1, 225, 350	806	73	82	427, 013	936, 050	1, 662, 131
Iron forgings	12	445, 000	266	....	15	141, 489	282, 225	512, 620
Iron nails and spikes, cut and wrought	1	60, 000	30	14	....	30, 000	80, 000	120, 000
Iron railings, wrought	1	4, 000	4	....	....	925	2, 116	5, 335
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	1	10, 000	14	....	....	2, 100	8, 000	12, 000
Ivory and bone work	9	305, 800	219	32	8	109, 373	322, 460	498, 141
Jewelry	1	65, 000	25	....	1	21, 554	27, 530	67, 680
Jewelry and instrument cases	2	1, 700	6	6	1	2, 000	2, 150	5, 200
Kaolin and ground earths	5	80, 000	73	1	....	26, 100	132, 000	191, 500
Kindling wood	2	2, 000	6	....	....	1, 925	3, 500	6, 750
Lamps and reflectors	5	49, 000	82	1	2	35, 300	46, 800	102, 800
Leather, curried	8	29, 300	16	....	....	6, 863	70, 170	86, 950
Leather, dressed skins	4	75, 000	64	....	3	35, 250	385, 200	460, 000
Leather, tanned	11	50, 600	49	....	....	16, 062	107, 005	146, 750
Lime	6	62, 000	65	....	....	22, 630	49, 500	88, 700
Liquors, distilled	4	61, 000	7	....	....	2, 075	19, 135	29, 075

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—DAKOTA TERRITORY, BY SPECIFIED INDUSTRIES.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	251	$771, 428	854	8	6	$339, 375	$1, 523, 761	$2, 373, 970
Blacksmithing (see also Wheelwrighting)	37	26, 395	53	....	1	23, 745	30, 830	89, 988
Boots and shoes, including custom work and repairing	21	31, 750	48	....	....	27, 600	36, 265	84, 490
Bread and other bakery products	1	1, 500	8	....	....	2, 500	6, 000	10, 000
Brick and tile	14	25, 600	108	....	....	33, 622	16, 366	66, 085
Brooms and brushes	3	780	6	....	....	840	1, 406	3, 610
Carpentering	9	8, 750	40	....	....	18, 500	79, 800	121, 200
Carriages and wagons (see also Wheelwrighting)	4	11, 500	15	....	....	8, 200	9, 500	25, 300
Cheese and butter (factory)	4	10, 200	3	....	....	210	1, 002	2, 260
Clothing, men's	10	14, 300	26	8	....	15, 009	21, 337	53, 600
Confectionery	1	500	1	....	....	100	1, 500	2, 000
Flouring- and grist-mill products	30	301, 665	86	....	....	37, 372	842, 298	1, 040, 958
Foundery and machine-shop products	4	23, 838	22	....	....	15, 103	11, 000	32, 800
Furniture (see also Upholstering)	3	3, 300	2	....	....	250	800	3, 700
Jewelry	4	17, 000	15	....	....	17, 300	13, 200	40, 500
Liquors, malt	10	64, 400	20	....	....	8, 604	31, 649	57, 160
Lumber, planed (see also Sash, doors, and blinds)	1	10, 000	10	....	....	9, 000	7, 000	20, 000
Lumber, sawed	39	113, 750	286	....	4	54, 974	281, 875	435, 792
Mineral and soda waters	1	1, 500	....	....	1	60	600	2, 000
Photographing	1	500	1	....	....	900	300	2, 700
Saddlery and harness	19	31, 350	32	....	....	17, 476	54, 300	97, 100
Sash, doors, and blinds (see also Lumber, planed)	3	9, 000	11	....	....	8, 400	10, 100	28, 000
Tinware, copperware, and sheet-iron ware	20	39, 150	35	....	....	19, 500	46, 800	98, 400
Tobacco, cigars and cigarettes	1	3, 000	13	....	....	6, 000	10, 000	18, 000
Upholstering (see also Furniture)	1	1, 000	1	....	....	600	400	1, 600
Watch and clock repairing	1	10, 000	4	....	....	4, 500	500	6, 000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	9	10, 700	13	....	....	9, 010	8, 933	30, 127

A—DELAWARE, BY TOTALS OF COUNTIES.

The State	746	$15, 655, 822	10, 250	1, 426	962	$4, 267, 349	$12, 828, 461	$20, 514, 438
COUNTIES.								
Kent	204	982, 839	1, 037	503	171	257, 352	1, 171, 943	1, 731, 032
New Castle	399	14, 144, 683	8, 543	770	734	3, 862, 501	11, 097, 635	17, 805, 608
Sussex	143	528, 300	670	153	57	147, 496	558, 883	977, 798

B—DELAWARE, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	746	$15, 655, 822	10, 250	1, 426	962	$4, 267, 349	$12, 828, 461	$20, 514, 438
Agricultural implements	12	67, 400	66	....	....	20, 524	19, 621	57, 776
Bags, paper	1	500	4	....	....	600	800	1, 800
Baskets, rattan and willow ware	8	60, 725	106	29	18	26, 950	42, 700	110, 725
Belting and hose, leather	1	30, 000	10	....	....	3, 500	38, 000	44, 576
Blacksmithing (see also Wheelwrighting)	67	91, 590	157	....	3	53, 125	49, 600	148, 663
Bookbinding and blank-book making	2	4, 000	4	3	....	2, 050	3, 800	7, 000
Boots and shoes, including custom work and repairing	23	29, 950	41	2	....	13, 870	15, 210	45, 714
Boot and shoe cut stock	1	1, 000	3	21	....	1, 500	1, 600	3, 500
Boot and shoe uppers	1	6, 000	3	2	....	2, 000	10, 000	18, 000
Bread and other bakery products	20	128, 000	54	12	15	27, 220	108, 280	175, 565
Brick and tile	15	102, 400	230	....	77	55, 216	33, 683	125, 610
Brooms and brushes	2	1, 800	5	....	....	1, 450	2, 675	4, 500
Carpentering	34	54, 200	179	....	....	61, 352	180, 280	313, 255
Carriage and wagon materials	10	130, 500	114	....	8	50, 250	65, 500	161, 000
Carriages and wagons (see also Wheelwrighting)	15	452, 270	397	1	12	137, 256	272, 098	500, 567
Cars, railroad, street, and repairs	2	589, 100	760	....	100	319, 915	775, 900	1, 185, 688
Cheese and butter (factory)	3	18, 200	4	3	1	610	4, 620	7, 710
Clothing, men's	10	77, 150	56	43	1	27, 549	51, 900	97, 900
Coffee and spices, roasted and ground	1	3, 000	....	....	1	500	5, 000	7, 000
Coffins, burial cases, and undertakers' goods	10	22, 600	15	....	....	6, 850	13, 050	29, 500
Confectionery	3	49, 000	16	2	....	5, 600	18, 000	35, 000
Cooperage	2	19, 000	8	....	....	2, 500	6, 500	12, 000
Coppersmithing (see Tinware, copperware, and sheet-iron ware)	1	8, 000	7	....	....	2, 000	9, 000	14, 800
Cotton goods (see also Mixed textiles)	10	929, 570	303	419	223	232, 727	632, 205	1, 057, 257
Dentists' materials	1	20, 000	9	....	....	5, 000	10, 000	18, 000
Dyestuffs and extracts	2	17, 000	19	....	....	4, 000	7, 100	15, 400
Fertilizers	17	753, 000	270	....	....	91, 558	442, 316	657, 250
Flouring- and grist-mill products	81	761, 015	219	....	1	72, 231	1, 165, 103	1, 341, 026
Foundery and machine-shop products	17	788, 100	752	....	49	266, 618	330, 732	704, 225
Fruits and vegetables, canned and preserved	33	396, 379	428	643	188	99, 621	453, 503	634, 940
Furniture (see also Upholstering)	6	43, 500	25	2	1	10, 000	13, 800	39, 800
Grease and tallow	1	15, 000	4	....	....	3, 000	98, 000	124, 000
Gunpowder	1	1, 000, 000	248	2	....	115, 778	127, 586	243, 365
Iron and steel	9	1, 431, 469	818	....	49	344, 476	1, 214, 050	2, 347, 177
Iron bolts, nuts, washers, and rivets	1	10, 000	20	....	2	6, 550	28, 044	37, 100

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—DELAWARE, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Iron forgings	3	$51,000	53	....	....	$16,590	$57,043	$83,782
Iron pipe, wrought	1	925,000	618	....	....	245,278	1,491,476	2,000,000
Jute and jute goods	1	25,000	8	20	18	9,358	31,306	46,422
Kindling wood	4	6,800	15	....	....	3,975	4,150	12,500
Leather, curried	4	14,800	12	....	....	3,981	57,125	67,300
Leather, dressed skins	16	926,500	848	61	73	388,064	1,350,860	1,886,597
Leather, tanned	3	2,800	4	....	....	650	4,700	7,000
Liquors, distilled	1	800	1	....	....	75	415	700
Liquors, malt	2	95,000	15	....	....	7,370	38,959	66,998
Looking-glass and picture frames	3	1,900	2	....	1	1,850	2,400	6,500
Lumber, planed (see also Wood, turned and carved)	7	51,800	54	....	7	12,600	63,650	90,600
Lumber, sawed	86	259,250	378	....	13	40,694	243,375	411,060
Marble and stone work	4	28,500	24	....	....	8,700	10,700	23,900
Masonry, brick and stone	10	21,370	78	....	2	22,975	104,290	172,590
Matches	1	250,000	200	....	....	44,000	446,727	550,000
Mats and matting	1	5,000	3	....	....	2,000	17,000	26,000
Mineral and soda waters	1	5,000	8	....	....	2,500	1,000	6,000
Mixed textiles (see also Cotton goods; Woolen goods)	2	20,000	27	11	4	12,476	20,915	50,220
Musical instruments, organs and materials	1	2,500	2	....	....	200	200	1,000
Painting and paperhanging	6	3,825	17	....	....	4,362	8,275	16,648
Paints	1	60,000	10	....	1	5,200	20,000	30,000
Paper	4	2,508,000	179	67	6	112,666	582,154	737,905
Printing and publishing	2	18,000	12	....	1	5,580	6,500	14,500
Pumps, not including steam pumps	1	5,000	4	....	....	2,000	3,000	8,000
Roofing and roofing materials	3	10,500	16	....	....	8,344	11,500	29,500
Rubber and elastic goods	1	150,000	15	....	3	5,000	40,000	66,662
Saddlery and harness	17	30,500	34	....	2	14,570	34,400	68,700
Saws	1	60,000	5	....	15	6,000	10,000	23,000
Shipbuilding	18	935,200	1,576	....	....	900,322	964,275	2,162,503
Shirts	1	2,000	2	5	1	1,800	6,000	12,000
Slaughtering and meat-packing, not including retail butchering establishments.	2	160,000	26	....	....	11,200	179,368	198,000
Soap and candles	3	14,800	12	....	1	5,180	13,400	22,070
Sporting goods	1	10,000	10	5	2	5,000	15,000	25,000
Springs, steel, car and carriage	2	15,000	36	....	2	11,600	45,500	65,500
Stone- and earthen-ware	3	12,000	6	....	1	1,100	2,350	8,500
Sugar and molasses, beet	1	100,000	50	....	....	3,140	6,404	8,584
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	21	134,600	71	....	9	34,658	95,463	180,152
Tobacco, cigars and cigarettes	23	32,300	50	13	14	24,420	34,840	78,453
Tools	1	160,000	100	....	....	52,000	65,000	130,000
Upholstering (see also Furniture)	1	300	....	1	....	150	300	1,500
Upholstering materials	2	5,000	11	....	....	1,050	2,800	5,000
Watch and clock repairing	1	400	....	....	....	....	100	600
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	49	70,300	127	....	6	44,346	35,750	114,350
Wood, turned and carved (see also Lumber, planed)	1	800	5	....	....	1,500	750	4,000
Wooden ware	1	300	1	....	....	375	500	1,500
Woolen goods (see also Mixed textiles; Worsted goods)	5	352,559	171	59	31	108,504	448,285	665,253

A—DISTRICT OF COLUMBIA.

The District	971	$5,552,526	5,496	1,389	261	$3,924,612	$5,365,400	$11,882,316

B—DISTRICT OF COLUMBIA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	971	$5,552,526	5,496	1,389	261	$3,924,612	$5,365,400	$11,882,316
Artificial limbs	1	1,600	1	....	....	930	600	1,725
Awnings and tents	3	2,050	4	6	....	3,581	4,643	13,924
Bags, paper	1	800	1	1	....	234	1,310	3,000
Baskets, rattan and willow ware	1	100	1	....	....	218	150	750
Blacksmithing (see also Wheelwrighting)	77	31,165	113	....	1	45,408	39,474	146,219
Bluing	1	550	1	....	....	220	300	850
Bookbinding and blank-book making	4	4,200	9	1	2	4,332	2,280	10,731
Boots and shoes, including custom work and repairing	73	49,220	66	1	2	31,111	42,225	127,107
Boxes, cigar	2	1,100	2	2	3	1,450	2,476	9,164
Boxes, fancy and paper	1	100	1	....	....	78	180	520
Brass castings	3	132,038	61	....	....	22,087	67,152	96,769
Bread and other bakery products	63	120,340	164	7	8	73,148	400,608	606,236
Brick and tile (see also Terra-cotta ware)	16	330,600	576	....	120	123,161	62,575	314,298
Brooms and brushes	1	500	3	....	....	1,000	3,000	6,000
Cheese and butter (factory)	1	10,000	8	....	....	3,300	36,500	44,925
Carpentering	58	48,145	245	....	8	135,626	247,006	486,702
Carpets, rag	1	75	....	....	....	....	200	600
Carriages and wagons (see also Wheelwrighting)	25	173,792	149	....	5	69,496	53,277	183,265
Cars, railroad, street, and repairs	1	30,000	25	....	....	17,450	10,000	29,097
Clothing, men's	35	104,550	157	68	2	98,778	178,302	376,665

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—DISTRICT OF COLUMBIA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Clothing, women's	1	$4, 000	1	50		$14, 000	$12, 000	$30, 000
Coffee and spices, roasted and ground	3	17, 600	14			6, 356	84, 680	100, 020
Coffins, burial cases, and undertakers' goods	14	61, 425	32			19, 631	41. 440	92, 640
Confectionery	27	85, 575	80	24	2	40, 131	122, 263	221, 902
Cooperage	3	6, 700	28			11, 300	10, 770	25, 770
Cordage and twine	1	500	3			1, 404	2, 000	5, 100
Dentistry, mechanical	6	4, 975	6			2, 632	5, 600	19, 200
Drugs and chemicals (see also Patent medicines and compounds)	5	54, 000	25		1	10, 190	31, 836	63, 025
Dyeing and cleaning	2	11, 000	7	3		4, 072	1, 800	10, 350
Electroplating	2	550	1		1	578	330	2, 028
Engraving and die-sinking	3	3, 900	5		1	1, 965	3, 900	12, 375
Engraving, steel	2	1, 217, 000	452	456	4	696, 698	135, 811	879, 166
Engraving, wood	1	100	1			1, 600	300	3, 000
Fertilizers	3	95, 000	87			29, 600	156, 250	207, 250
Files	2	700	1			624	850	2, 150
Flouring- and grist-mill products	9	230, 400	40			21, 508	1, 071, 600	1, 172, 375
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	10	236, 000	198		9	75, 102	155, 098	358, 166
Fruits and vegetables, canned and preserved	2	4, 000	7	8		1, 120	2, 132	6, 000
Furniture (see also Mattresses and spring beds; Upholstering)	19	46, 125	72			39, 385	39, 005	113, 375
Furniture, chairs	1	500	1			350	600	2, 000
Glass	1	25, 000						
Glass, cut, stained, and ornamented	1	500	2			750	300	1, 500
Gloves and mittens	1	1, 500	2			650	1, 000	3, 000
Grease and tallow	3	25, 000	7			3, 422	47, 918	69, 400
Hairwork	12	6, 600		27		3, 276	6, 500	14, 800
Ink	1	300	1			78	400	1, 200
Instruments, professional and scientific	5	36, 100	14	2	1	13, 724	7, 750	37, 561
Iron and steel	1	89, 600	18			7, 528	2, 264	10, 970
Iron railing, wrought	5	3, 275	11			3, 912	4, 685	13, 403
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	2	12, 000	35			20, 000	17, 500	50, 000
Jewelry	11	19, 600	21		2	12, 444	11, 310	37, 533
Kindling wood	6	18, 465	28		7	11, 114	21, 969	40, 650
Leather, curried	1	500	1			25	645	880
Leather, dressed skins	1	4, 000	5			3, 500	17, 000	30, 000
Leather, tanned	1	9, 500	2			400	3, 365	4, 284
Lime	5	19, 100	24			11, 959	17, 424	51, 648
Liquors, malt	10	208, 300	60		4	30, 186	162, 739	275, 232
Lithographing (see also Printing and publishing)	5	33, 200	40		3	23, 164	16, 860	52, 334
Lock- and gun-smithing	6	11, 700	10			5, 595	3, 745	13, 546
Looking-glass and picture frames	10	15, 000	32			16, 308	28, 706	65, 227
Lumber, planed (see also Wood, turned and carved)	10	96, 200	86		5	40, 920	124, 925	192, 792
Lumber, sawed	1	25, 000	25			6, 000	34, 000	50, 000
Mantels, slate, marble, and marbleized	2	28, 000	78		2	28, 900	56, 080	112, 000
Marble and stone work	25	113, 745	137		1	60, 490	91, 806	198, 699
Masonry, brick and stone	31	10, 500	190			68, 750	90, 050	200, 970
Mattresses and spring beds (see also Furniture)	3	8, 250	6	2		2, 000	12, 640	17, 440
Mineral and soda waters	3	19, 200	24		8	13, 432	10, 100	33, 700
Models and patterns	7	7, 200	12			6, 838	2, 605	16, 440
Musical instruments and materials (not specified)	1	2, 000	2			1, 036	200	2, 400
Oil, neat's-foot	2	2, 250	5			1, 560	19, 025	23, 486
Paints	2	11, 000	25			6, 080	10, 600	20, 400
Painting and paperhanging	37	16, 600	101		2	50, 044	49, 387	143, 471
Paper	1	35, 000	20	8		7, 497	44, 520	70, 400
Patent medicines and compounds (see also Drugs and chemicals)	5	5, 600	9			7, 098	7, 200	20, 454
Paving materials	5	56, 000	259			99, 500	171, 250	316, 560
Perfumery and cosmetics	1	1, 200	4	3		1, 820	3, 750	7, 500
Photographing	16	34, 750	34	5		16, 291	10, 515	55, 551
Plumbing and gasfitting	31	47, 750	129		6	66, 194	102, 799	225, 193
Printing and publishing (see also Lithographing)	28	971, 800	1, 026	688	28	1, 478, 880	827, 519	2, 896, 312
Saddlery and harness	26	30, 400	45			19, 471	33, 157	80, 349
Shirts	2	4, 310	3	19		9, 740	15, 850	36, 350
Soap and candles	5	60, 966	22		1	7, 735	41, 678	66, 563
Spectacles and eyeglasses	2	1, 000	2			570	900	5, 700
Stationery goods	2	2, 300	3		1	2, 485	2, 856	10, 311
Stereotyping and electrotyping (see also Type founding)	1	1, 500	7			2, 458	800	5, 682
Stone- and earthen-ware	1	200	1			150	150	650
Taxidermy	1	5, 000	6			6, 100	2, 000	25, 060
Terra-cotta ware (see also Brick and tile)	2	146, 550	24			14, 000	8, 000	43, 000
Tinware, copperware, and sheet-iron ware	42	66, 965	87		3	44, 857	96, 472	192, 081
Tobacco, cigars and cigarettes	43	25, 950	81		8	31, 628	45, 692	118, 318
Type founding (see also Stereotyping and electrotyping)	1	5, 000	2			1, 600	3, 000	6, 600
Umbrellas and canes	5	1, 150	3	3	1	785	2, 070	6, 218
Upholstering (see also Furniture)	10	18, 550	25	5	1	12, 341	27, 016	56, 191
Vinegar	1	6, 000	4			2, 500	4, 000	13, 000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	10	6, 565	7		1	2, 252	3, 230	11, 323
Watch and clock repairing	32	17, 460	40		5	24, 361	6, 345	42, 360
Wirework	1	300	1		2	360	300	1, 170
Wood, turned and carved (see also Lumber, planed)	1	100					250	800

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—FLORIDA, BY TOTALS OF COUNTIES.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	426	$3, 210, 680	4, 564	558	382	$1, 270, 875	$3, 040, 119	$5, 546, 448
Alachua	27	74, 050	80	....	....	20, 360	59, 246	103, 534
Baker (*a*)								
Bradford	2	30, 000	30	....	....	11, 500	35, 500	68, 400
Brevard	1	1, 000	2	....	....	300	1, 025	1, 800
Calhoun (*a*)								
Clay	6	3, 725	18	....	....	919	3, 850	7, 032
Columbia	19	56, 850	86	1	13	15, 257	99, 444	144, 445
Dade (*a*)								
Duval	44	373, 850	572	15	10	175, 094	296, 317	582, 650
Escambia	15	767, 000	446	....	2	177, 430	516, 030	868, 785
Franklin	4	550	1	....	....	1, 300	2, 100	3, 400
Gadsden	7	13, 000	9	....	....	2, 800	18, 140	26, 456
Hamilton	6	12, 300	27	....	3	3, 432	11, 100	19, 015
Hernando	1	300	1	....	....	800	4, 000	5, 000
Hillsborough	6	13, 100	29	....	16	4, 950	25, 550	41, 400
Holmes	1	1, 200	2	....	....	300	1, 420	2, 500
Jackson	12	20, 000	22	1	....	3, 045	51, 101	61, 409
Jefferson	21	22, 430	32	....	....	4, 445	20, 145	31, 507
Lafayette	4	2, 600	2	....	....	300	5, 250	6, 101
Leon	18	33, 400	75	2	10	13, 877	67, 832	95, 195
Levy	27	99, 400	124	....	15	48, 580	76, 040	170, 650
Liberty (*a*)								
Madison	16	350, 225	257	....	....	70, 308	198, 000	343, 510
Manatee	4	4, 200	10	....	1	4, 100	6, 200	12, 000
Marion	15	66, 200	38	....	....	7, 582	27, 900	46, 381
Monroe	76	465, 100	1, 454	489	263	378, 773	572, 807	1, 366, 785
Nassau	13	151, 800	315	....	6	75, 650	252, 931	398, 289
Orange	12	24, 500	50	....	2	8, 740	33, 175	62, 000
Polk	1	2, 000	3	....	1	500	2, 850	4, 000
Putnam	9	30, 450	51	....	14	7, 000	44, 240	70, 500
Saint John's (*a*)								
Santa Rosa	9	399, 500	268	....	18	100, 600	361, 825	522, 500
Sumter	6	12, 000	28	....	5	5, 329	19, 450	32, 200
Suwannee	17	100, 600	424	50	3	102, 475	110, 066	251, 370
Taylor	5	8, 300	7	....	....	904	11, 860	14, 325
Volusia	4	15, 100	9	....	....	2, 050	12, 100	21, 944
Wakulla	1	1, 000	3	....	....	600	1, 800	3, 200
Walton	13	29, 950	38	....	....	6, 575	32, 025	47, 565
Washington	4	25, 000	51	....	....	15, 000	58, 800	110, 600

a Returned as having no manufactures.

B—FLORIDA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	426	$3, 210, 680	4, 564	558	382	$1, 270, 875	$3, 040, 119	$5, 546, 448
Blacksmithing (see also Wheelwrighting)	26	23, 800	57	....	1	16, 641	21, 675	56, 085
Boots and shoes, including custom work and repairing	2	650	....	....	....	....	575	1, 650
Boxes, wooden, packing	4	4, 600	10	....	....	2, 400	1, 600	6, 700
Bread and other bakery products	2	2, 000	7	....	....	3, 420	13, 900	20, 780
Brick and tile	9	7, 850	104	....	3	12, 458	9, 750	28, 100
Carpentering	9	18, 200	56	....	1	22, 707	25, 200	88, 400
Carriages and wagons (see also Wheelwrighting)	2	3, 000	14	....	....	3, 748	5, 400	13, 500
Confectionery	2	2, 500	2	2	2	1, 944	1, 800	5, 700
Cotton goods	1	11, 000	19	2	10	5, 000	18, 095	25, 000
Flouring- and grist-mill products	94	224, 655	140	2	....	22, 257	287, 959	337, 780
Foundery and machine-shop products	1	2, 500	8	....	....	3, 300	1, 100	6, 000
Furniture	3	1, 675	3	....	....	650	1, 215	3, 200
Lumber, planed (see also Sash, doors, and blinds)	1	7, 000	15	....	....	5, 460	8, 000	17, 000
Lumber, sawed	135	2, 219, 550	1, 945	....	85	562, 249	1, 867, 213	3, 060, 291
Marble and stone work	1	10, 000	5	....	....	1, 622	3, 000	5, 500
Painting and paperhanging	1	100	3	....	....	500	2, 000	4, 000
Printing and publishing	3	8, 000	13	....	2	6, 000	5, 250	16, 000
Rice cleaning and polishing	2	900	5	....	1	470	5, 800	8, 607
Saddlery and harness	2	1, 400	3	....	....	1, 644	700	3, 500
Sash, doors, and blinds (see also Lumber, planed)	1	25, 000	12	....	8	5, 000	30, 000	40, 000
Shipbuilding	48	30, 750	46	....	....	33, 580	43, 250	85, 050
Soap and candles	1	300	2	....	....	315	500	1, 000
Starch	1	3, 500	6	....	....	1, 800	2, 000	6, 000
Stone- and earthen-ware	1	1, 000	2	....	2	350	150	850
Tar and turpentine, not including farm products	10	109, 500	539	50	....	129, 400	104, 500	295, 500
Taxidermy	1	2, 000	4	....	....	1, 200	1, 000	4, 000
Tinware, copperware, and sheet-iron ware	2	700	4	....	....	1, 400	900	3, 600
Tobacco, cigars and cigarettes	51	461, 750	1, 495	497	261	409, 616	555, 107	1, 347, 555
Umbrellas and canes	1	1, 000	7	....	....	2, 000	580	4, 000
Upholstering materials	1	2, 500	14	5	5	1, 575	9, 600	12, 800
Watch and clock repairing	3	19, 000	15	....	1	9, 244	8, 300	27, 000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	5	4, 300	9	....	....	2, 925	4, 000	11, 300

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—GEORGIA, BY TOTALS OF COUNTIES.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The State	3, 593	$20, 672, 410	18, 937	3, 619	2, 319	$5, 266, 152	$24, 143, 939	$36, 440, 948
Appling	16	156, 100	252	....	....	45, 682	80, 500	217, 750
Baker	4	8, 700	5	....	....	282	2, 771	3, 738
Baldwin	29	55, 350	118	....	5	16, 922	94, 195	130, 543
Banks	19	30, 250	41	....	1	4, 093	43, 955	55, 437
Bartow	63	400, 730	285	25	27	57, 872	312, 897	474, 417
Berrien	20	83, 425	162	....	....	31, 597	93, 591	157, 040
Bibb	51	651, 800	818	203	134	301, 022	936, 196	1, 724, 125
Brooks	29	47, 890	63	10	20	6, 738	76, 159	107, 640
Bryan	4	35, 000	289	....	....	40, 500	53, 557	118, 300
Bulloch	9	18, 500	20	....	....	1, 309	13, 930	19, 450
Burke	23	43, 100	50	....	....	9, 014	61, 140	76, 855
Butts	11	39, 500	19	....	....	3, 135	81, 372	96, 165
Calhoun	11	14, 875	37	....	2	2, 985	70, 590	78, 307
Camden	6	228, 000	75	....	13	29, 352	226, 600	348, 333
Campbell	43	64, 950	111	....	5	12, 754	162, 330	205, 902
Carroll	75	100, 450	177	2	3	20, 367	144, 263	209, 353
Catoosa	13	88, 325	33	....	1	5, 099	142, 416	171, 338
Charlton	6	21, 700	169	....	....	32, 132	21, 370	93, 715
Chatham	129	1, 176, 970	1, 103	109	97	460, 847	2, 492, 506	3, 483, 866
Chattahoochee	8	14, 050	16	....	....	1, 075	15, 211	17, 398
Chattooga	57	473, 270	119	103	78	46, 199	283, 130	462, 909
Cherokee	55	80, 051	121	17	20	17, 112	88, 114	134, 303
Clarke	20	568, 400	265	286	146	118, 672	434, 270	629, 933
Clay	15	19, 324	45	....	5	5, 702	45, 715	58, 691
Clayton	24	39, 804	64	....	....	12, 010	41, 997	71, 732
Clinch	5	87, 400	116	....	3	27, 300	113, 663	179, 856
Cobb	93	537, 133	341	189	67	120, 778	909, 253	1, 383, 322
Coffee	1	2, 000	4	....	....	300	1, 512	2, 880
Colquitt	4	5, 500	4	....	....	523	5, 145	6, 759
Columbia	7	15, 900	18	....	....	1, 243	18, 840	23, 139
Coweta	57	197, 030	171	13	24	43, 967	142, 364	241, 199
Crawford	21	19, 235	33	....	1	3, 770	38, 005	50, 217
Dade	34	240, 530	334	....	8	28, 853	365, 795	521, 298
Dawson	21	26, 900	37	....	1	5, 286	53, 195	76, 720
Decatur	8	18, 100	16	....	....	3, 250	20, 825	27, 900
De Kalb	61	290, 356	183	58	37	48, 049	288, 695	404, 738
Dodge	16	66, 800	360	....	2	76, 540	139, 823	287, 200
Dooly	15	23, 610	55	....	3	3, 966	28, 557	43, 862
Dougherty	9	25, 700	50	....	....	10, 003	56, 567	75, 600
Douglas	40	49, 425	52	....	....	8, 851	91, 211	117, 272
Early	16	36, 100	32	....	....	4, 137	30, 700	39, 307
Echols	1	2, 000	....	....	....	....	691	760
Effingham	2	3, 000	5	....	....	163	1, 305	2, 065
Elbert	22	59, 600	48	....	....	7, 755	69, 685	90, 387
Emanuel	5	36, 000	121	....	4	20, 400	70, 160	110, 750
Fannin	5	5, 700	25	....	....	2, 700	8, 150	17, 500
Fayette	8	23, 300	10	....	....	1, 250	55, 110	63, 425
Floyd	90	512, 005	577	1	36	165, 654	727, 716	1, 104, 376
Forsyth	27	40, 300	73	....	4	10, 107	58, 714	87, 915
Franklin	27	47, 545	45	....	....	4, 530	66, 535	83, 932
Fulton	249	2, 582, 131	2, 933	534	418	927, 898	3, 324, 005	5, 125, 826
Gilmer	6	7, 550	7	....	....	525	10, 100	12, 605
Glascock	[illegible]	24, 700	14	....	....	1, 575	41, 335	44, 755
Glynn	6	868, 000	114	....	65	48, 792	652, 000	755, 785
Gordon	38	81, 260	84	....	....	12, 931	109, 484	155, 933
Greene	49	182, 210	117	30	56	41, 754	250, 954	344, 242
Gwinnett	79	87, 760	181	1	9	29, 285	222, 433	316, 629
Habersham	26	30, 580	61	1	1	7, 300	63, 155	94, 348
Hall	55	106, 278	179	2	13	33, 712	172, 972	249, 575
Hancock	28	46, 950	72	....	....	8, 282	37, 112	59, 320
Haralson	13	19, 800	20	....	6	2, 479	41, 200	46, 423
Harris	29	152, 210	66	25	25	20, 625	139, 613	193, 480
Hart	18	57, 050	40	6	3	4, 562	96, 891	110, 347
Heard	20	47, 900	32	....	1	4, 885	25, 345	38, 760
Henry	35	85, 725	90	....	....	14, 069	109, 403	141, 147
Houston	26	120, 250	143	30	18	28, 819	130, 874	205, 439
Irwin (*a*)	....	....	....	....	....	....	....	....
Jackson	36	50, 255	67	....	2	9, 049	80, 167	106, 868
Jasper	12	30, 300	27	....	....	6, 151	48, 125	66, 443
Jefferson	29	54, 850	88	1	....	17, 086	78, 377	123, 694
Johnson	13	8, 760	15	....	1	1, 869	5, 360	11, 734
Jones	7	24, 400	12	....	1	950	6, 015	9, 590
Laurens	11	23, 150	34	....	....	3, 848	20, 106	33, 148
Lee	15	17, 135	37	....	....	5, 095	34, 245	50, 090
Liberty	15	31, 285	190	2	5	25, 198	27, 423	90, 537
Lincoln	13	21, 700	18	....	....	1, 875	18, 290	24, 512
Lowndes	22	49, 335	191	....	13	30, 753	64, 225	125, 414
Lumpkin	21	25, 170	22	....	1	3, 251	41, 570	60, 690
McDuffie	17	49, 000	48	....	8	8, 675	63, 734	87, 532
McIntosh	7	171, 750	99	....	....	28, 875	410, 875	540, 700

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—GEORGIA, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Macon	7	$11,800	23	....	....	$4,127	$14,250	$22,165
Madison	25	32,130	36	....	2	4,220	65,962	81,333
Marion	15	29,750	32	....	1	6,158	23,976	47,589
Meriwether	36	54,075	71	....	1	8,220	53,990	76,386
Miller	5	8,900	21	....	....	700	21,340	23,630
Milton	29	30,550	44	....	4	5,561	67,114	87,045
Mitchell	7	20,300	83	....	....	14,860	41,180	70,017
Monroe	28	52,330	55	....	1	5,675	65,777	76,168
Montgomery	1	2,500	4	....	....	300	5,000	7,020
Morgan	32	57,525	67	....	1	9,021	81,114	104,938
Murray	22	23,700	36	....	1	4,562	34,235	47,548
Muscogee	64	2,456,371	1,186	1,133	346	599,121	1,624,614	3,019,309
Newton	32	80,200	58	33	8	13,486	102,834	139,574
Oconee	4	4,000	8	....	....	2,125	3,860	8,400
Oglethorpe	54	78,065	108	1	1	19,015	96,405	139,213
Paulding	30	30,900	48	....	1	7,483	69,355	99,129
Pickens	42	56,110	45	7	12	6,680	83,955	111,304
Pierce	13	199,000	316	11	10	80,500	142,300	302,725
Pike	46	164,560	149	1	2	38,197	150,924	249,052
Polk	39	529,570	492	....	4	87,581	207,103	374,395
Pulaski	17	51,375	57	8	6	8,421	54,934	77,134
Putnam	24	61,700	58	....	....	10,023	124,875	145,507
Quitman	7	21,300	12	....	....	1,600	42,572	49,396
Rabun	2	1,700	4	....	....	100	975	1,000
Randolph	11	23,300	28	....	....	2,831	24,690	30,799
Richmond	86	2,402,275	1,126	523	310	527,700	2,466,570	3,490,780
Rockdale	61	92,720	156	4	6	27,617	148,560	223,115
Schley	10	13,900	18	....	1	2,690	38,221	43,055
Screven	8	80,300	96	....	....	20,245	61,375	109,780
Spalding	25	63,050	79	....	4	24,090	98,705	157,115
Stewart	16	23,650	29	....	....	3,515	71,805	86,331
Sumter	21	95,207	118	1	....	24,355	66,345	122,411
Talbot	26	53,850	73	....	8	6,545	116,660	132,987
Taliaferro	5	12,400	[illegible]	....	....	1,100	12,472	15,960
Tattnall	11	92,750	33	....	....	10,428	13,580	38,840
Taylor	28	69,000	105	....	....	13,633	38,030	67,116
Telfair	10	39,180	129	....	1	36,309	31,449	122,054
Terrell	21	52,500	87	....	2	19,563	69,280	107,450
Thomas	27	37,275	107	....	....	21,258	47,203	90,107
Towns	2	3,100	3	....	....	475	4,335	5,016
Troup	81	406,700	199	77	63	61,745	300,492	489,106
Twiggs	12	15,280	32	1	....	2,964	33,565	43,003
Union	8	5,800	8	....	....	975	13,403	16,924
Upson	41	222,170	112	58	31	26,043	211,829	301,139
Walker	33	50,200	25	....	....	4,293	122,270	153,466
Walton	48	188,660	95	52	49	31,319	132,987	219,902
Ware	10	87,450	237	....	3	33,230	112,350	195,260
Warren	14	124,500	86	50	21	23,282	128,156	198,269
Washington	23	40,700	67	....	....	13,737	60,725	93,238
Wayne	22	194,800	383	11	9	111,975	276,650	470,269
Webster	17	20,250	20	....	....	2,646	30,300	43,800
White	2	2,600	3	....	....	450	6,850	8,220
Whitfield	30	79,550	60	....	1	11,638	195,614	238,963
Wilcox	7	6,350	8	....	....	1,300	24,205	29,100
Wilkes	18	41,160	49	....	....	10,640	49,875	73,530
Wilkinson	30	37,745	46	....	1	5,560	58,715	77,296
Worth	12	46,500	133	....	20	32,250	101,550	170,880

B—GEORGIA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	3,593	$20,672,410	18,937	3,619	2,319	$5,266,152	$24,143,939	$36,440,948
Agricultural implements	20	200,124	230	....	44	77,585	337,846	601,935
Bagging, flax, hemp, and jute	1	40,000	17	20	13	10,400	50,000	65,000
Bags, paper	1	75,000	45	30	20	30,000	100,000	140,000
Baking and yeast powders (see also Drugs and chemicals)	1	5,000	3	2	....	1,100	10,000	15,000
Blacksmithing (see also Wheelwrighting)	435	159,700	596	....	8	123,198	146,269	472,945
Bookbinding and blank-book making	2	2,500	3	7	4	3,000	2,000	9,600
Boots and shoes, including custom work and repairing	153	157,155	300	3	6	84,450	202,522	406,536
Boxes, fancy and paper	2	26,500	7	30	8	5,900	12,500	24,200
Boxes, wooden, packing	2	9,000	8	....	....	2,300	6,600	16,300
Brass castings	1	5,000	4	....	2	1,560	1,000	4,000
Bread and other bakery products	26	118,450	159	14	24	55,742	343,280	464,162
Brick and tile	76	212,660	1,022	14	192	188,883	115,747	409,025
Bridges	1	500	6	....	....	2,000	500	5,000
Carpentering	84	140,045	684	....	12	219,594	421,862	814,049
Carriages and wagons (see also Wheelwrighting)	59	275,300	515	1	12	184,159	246,470	582,581

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—GEORGIA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Cars, railroad, street, and repairs	1	$10,000	12			$3,200	$6,000	$11,000
Cement	1	3,000	10			1,800	800	8,000
Clothing, men's	9	27,550	26	81		23,890	34,650	76,350
Coal-tar	1	10,000	26			3,500	10,000	20,000
Coffee and spices, roasted and ground	1	17,000	8	3	6	5,200	21,000	43,000
Coffins, burial cases, and undertakers' goods	4	24,500	46			14,101	26,128	50,153
Coke	1	80,000	107			13,837	124,900	140,000
Confectionery	14	130,700	82	24	4	28,831	263,165	336,325
Cooperage	7	11,950	29			9,880	43,100	60,172
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	1	500	1			200	900	1,600
Cotton compressing	1	1,800	5			1,000	1,500	3,200
Cotton goods	44	6,537,657	1,861	2,969	1,411	1,141,782	4,039,673	6,513,490
Cotton-ties	1	500	1			100	600	1,200
Dentistry, mechanical	2	1,800					1,800	5,500
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	1	10,000	100	25		37,000	50,000	125,000
Dyeing and cleaning	4	7,850	9	4		3,914	2,824	11,500
Dyeing and finishing textiles	1	3,000	4	1		1,400	724	3,500
Fertilizers	3	240,000	64		3	22,877	203,000	246,500
Flouring- and grist-mill products	1,132	3,576,301	1,823	4	18	327,602	8,619,092	9,793,898
Foundery and machine-shop products	39	916,510	868	7	37	343,072	612,483	1,299,491
Furniture (see also Mattresses and spring beds; Upholstering)	40	56,865	190	3	10	45,527	54,364	186,514
Furniture, chairs	3	6,700	16	8		5,690	5,600	31,900
Housefurnishing goods	1	3,000	2			500	2,000	3,000
Ice, artificial	8	243,000	59		1	21,165	25,510	97,060
Instruments, professional and scientific	2	5,000	6			3,500	5,300	16,000
Iron and steel	14	1,135,900	1,266		37	185,489	631,707	990,850
Kaolin and ground earths	1	10,000	15		5	3,000	3,500	10,000
Leather, curried	79	60,009	89		2	18,040	190,753	296,150
Leather, tanned	94	143,441	150		2	32,244	197,943	323,807
Lime	1	5,000	20		5	5,500	3,600	11,500
Liquors, distilled	25	41,073	31			5,350	45,817	73,070
Liquors, malt	1	65,000	25			10,943	60,567	99,584
Lithographing (see also Printing and publishing)	1	1,500	2			626	6,000	12,000
Lock- and gun-smithing	4	3,500	2		1	950	925	3,900
Looking-glass and picture frames	4	4,600	8			2,920	8,600	15,339
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	13	122,000	319		15	85,389	195,300	371,200
Lumber, sawed	655	3,101,452	3,298		94	554,085	3,197,155	4,875,310
Marble and stone work	10	45,100	65			24,720	32,039	88,567
Masonry, brick and stone	4	2,675	38			7,450	7,500	18,300
Mattresses and spring beds (see also Furniture)	4	4,900	9	7	2	3,760	5,100	12,600
Millstones	1	10,000	6			2,000	10,000	30,000
Mineral and soda waters	6	13,300	22		2	8,206	10,889	33,288
Models and patterns	1	500	1			600	400	1,840
Musical instruments, organs and materials	1	1,500	2			750	1,500	2,400
Oil, lubricating	1	3,000	3			750	100	3,000
Painting and paperhanging	21	46,650	105		1	46,603	44,513	124,830
Paints	1	1,000	3		3	1,200	1,200	4,500
Paper	7	255,000	102	41	7	31,668	149,563	221,572
Patent medicines and compounds (see also Drugs and chemicals)	12	114,500	64	19	7	32,479	56,900	138,500
Paving materials	2	7,500	13			3,600	6,000	13,100
Perfumery and cosmetics	1	5,000	5	2	1	2,600	4,000	8,000
Photographing	2	2,000	4			1,900	4,000	8,500
Plumbing and gasfitting	8	18,400	50			17,171	37,474	72,100
Printing and publishing (see also Lithographing)	21	506,800	405	21	57	213,052	218,306	579,054
Rice cleaning and polishing	9	263,000	111	74	24	34,957	1,309,400	1,488,769
Saddlery and harness	37	100,595	107	10	16	44,219	113,925	211,545
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	14	160,500	326		22	79,274	158,000	366,000
Shipbuilding	2	3,000	4			2,250	13,700	17,000
Silversmithing	1	800					250	1,885
Slaughtering and meat-packing, not including retail butchering establishments.	9	25,700	35		6	9,473	269,077	309,093
Stencils and brands	3	2,900	4			1,468	1,450	5,000
Stone- and earthen-ware	5	1,175	17		3	1,850	1,050	5,225
Straw goods	2	21,000	8	115	9	21,000	16,200	75,000
Surgical appliances	1	1,000	2	1		600	1,000	2,000
Tar and turpentine, not including farm products	84	513,885	2,622	24	97	506,842	490,355	1,455,739
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	56	155,350	204		8	67,560	181,710	329,624
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	10,000	15	2	13	3,000	10,000	15,000
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	21	37,900	68	7	13	38,751	46,587	104,364
Trunks and valises	3	10,300	15	1		5,600	7,500	16,800
Upholstering (see also Furniture)	2	550	2			215	1,100	2,000
Watch and clock repairing	10	8,450	10		2	5,674	6,150	22,100
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	118	87,155	233		4	63,065	64,860	207,367
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	2	5,000	6		1	2,800	3,500	9,500
Woolen goods	32	180,733	72	45	25	25,070	165,065	239,390

Table IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—IDAHO TERRITORY, BY TOTALS OF COUNTIES.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The Territory	162	$677, 215	374	8	6	$136, 326	$844, 874	$1, 271, 317
Ada	34	261, 050	87	2	....	44, 750	358, 160	511, 790
Alturas	2	11, 600	12	....	....	4, 000	13, 250	20, 150
Bear Lake	17	43, 650	38	6	2	10, 140	38, 641	68, 529
Boisé	24	80, 025	28	....	1	10, 194	54, 763	97, 816
Cassia	7	10, 300	13	....	1	3, 250	10, 450	19, 350
Idaho	14	38, 850	32	....	....	9, 996	49, 275	78, 800
Kootenai	2	4, 000	3	....	....	500	2, 390	4, 545
Lemhi	3	20, 000	7	....	....	1, 850	22, 050	32, 161
Nez Percé	22	102, 640	60	....	....	21, 077	80, 350	129, 411
Oneida	22	62, 300	66	....	2	16, 752	178, 470	232, 370
Owyhee	11	27, 300	21	....	....	12, 057	23, 630	55, 095
Shoshone	1	5, 000	3	....	....	900	6, 600	10, 300
Washington	3	10, 500	4	....	....	860	6, 845	11, 000

B—IDAHO TERRITORY, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	162	$677, 215	374	8	6	$136, 326	$844, 874	$1, 271, 317
Blacksmithing (see also Wheelwrighting)	28	39, 750	39	....	....	24, 791	36, 203	97, 250
Boots and shoes, including custom work and repairing	11	15, 975	23	1	1	13, 214	17, 025	46, 026
Bread and other bakery products	3	5, 800	4	....	....	2, 200	3, 450	7, 500
Brick and tile	2	2, 500	11	....	....	3, 340	1, 850	6, 990
Carpentering	17	36, 980	39	....	....	20, 750	55, 300	98, 175
Carriages and wagons (see also Wheelwrighting)	1	2, 500	2	....	....	1, 800	6, 000	10, 000
Cheese and butter (factory)	6	15, 250	8	5	....	2, 100	6, 590	13, 239
Flouring- and grist-mill products	16	287, 000	46	2	....	16, 155	422, 630	520, 986
Foundery and machine-shop products	1	4, 000	4	....	....	1, 500	6, 000	12, 000
Furniture	2	800	1	....	....	80	300	1, 500
Leather, curried	2	1, 850	1	....	1	500	2, 687	3, 949
Leather, tanned	2	1, 850	1	....	....	500	1, 816	2, 612
Liquors, distilled	1	6, 000	1	....	....	375	2, 230	3, 710
Liquors, malt	2	9, 000	3	....	....	794	3, 077	5, 395
Lumber, sawed	48	192, 460	169	....	4	33, 367	230, 566	349, 635
Saddlery and harness	5	14, 500	7	....	....	5, 850	23, 400	37, 850
Sash, doors, and blinds	1	6, 000	1	....	....	300	1, 200	3, 000
Tinware, copperware, and sheet-iron ware	8	29, 300	10	....	....	7, 460	21, 100	41, 300
Watch and clock repairing	2	2, 200	....	....	....	....	350	2, 200
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	4	3, 500	4	....	....	1, 250	3, 100	8, 000

A—ILLINOIS, BY TOTALS OF COUNTIES.

	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	14, 549	$140, 652, 066	120, 558	15, 233	8, 936	$57, 429, 085	$289, 843, 907	$414, 864, 673
COUNTIES.								
Adams	425	4, 368, 400	3, 068	151	315	1, 330, 646	5, 753, 890	8, 904, 995
Alexander	45	443, 800	345	....	11	125, 435	1, 119, 323	1, 433, 070
Bond	53	77, 165	93	....	....	20, 899	163, 491	230, 575
Boone	76	142, 550	140	4	1	48, 385	241, 174	353, 240
Brown	55	88, 585	129	....	4	30, 715	132, 406	207, 042
Bureau	130	309, 925	291	1	10	76, 714	367, 205	560, 708
Calhoun	31	33, 250	34	....	....	3, 920	19, 534	36, 793
Carroll	63	185, 650	107	6	3	35, 493	280, 892	395, 059
Cass	67	156, 640	95	2	7	25, 427	277, 816	367, 558
Champaign	210	432, 071	477	6	26	139, 941	451, 909	789, 189
Christian	122	219, 150	272	2	5	84, 905	547, 302	807, 339
Clark	76	161, 835	193	5	2	40, 521	376, 577	565, 313
Clay	37	84, 800	94	....	3	19, 055	187, 820	252, 834
Clinton	117	435, 800	319	1	7	97, 954	1, 040, 848	1, 328, 786
Coles	130	418, 708	485	22	10	156, 568	759, 681	1, 125, 220
Cook	3, 775	72, 401, 453	64, 454	12, 232	4, 909	35, 603, 567	181, 867, 817	253, 910, 548
Crawford	35	106, 450	105	....	....	24, 095	181, 330	249, 883
Cumberland	42	64, 990	119	....	....	21, 602	141, 285	213, 984
De Kalb	154	948, 283	748	16	20	310, 354	1, 041, 015	1, 645, 980
De Witt	70	159, 575	180	....	7	46, 360	125, 468	238, 221
Douglas	54	105, 485	90	....	1	18, 651	154, 309	227, 297
Du Page	119	359, 294	239	24	19	82, 128	567, 653	812, 976
Edgar	127	288, 220	371	1	12	88, 034	471, 834	725, 765
Edwards	25	71, 700	69	....	6	14, 637	66, 762	112, 313
Effingham	68	213, 520	183	6	17	50, 865	372, 897	509, 690
Fayette	90	285, 834	279	3	5	68, 513	421, 789	587, 261
Ford	58	90, 225	94	....	1	22, 251	75, 661	137, 421
Franklin	18	69, 200	69	1	4	20, 805	187, 422	253, 458
Fulton	185	857, 335	707	36	43	210, 447	914, 794	1, 429, 975
Gallatin	27	53, 550	78	....	....	14, 680	78, 075	115, 460
Greene	94	373, 540	344	....	3	115, 324	509, 983	758, 242
Grundy	70	267, 925	259	2	34	106, 089	246, 212	470, 006
Hamilton	38	127, 370	120	3	....	27, 974	245, 612	335, 096
Hancock	150	543, 790	337	27	9	103, 411	779, 613	1, 014, 030
Hardin	18	40, 225	34	....	....	8, 792	18, 429	62, 715

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—ILLINOIS, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Henderson	23	$66, 140	66	....	6	$11, 880	$104, 235	$135, 850
Henry	123	497, 400	451	6	44	165, 177	478, 290	812, 702
Iroquois	116	225, 302	262	5	4	72, 617	292, 603	473, 830
Jackson	81	470, 480	268	25	18	71, 935	484, 040	666, 837
Jasper	43	60, 235	135	....	11	20, 145	87, 614	132, 892
Jefferson	44	107, 125	154	24	11	36, 547	333, 951	438, 849
Jersey	51	190, 625	172	3	5	54, 516	404, 702	589, 410
Jo Daviess	194	1, 695, 299	815	66	43	319, 038	1, 149, 933	1, 790, 197
Johnson	25	88, 900	97	....	1	17, 167	168, 421	224, 820
Kane	328	3, 686, 908	2, 619	570	268	1, 423, 229	3, 869, 239	6, 531, 913
Kankakee	73	474, 900	322	98	9	140, 389	559, 896	889, 498
Kendall	53	253, 840	527	10	20	216, 129	467, 420	849, 418
Knox	197	816, 224	789	25	32	263, 096	714, 320	1, 319, 095
Lake	85	492, 750	355	5	8	119, 257	646, 649	922, 367
La Salle	309	3, 097, 840	2, 960	70	183	1, 309, 728	3, 056, 339	5, 647, 142
Lawrence	17	87, 900	89	....	1	21, 330	288, 010	354, 890
Lee	103	668, 825	429	28	10	207, 766	1, 162, 655	1, 681, 349
Livingston	78	189, 325	225	1	40	71, 403	319, 097	478, 240
Logan	96	199, 945	284	1	5	80, 951	270, 231	457, 626
McDonough	106	429, 665	405	31	12	137, 860	523, 882	850, 680
McHenry	214	519, 329	354	127	215	113, 869	1, 062, 788	1, 496, 242
McLean	208	1, 194, 355	906	42	69	338, 396	1, 627, 288	2, 400, 561
Macon	164	1, 125, 195	826	59	71	368, 486	1, 310, 901	2, 333, 481
Macoupin	153	624, 650	439	6	19	156, 926	1, 717, 619	2, 074, 392
Madison	285	1, 970, 111	1, 651	70	324	769, 163	5, 091, 082	7, 298, 568
Marion	101	300, 700	386	11	6	116, 583	409, 295	666, 596
Marshall	80	270, 270	190	36	4	76, 282	289, 874	530, 744
Mason	67	163, 315	131	1	4	37, 320	203, 777	318, 177
Massac	46	305, 180	473	....	30	139, 640	502, 675	739, 886
Menard	42	156, 000	128	4	12	28, 809	191, 322	294, 673
Mercer	85	121, 750	166	2	6	45, 231	223, 935	364. 096
Monroe	23	205, 702	141	....	1	56, 375	741, 505	857, 967
Montgomery	109	517, 560	646	8	7	251, 972	1, 587, 608	2, 031, 409
Morgan	195	804, 090	850	39	108	309, 682	1, 418, 140	2, 060, 667
Moultrie	55	74, 900	96	1	2	22, 979	121, 739	196, 352
Ogle	90	281, 875	214	4	12	71, 250	517, 701	730, 421
Peoria	402	4, 450, 872	4, 013	322	151	1, 612, 974	9, 809, 882	14, 703, 382
Perry	48	110, 900	162	....	9	48, 413	381, 435	524, 036
Piatt	26	91, 250	73	....	....	21, 466	123, 330	172, 940
Pike	122	413, 900	325	7	12	113, 369	1, 035, 402	1, 340, 799
Pope	51	102, 135	123	1	....	30, 706	142, 737	211, 161
Pulaski	29	391, 800	279	....	18	93, 213	366, 925	589, 112
Putnam	19	23, 040	35	....	....	7, 173	20, 869	38, 870
Randolph	98	631, 625	342	7	1	129, 743	1, 727, 770	2, 075, 000
Richland	69	161, 775	225	12	17	57, 299	464, 778	596, 528
Rock Island	228	4, 738, 822	3, 213	65	330	1, 609, 717	4, 603, 023	7, 794, 268
Saint Clair	349	5, 343, 404	4, 973	12	572	1, 775, 942	12, 845, 905	17, 319, 819
Saline	31	94, 675	139	....	8	31, 067	184, 515	256, 870
Sangamon	238	2, 658, 631	2, 164	214	275	932, 398	4, 316, 981	5, 872, 368
Schuyler	44	143, 085	115	27	5	44, 726	236, 627	357, 452
Scott	53	65, 880	104	3	9	28, 451	116, 968	188, 667
Shelby	109	222, 280	262	....	17	71, 882	533, 472	727, 727
Stark	69	98, 100	101	2	9	29, 534	118, 065	196, 775
Stephenson	188	1, 085, 676	794	25	27	317, 261	1, 221, 189	2, 045, 117
Tazewell	158	1, 248, 400	899	8	14	320, 348	1, 579, 363	2, 416, 898
Union	44	146, 625	258	....	6	63, 112	528, 298	659, 870
Vermilion	160	603, 210	540	44	39	189, 232	815, 792	1, 241, 182
Wabash	19	61, 310	55	....	8	12, 950	216, 000	263, 602
Warren	42	715, 848	577	1	3	199, 804	527, 518	859, 803
Washington	87	451, 382	301	....	5	97, 313	1, 235, 874	1, 666, 343
Wayne	51	170, 000	195	71	28	61, 236	350, 803	454, 636
White	76	286, 655	375	1	18	87, 213	692, 254	897, 419
Whiteside	188	1, 527, 471	864	48	18	384, 585	1, 881, 370	2, 868, 624
Will	224	3, 533, 805	2, 620	130	110	1, 164, 372	8, 252, 302	12, 544, 737
Williamson	25	85, 725	94	3	5	25, 840	126, 549	180, 184
Winnebago	292	3, 289, 107	2, 088	301	108	959, 245	2, 533, 344	4, 668, 974
Woodford	94	243, 775	208	....	3	50, 201	237, 873	381, 531

B—ILLINOIS, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	14, 549	$140, 652, 066	120, 558	15, 233	8, 936	$57, 429, 085	$289, 843, 907	$414, 864, 673
Agricultural implements	220	11, 306, 955	6, 989	27	284	3, 186, 999	6, 722, 930	13, 498, 575
Awnings and tents	12	13, 300	33	28	1	16, 415	51, 947	82, 251
Axle-grease	3	202, 500	21	2	3	14, 800	66, 737	141, 000
Bagging, flax, hemp, and jute	3	175, 000	95	40	40	47, 531	109, 000	215, 110
Bags, other than paper	1	25, 000	13	7	....	12, 000	130, 000	150, 000

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—ILLINOIS, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Bags, paper	3	$101, 200	29	37	6	$24, 375	$532, 300	$608, 800
Baking and yeast powders (see also Drugs and chemicals)	9	151, 700	90	45	1	51, 069	519, 750	686, 600
Baskets, rattan and willow ware	15	108, 222	121	1	14	49, 550	54, 810	124, 785
Belting and hose, leather	2	192, 796	58			26, 710	225, 000	302, 275
Billiard tables and materials	4	263, 200	300			137, 225	283, 900	665, 400
Blacking	1	10, 000	5			2, 400	6, 000	20, 000
Blacksmithing (see also Wheelwrighting)	1, 856	1, 366, 074	2, 082		39	753, 289	990, 046	3, 020, 521
Bone-, ivory-, and lamp-black	3	45, 000	53			19, 500	92, 500	163, 500
Bookbinding and blank-book making	45	253, 475	284	196	53	214, 024	241, 060	597, 077
Boots and shoes, including custom work and repairing	1, 117	2, 453, 831	2, 938	364	141	1, 223, 162	2, 623, 354	5, 103, 147
Boxes, cigar	9	65, 300	49	50	26	39, 658	122, 290	196, 311
Boxes, fancy and paper	13	68, 700	71	180	32	83, 550	119, 100	262, 292
Boxes, wooden, packing	23	575, 300	1, 010	18	117	459, 777	1, 328, 832	2, 008, 159
Brass castings	15	461, 500	550		3	249, 118	385, 085	784, 005
Bread and other bakery products	267	993, 810	1, 103	221	69	577, 065	2, 648, 972	3, 857, 139
Brick and tile (see also Terra-cotta ware)	616	2, 397, 023	5, 319	13	571	1, 288, 604	955, 584	3, 065, 302
Bridges	3	348, 000	642			311, 763	1, 473, 000	1, 974, 000
Brooms and brushes	88	307, 225	436	106	51	181, 578	357, 852	686, 166
Buttons	3	29, 000	12	71	4	16, 642	27, 085	66, 700
Carpentering	742	1, 220, 822	3, 650	1	69	1, 602, 128	3, 224, 708	5, 908, 100
Carpets, rag	19	4, 420	16	2	2	7, 297	12, 798	28, 469
Carriage and wagon materials	7	24, 700	37			10, 370	18, 100	38, 800
Carriages and sleds, children's	1	15, 000	7	6		3, 900	8, 000	15, 000
Carriages and wagons (see also Wheelwrighting)	215	3, 466, 830	3, 017	37	177	1, 429, 705	2, 331, 111	5, 003, 053
Cars, railroad, street, and repairs	7	771, 500	1, 057		29	476, 742	1, 875, 291	2, 543, 682
Cement	2	340, 000	132		13	40, 000	30, 000	93, 000
Cheese and butter (factory)	285	933, 586	631	56	11	233, 974	2, 840, 327	3, 876, 085
Cleansing and polishing preparations	1	6, 000	8	3	1	3, 500	3, 900	13, 000
Clothing, men's	330	7, 135, 533	4, 842	4, 499	385	3, 929, 964	12, 809, 297	19, 356, 849
Clothing, women's	19	353, 500	72	1, 488	23	334, 885	1, 017, 720	1, 585, 990
Coffee and spices, roasted and ground	15	530, 900	209	44	51	159, 996	2, 477, 021	3, 008, 879
Coffins, burial cases, and undertakers' goods	39	306, 675	179	13	8	99, 477	251, 295	470, 985
Coke	4	205, 000	16		2	9, 347	15, 420	24, 700
Confectionery	44	482, 250	373	173	139	242, 908	1, 589, 850	2, 208, 792
Cooperage	372	805, 720	2, 297	1	48	877, 471	1, 737, 539	3, 233, 305
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	3	3, 100	10			4, 460	4, 820	14, 200
Cordage and twine	2	8, 200	6		5	3, 241	19, 850	28, 500
Cork cutting	3	45, 800	24	15	17	22, 103	125, 038	217, 220
Corsets	2	15, 075	10	104		38, 334	100, 900	177, 384
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	4	256, 000	83	100	87	51, 035	156, 503	244, 261
Cutlery and edge tools (see also Hardware; Tools)	13	133, 700	143	8	27	71, 581	52, 170	185, 000
Dentistry, mechanical	82	65, 290	54	5	2	29, 163	41, 970	217, 539
Dentists' materials	3	11, 000	18	5		11, 300	12, 000	46, 000
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds)	28	513, 800	230	66	16	132, 700	734, 828	1, 170, 216
Dyeing and cleaning	21	82, 000	81	15	7	50, 283	47, 768	149, 006
Dyeing and finishing textiles	11	69, 850	72	13	7	46, 519	45, 565	135, 521
Electrical apparatus and supplies (see also Telegraph and telephone apparatus).	3	271, 200	127	25		100, 603	143, 587	543, 000
Electroplating	11	32, 300	42	2	6	22, 645	13, 020	71, 000
Engraving and die-sinking	6	18, 100	22	3		17, 397	13, 650	49, 750
Engraving, wood	16	35, 825	66	3	8	51, 785	12, 970	116, 775
Envelopes	1	3, 000	3	2	3	2, 500	3, 000	8, 000
Explosives and fireworks	2	45, 000	14	8	15	7, 000	11, 500	30, 000
Fancy articles	1	1, 500	3	3		2, 000	5, 000	10, 000
Fertilizers	6	467, 000	220			110, 760	500, 957	729, 400
Files (see also Saws)	7	33, 800	66		8	28, 535	17, 800	68, 600
Fire-arms	1	United States	64		16	39, 000	76, 800	115, 800
Fire extinguishers, chemical	2	370, 000	113		2	82, 500	75, 000	190, 000
Flavoring extracts	4	71, 200	65	40	5	36, 730	334, 500	461, 500
Flax, dressed	15	111, 755	189	19	11	61, 124	50, 130	138, 593
Flouring- and grist-mill products	1, 024	13, 579, 680	4, 950	7	3	1, 868, 124	41, 486, 756	47, 471, 558
Food preparations (see page 39)	6	90, 400	30	12	8	16, 160	58, 700	120, 900
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	299	7, 568, 359	7, 377	6	251	3, 644, 339	7, 107, 553	13, 515, 791
Fruits, vegetables, canned and preserved	12	151, 200	175	187	335	86, 602	504, 315	730, 843
Furnishing goods, men's	13	586, 100	144	1, 119	47	392, 700	1, 143, 275	1, 835, 597
Furniture (see also Mattresses and spring beds; Upholstering)	335	3, 554, 130	5, 206	79	410	2, 497, 778	3, 607, 313	7, 644, 638
Furniture, chairs	11	270, 000	326	3	61	140, 180	178, 890	397, 572
Furs, dressed	16	168, 800	60	105	2	56, 908	241, 600	398, 850
Gas and lamp fixtures	3	17, 100	46	1	2	18, 600	41, 225	96, 000
Gas machines and meters	3	45, 500	42			19, 723	28, 884	64, 800
Glass	7	445, 000	632		100	342, 027	297 842	901, 343
Glass, cut, stained, and ornamented	6	39, 600	76	1	3	47, 545	38, 564	113, 612
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	12	130, 000	95	191	5	71, 191	211, 200	325, 200
Glucose	3	450, 000	367		3	116, 700	1, 025, 420	1, 450, 400
Glue	3	465, 000	199	75	8	95, 700	281, 000	563, 500
Gold and silver leaf and foil	3	22, 000	34	45	2	25, 750	41, 000	85, 000
Gold and silver, reduced and refined (not from the ore)	2	40, 000	18			11, 170	96, 810	126, 470
Grease and tallow	14	694, 000	227		1	123, 954	1, 454, 775	1, 764, 300
Hairwork	21	55, 050	9	120		28, 842	67, 950	143, 415
Hand-knit goods	7	14, 900	4	106	9	14, 065	43, 470	64, 072
Handles, wooden	4	5, 350	11		2	4, 750	5, 535	16, 000

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—ILLINOIS, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Hand-stamps	4	$5, 500	11	1	1	$7, 140	$11, 600	$26, 050
Hardware (see also Cutlery and edge tools; Tools)	22	291, 370	300	1	36	146, 583	296, 795	575, 502
Hardware, saddlery	3	30, 100	32	1	20	18, 200	48, 200	87, 000
Hats and caps, not including wool hats	14	22, 550	40	35	7	31, 226	41, 350	98, 900
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	14	105, 800	160	471	76	92, 385	290, 895	484, 124
Housefurnishing goods	1	31, 000	8	10	....	6, 000	60, 000	80, 000
Ink	5	57, 750	19	4	14	12, 597	26, 000	79, 000
Iron and steel	21	6, 460, 620	4, 887	....	366	2, 508, 718	14, 977, 145	20, 545, 289
Iron bolts, nuts, washers, and rivets	4	187, 000	295	....	40	164, 800	727, 150	1, 104, 000
Iron doors and shutters	3	7, 500	18	....	....	11, 720	19, 800	40, 560
Iron forgings	5	145, 800	155	....	....	73, 130	424, 337	585, 581
Iron nails and spikes, cut and wrought	5	448, 000	339	29	78	192, 528	375, 430	804, 270
Iron pipe, wrought	2	735, 000	690	12	70	321, 521	881, 027	1, 455, 470
Iron railing, wrought	5	10, 000	27	....	....	15, 590	17, 400	42, 882
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	13	68, 000	144	....	12	72, 854	177, 800	318, 900
Ivory and bone work	2	2, 900	1	....	....	246	1, 500	6, 200
Japanning	3	9, 100	26	....	1	6, 300	5, 000	17, 100
Jewelry	13	74, 600	81	4	5	53, 396	107, 380	247, 004
Jewelry and instrument cases	2	3, 100	4	....	1	2, 100	3, 250	8, 000
Labels and tags	3	16, 100	8	2	4	5, 995	16, 750	28, 800
Lamps and reflectors	4	453, 500	345	25	55	159, 250	648, 408	1, 051, 346
Lapidary work	1	400	1	....	....	300	200	2, 000
Lard, refined	4	1, 012, 700	329	40	75	181, 200	4, 637, 050	5, 055, 000
Lasts	3	16, 500	34	....	2	19, 988	34, 075	61, 700
Lead, bar, pipe, sheet, and shot	3	153, 000	28	1	3	17, 379	85, 750	150, 401
Leather, curried	18	534, 786	247	....	1	141, 096	1, 967, 255	2, 391, 380
Leather, tanned	34	2, 220, 114	1, 113	99	29	599, 028	4, 160, 113	5, 402, 070
Lightning rods	3	21, 250	22	....	....	13, 333	37, 650	65, 200
Lime	23	313, 150	397	....	....	149, 212	190, 460	444, 990
Liquors, distilled	36	3, 437, 616	2, 114	....	....	934, 751	10, 066, 860	14, 600, 760
Liquors, malt	111	6, 098, 835	1, 640	2	6	754, 510	3, 261, 272	5, 798, 109
Lithographing (see also Printing and publishing)	13	494, 150	307	12	11	220, 955	263, 549	698, 387
Lock- and gun-smithing	38	44, 380	62	....	3	24, 953	18, 739	77, 512
Looking-glass and picture frames	63	350, 925	798	32	158	361, 675	619, 090	1, 304, 903
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	65	971, 808	1, 155	2	71	474, 739	3, 799, 814	4, 813, 290
Lumber, sawed	640	3, 295, 483	3, 652	....	199	787, 867	3, 144, 905	5, 063, 037
Malt	22	941, 200	257	....	1	117, 710	1, 703, 169	2, 113, 080
Mantels, slate, marble, and marbleized	1	6, 000	4	....	....	2, 496	7, 200	12, 604
Marble and stone work	188	799, 125	1, 556	....	21	712, 515	909, 793	2, 102, 387
Masonry, brick and stone	99	297, [illegible]67	1, 893	....	19	863, 283	1, 778, 296	2, 942, 422
Matches	2	51, 500	16	51	....	16, 065	195, 894	235, 000
Mattresses and spring beds (see also Furniture)	32	223, 350	298	63	50	136, 316	342, 850	758, 508
Millinery and lace goods	19	122, 750	56	306	65	90, 360	267, 060	471, 400
Mineral and soda waters	56	290, 118	314	1	17	120, 868	274, 702	613, 358
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	3	57, 000	36	122	17	39, 650	166, 042	227, 600
Models and patterns	18	18, 200	66	....	1	36, 280	9, 851	72, 572
Musical instruments and materials (not specified)	1	150	....	....	....	....	400	800
Musical instruments, organs and materials	17	261, 000	305	1	42	201, 007	323, 978	656, 500
Musical instruments, pianos and materials	5	20, 300	27	....	....	16, 902	11, 800	37, 675
Oil, castor	3	33, 500	14	....	....	3, 060	20, 090	32, 400
Oil, essential	2	1, 700	10	....	....	5, 100	8, 100	20, 260
Oil, lard	3	190, 000	82	....	3	42, 600	928, 000	1, 107, 000
Oil, linseed	12	1, 035, 000	238	4	11	117, 255	2, 520, 380	3, 099, 893
Oleomargarine	3	208, 800	63	....	7	21, 310	328, 500	437, 800
Painting and paperhanging	269	389, 376	1, 349	1	42	662, 180	745, 547	1, 861, 048
Paints (see also Varnish)	14	792, 800	257	18	7	154, 328	2, 112, 145	2, 799, 700
Paper (see also Envelopes)	23	1, 246, 000	646	82	41	293, 144	884, 688	1, 679, 692
Patent medicines and compounds (see also Drugs and chemicals)	22	322, 050	140	59	7	81, 040	584, 010	827, 410
Paving materials	4	59, 500	91	....	....	39, 037	247, 000	313, 000
Perfumery and cosmetics	3	5, 500	6	3	....	3, 214	5, 800	14, 200
Photographic apparatus	2	23, 000	16	1	4	11, 150	4, 000	18, 930
Photographing	92	256, 325	177	74	7	132, 522	121, 615	455, 733
Pickles, preserves, and sauces	12	87, 500	94	10	12	38, 165	367, 970	518, 200
Pipes, tobacco	6	7, 000	8	....	1	4, 350	3, 625	17, 200
Plated and britannia ware	1	150, 000	65	17	....	26, 885	43, 500	115, 500
Plumbing and gasfitting	106	187, 251	414	3	65	242, 907	400, 585	813, 932
Pocket-books	3	22, 300	61	28	....	31, 890	95, 840	150, 599
Printing and publishing (see also Lithographing)	243	3, 625, 400	3, 650	531	531	2, 401, 894	2, 807, 361	7, 114, 939
Printing materials	4	20, 200	24	....	7	17, 452	26, 300	61, 000
Pumps, not including steam pumps	27	348, 050	225	3	10	85, 443	272, 362	470, 729
Refrigerators	1	800	6	....	4	2, 500	4, 000	9, 000
Regalia and society banners and emblems	2	23, 500	5	16	1	5, 970	41, 260	60, 860
Roofing and roofing materials	20	199, 721	242	....	....	90, 187	437, 877	623, 681
Rubber and elastic goods	3	10, 500	8	10	....	4, 540	25, 750	35, 600
Saddlery and harness	718	1, 246, 281	1, 459	163	172	589, 250	1, 645, 270	3, 095, 322
Safes, doors, and vaults, fire-proof	2	28, 000	27	....	....	10, 250	13, 650	29, 250
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	70	1, 589, 313	2, 185	17	212	968, 621	1, 904, 089	3, 500, 993
Saws	9	58, 400	42	....	....	25, 118	32, 500	92, 000
Scales and balances	6	71, 600	88	....	....	49, 350	123, 340	244, 750
Screws	1	25, 000	24	....	1	10, 500	15, 000	30, 000

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—ILLINOIS, BY SPECIFIED INDUSTRIES—Continued.

Manufacturing and mechanical industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Sewing machines and attachments	17	$1, 187, 600	584	4	8	$332, 776	$379, 534	$1, 387, 911
Sewing-machine cases	7	115, 800	429		36	161, 706	134, 685	382, 355
Shipbuilding	28	457, 000	465			247, 395	492, 010	802, 093
Shirts	32	162, 150	112	458	9	141, 800	427, 957	746, 117
Shoddy (see also Mixed textiles)	2	22, 000	16	12	3	12, 300	74, 500	100, 000
Show-cases	14	62, 100	119		9	65, 276	125, 900	263, 700
Silk and silk goods (see also Mixed textiles)	5	82, 000	67	135	57	72, 195	125, 895	214, 150
Slaughtering and meat-packing, not including retail butchering establishments.	143	12, 019, 980	10, 217		731	4, 077, 617	84, 649, 718	97, 891, 517
Soap and candles	35	1, 407, 750	469	33	80	224, 874	3, 341, 777	3, 930, 322
Soda-water apparatus	1	3, 000	2			2, 000	3, 500	8, 000
Sporting goods	2	6, 500	4	2	2	3, 000	4, 500	19, 000
Springs, steel, car, and carriage	6	46, 000	67		1	38, 240	152, 500	227, 500
Stamped ware (see also Tinware, copperware, and sheet-iron ware)	2	4, 000	11		3	7, 400	5, 500	20, 000
Starch	2	391, 500	152	24	13	33, 000	141, 000	219, 500
Stationery goods	3	5, 600	6	4	3	4, 100	17, 050	25, 500
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	13	182, 700	265		13	143, 390	462, 780	680, 530
Stencils and brands	2	8, 600	19	2	4	10, 200	10, 400	28, 000
Stereotyping and electrotyping (see also Type founding)	4	26, 200	54		12	27, 272	18, 800	69, 554
Stone- and earthen-ware	41	168, 090	272	3	24	101, 281	74, 306	246, 305
Straw goods	8	144, 000	85	335	19	119, 514	297, 744	484, 609
Surgical appliances	4	20, 500	16	12		10, 700	17, 200	48, 800
Telegraph and telephone apparatus (see also Electrical apparatus and supplies).	1	2, 000	16			1, 750	2, 250	5, 700
Terra-cotta ware (see also Brick and tile)	3	28, 000	81		13	26, 500	22, 576	68, 000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing; Stamped ware).	561	1, 491, 278	1, 760	108	172	870, 807	2, 071, 345	3, 894, 655
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	10	1, 129, 750	458	197	393	355, 135	2, 955, 741	4, 197, 400
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	532	1, 050, 871	2, 382	215	232	1, 101, 786	1, 702, 458	3, 764, 990
Tools (see also Cutlery and edge tools; Hardware)	7	35, 300	70			32, 200	39, 850	99, 224
Toys and games	2	1, 600	7			3, 860	620	5, 700
Trunks and valises	17	168, 300	238	4	10	111, 345	309, 400	542, 800
Type founding (see also Stereotyping and electrotyping)	4	290, 000	127	95	96	109, 300	86, 000	314, 000
Umbrellas and canes	6	2, 775	8		2	2, 516	2, 100	7, 600
Upholstering (see also Furniture)	38	83, 200	148	26	12	67, 077	166, 941	307, 535
Varnish (see also Paints)	4	207, 000	32		1	24, 646	302, 600	389, 000
Vault lights and ventilators	2	10, 000	26			15, 919	33, 841	63, 179
Vinegar	26	230, 920	94	3	9	44, 410	202, 630	376, 583
Washing-machines and clothes-wringers	9	12, 275	13			3, 273	8, 681	18, 524
Watch and clock repairing	77	97, 928	104	1	3	57, 144	27, 322	139, 155
Watch cases	1	50, 000	50	10	40	70, 000	16, 000	150, 000
Watches	4	1, 968, 827	988	571		738, 974	223, 857	1, 238, 621
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	876	979, 862	1, 424		34	555, 605	662, 399	1, 890, 614
Whips	4	2, 300	8	3	1	3, 325	3, 950	11, 369
Windmills	23	293, 500	196	1	5	104, 157	205, 694	392, 967
Window blinds and shades	4	11, 500	12	8	9	6, 550	32, 600	51, 250
Wire	3	45, 000	55	2	22	20, 800	37, 600	82, 749
Wirework	38	572, 722	558		42	242, 279	1, 889, 581	2, 664, 710
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	24	136, 510	124	10	21	61, 977	86, 527	200, 315
Wooden ware	8	102, 500	123	1	9	46, 296	127, 960	216, 736
Woolen goods (see also Gloves and mittens; Mixed textiles)	53	1, 327, 553	527	365	150	296, 225	1, 332, 798	1, 896, 460
Zinc	5	681, 000	866		4	416, 600	1, 257, 228	1, 815, 200

A—INDIANA, BY TOTALS OF COUNTIES.

	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	11, 198	$65, 742, 962	62, 072	3, 615	3, 821	$21, 960, 888	$100, 262, 917	$148, 006, 411
COUNTIES.								
Adams	69	153, 250	195	1	10	41, 809	203, 168	322, 764
Allen	247	2, 926, 146	3, 099	165	221	1, 182, 448	5, 017, 413	7, 178, 778
Bartholomew	141	857, 565	556	83	32	201, 644	1, 341, 996	1, 776, 149
Benton	13	13, 000	19			4, 575	14, 405	28, 442
Blackford	46	127, 450	161	2	8	47, 747	301, 350	106, 132
Boone	138	211, 465	374		25	85, 808	522, 518	747, 084
Brown	14	116, 400	237			23, 100	102, 740	152, 925
Carroll	127	415, 570	383	7	7	94, 760	525, 896	795, 159
Cass	276	1, 309, 627	1, 259	30	53	422, 642	1, 647, 388	2, 573, 513
Clark	187	1, 051, 590	2, 541	32	51	823, 003	2, 677, 664	3, 937, 683
Clay	66	465, 189	271	2	13	66, 731	442, 699	609, 192
Clinton	146	327, 700	465		11	115, 422	482, 036	764, 051
Crawford	61	108, 905	147			18, 487	127, 140	185, 290
Daviess	54	149, 550	166			45, 346	388, 716	504, 119
Dearborn	168	3, 370, 859	1, 578	18	85	657, 525	2, 792, 351	4, 442, 678
Decatur	109	268, 495	305	16	7	75, 616	324, 885	530, 588
De Kalb	127	247, 300	277	6	6	54, 463	274, 949	431, 320
Delaware	159	701, 575	594	55	77	183, 500	836, 363	1, 280, 481
Dubois	111	197, 695	212	3	7	39, 868	261, 801	386, 754
Elkhart	175	1, 437, 915	1, 117	254	92	459, 339	1, 765, 818	2, 769, 442
Fayette	40	495, 255	411	71	54	189, 398	566, 931	887, 840
Floyd	200	3, 721, 562	2, 408	257	394	1, 151, 690	3, 754, 549	5, 917, 951
Fountain	104	237, 350	286	1	15	74, 237	437, 578	615, 094
Franklin	105	255, 860	314	9	2	96, 742	567, 624	879, 817
Fulton	106	189, 035	262	11	8	63, 714	303, 673	459, 197

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—INDIANA, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Gibson	92	$252, 585	253	....	5	$60, 320	$368, 441	$545, 353
Grant	134	657, 765	566	....	21	159, 162	818, 765	1, 181, 321
Greene	84	206, 380	226	....	14	49, 741	341, 110	471, 247
Hamilton	167	416, 626	448	4	23	92, 501	812, 425	1, 071, 061
Hancock	90	185, 640	232	....	4	51, 378	285, 580	432, 990
Harrison	72	126, 810	190	1	....	19, 652	286, 545	362, 993
Hendricks	158	243, 545	359	8	9	86, 247	504, 545	757, 803
Henry	177	724, 785	576	17	36	116, 046	921, 017	1, 251, 275
Howard	122	309, 625	468	5	4	107, 600	403, 455	641, 444
Huntington	153	469, 750	586	33	59	143, 975	716, 480	1, 061, 672
Jackson	141	398, 884	578	22	42	141, 624	587, 308	920, 689
Jasper	44	40, 160	68	1	....	14, 590	54, 078	96, 141
Jay	88	164, 920	210	....	1	34, 305	260, 680	374, 695
Jefferson	123	1, 033, 020	966	26	26	372, 396	1, 857, 139	2, 672, 199
Jennings	65	158, 630	183	....	5	43, 592	191, 870	295, 449
Johnson	133	699, 710	565	96	101	164, 027	928, 304	1, 315, 209
Knox	100	618, 960	449	4	36	132, 878	1, 031, 464	1, 356, 776
Kosciusko	177	449, 039	574	3	12	133, 785	563, 283	904, 549
Lagrange	79	236, 060	193	4	5	40, 700	253, 002	375, 503
Lake	64	699, 130	269	1	11	93, 410	3, 165, 552	3, 497, 900
La Porte	155	1, 201, 910	1, 496	85	51	538, 204	2, 332, 471	3, 393, 862
Lawrence	87	232, 425	259	26	15	47, 808	257, 484	399, 648
Madison	167	525, 250	585	8	34	176, 733	774, 472	1, 194, 312
Marion	809	10, 366, 985	9, 118	839	513	4, 027, 473	19, 855, 886	28, 425, 874
Marshall	142	510, 000	481	2	12	125, 189	831, 630	1, 175, 085
Martin	59	230, 540	340	....	22	32, 879	164, 136	245, 648
Miami	113	1, 205, 750	767	81	76	257, 702	806, 305	1, 311, 353
Monroe	71	268, 650	328	3	25	71, 717	329, 279	489, 996
Montgomery	148	569, 919	581	32	28	173, 963	729, 313	1, 138, 303
Morgan	106	216, 480	412	1	26	93, 968	593, 442	819, 985
Newton	26	30, 375	32	....	....	9, 087	59, 993	91, 548
Noble	189	527, 070	546	2	8	165, 619	688, 840	1, 076, 310
Ohio	29	94, 250	89	9	....	23, 850	142, 105	200, 945
Orange	77	95, 950	181	....	....	26, 145	185, 493	275, 826
Owen	63	122, 800	168	3	4	23, 714	206, 973	287, 475
Parke	109	347, 168	304	1	2	53, 022	295, 999	459, 409
Perry	67	472, 760	292	201	50	99, 487	370, 940	595, 843
Pike	25	69, 795	84	5	1	10, 389	125, 820	159, 470
Porter	68	348, 000	324	36	54	108, 487	452, 137	694, 457
Posey	141	368, 710	397	4	7	122, 300	1, 125, 810	1, 416, 989
Pulaski	19	67, 800	44	....	....	7, 370	97, 006	124, 752
Putnam	104	362, 285	502	11	29	205, 452	504, 153	881, 013
Randolph	130	316, 960	436	32	45	123, 779	674, 912	935, 261
Ripley	157	314, 440	402	12	23	113, 253	476, 975	745, 354
Rush	132	251, 835	363	2	10	88, 660	381, 957	619, 337
Saint Joseph	213	3, 760, 477	3, 467	119	367	1, 471, 983	3, 735, 130	6, 749, 756
Scott	29	54, 070	85	1	4	8, 083	63, 295	89, 883
Shelby	137	412, 560	484	....	4	126, 391	655, 822	982, 404
Spencer	121	221, 385	267	5	2	65, 737	387, 079	548, 249
Starke	9	27, 575	14	....	....	3, 195	62, 352	73, 717
Steuben	100	197, 735	218	2	2	58, 316	339, 274	489, 954
Sullivan	80	183, 438	206	10	4	53, 698	460, 228	596, 538
Switzerland	36	107, 945	150	1	1	34, 572	169, 132	248, 428
Tippecanoe	238	1, 213, 298	1, 473	94	55	584, 504	1, 734, 586	2, 866, 261
Tipton	58	105, 505	166	....	5	28, 412	274, 325	400, 491
Union	49	123, 025	109	3	10	33, 124	169, 090	265, 817
Vanderburgh	357	4, 823, 745	3, 060	337	381	1, 391, 171	5, 205, 230	8, 439, 173
Vermillion	47	127, 700	105	....	4	22, 035	166, 732	222, 946
Vigo	269	2, 757, 775	3, 340	144	154	1, 492, 932	7, 072, 514	9, 709, 800
Wabash	193	660, 495	687	12	9	152, 491	823, 878	1, 230, 287
Warren	49	118, 300	113	....	......	20, 523	166, 286	228, 246
Warrick	77	160, 635	155	1	2	35, 158	325, 163	438, 274
Washington	108	466, 735	320	122	24	95, 003	515, 679	762, 532
Wayne	332	2, 963, 535	2, 720	89	129	1, 087, 391	4, 400, 503	6, 805, 259
Wells	85	294, 360	343	20	35	99, 646	502, 577	752, 175
White	63	115, 940	107	8	1	25, 814	228, 862	302, 835
Whitley	103	280, 020	356	4	1	66, 926	308, 955	473, 410

B—INDIANA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	11, 198	$65, 742, 962	62, 072	3, 615	3, 821	$21, 960, 888	$100, 262, 917	$148, 006, 411
Agricultural implements	96	3, 231, 818	2, 357	1	113	1, 010, 644	2, 182, 137	4, 460, 408
Artificial limbs (see also Surgical appliances)	1	2, 000	1	....	....	800	500	3, 000
Awnings and tents	4	3, 700	13	7	....	3, 250	6, 500	12, 000
Bagging, flax, hemp, and jute	3	97, 000	88	72	61	69, 000	59, 500	189, 000
Bags, other than paper	1	5, 000	1	2	....	700	55, 000	60, 000

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—INDIANA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Bags, paper	1	$3, 000	1	4		$1, 000	$6, 000	$8, 000
Baking and yeast powders (see also Drugs and chemicals)	4	6, 300	18	2		6, 815	37, 000	59, 000
Baskets, rattan and willow ware	5	1, 390	6			830	1, 350	5, 920
Belting and hose, leather	2	25, 000	9			3, 600	40, 693	47, 759
Blacksmithing (see also Wheelwrighting)	1, 384	821, 051	1, 443	2	13	414, 713	668, 855	1, 940, 362
Bookbinding and blank-book making	10	15, 757	22	18	7	14, 848	13, 644	39, 215
Boots and shoes, including custom work and repairing	949	766, 218	1, 415	40	19	494, 435	975, 089	2, 143, 774
Boxes, cigar	4	7, 000	16	6		6, 331	7, 175	20, 500
Boxes, fancy and paper	3	4, 000	4	18		5, 250	7, 050	16, 000
Boxes, wooden, packing	4	43, 300	61			23, 020	50, 350	130, 700
Brass castings	7	24, 700	29			17, 149	53, 000	85, 410
Bread and other bakery products	155	360, 910	448	45	26	199, 949	779, 775	1, 291, 961
Brick and tile (see also Drain and sewer pipe)	735	1, 408, 264	3, 908	4	328	716, 254	694, 226	1, 927, 858
Bridges	2	11, 000	30			16, 500	11, 000	35, 000
Brooms and brushes	32	35, 925	104	25	23	33, 850	80, 229	158, 167
Carpentering	344	284, 790	1, 210		33	425, 249	1, 114, 488	2, 006, 094
Carpets, rag	15	10, 525	10	8	3	6, 427	16, 200	31, 930
Carriage and wagon materials	44	1, 249, 008	1, 761		44	614, 128	1, 306, 566	2, 369, 723
Carriages and wagons (see also Wheelwrighting)	195	2, 732, 417	2, 790	5	111	1, 133, 233	1, 605, 103	3, 998, 520
Cars, railroad, street, and repairs	5	450, 000	2, 483		25	791, 267	3, 792, 600	4, 960, 500
Cheese and butter (factory)	49	82, 345	104	16	2	20, 587	157, 606	225, 049
Clothing, men's	228	810, 640	876	807	17	610, 114	1, 398, 380	2, 504, 816
Clothing, women's	2	37, 000	3	87		20, 500	65, 000	109, 000
Coffee and spices, roasted and ground	9	174, 500	62	11	3	26, 608	439, 450	529, 100
Coffins, burial cases, and undertakers' goods	41	556, 100	349	30	15	167, 844	222, 975	585, 466
Coke	2	8, 000	4			300	2, 225	3, 000
Confectionery	29	132, 400	105	29	20	52, 302	286, 935	432, 080
Cooperage	265	970, 560	2, 447		140	843, 942	1, 943, 638	3, 342, 552
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	1	5, 000	8			2, 500	16, 000	20, 000
Cordage and twine	1	500	2			400	600	1, 500
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	4	1, 090, 000	193	391	124	162, 829	651, 434	1, 155, 029
Cutlery and edge tools (see also Hardware)	5	3, 850	11			2, 456	4, 850	11, 121
Dentistry, mechanical	39	24, 980	20	6	1	10,952	16, 787	70, 198
Drain and sewer pipe (see also Brick and tile)	8	12, 000	9			4, 500	4, 000	19, 000
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	9	84, 700	48	26		26, 976	63, 692	129, 273
Dyeing and cleaning	8	5, 500	19	24		13, 350	11, 700	37, 600
Dyeing and finishing textiles	5	4, 400	15	24		12, 100	9, 850	32, 000
Electrical apparatus and supplies (see also Telegraph and telephone apparatus).	2	1, 400					800	3, 200
Electroplating	3	1, 400	3			1, 218	1, 150	4, 550
Engraving, wood	2	825	3			1, 850	400	4, 500
Fertilizers	10	157, 000	168			64, 099	724, 525	980, 725
Files (see also Saws)	6	3, 850	17		1	7, 125	2, 250	14, 350
Flax, dressed	21	158, 500	216	30	47	87, 050	242, 110	420, 100
Flavoring extracts	1	500	1			300	800	1, 200
Flouring- and grist-mill products	996	9, 484, 023	3, 146		13	989, 087	26, 104, 637	29, 591,397
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	120	3, 993, 578	3, 798	4	128	1, 672, 520	3, 915, 164	6, 833, 648
Fruits and vegetables, canned and preserved	6	58, 450	147	93	97	29, 980	156, 325	248, 550
Furniture (see also Mattresses and spring beds; Upholstering)	251	2, 243, 250	2, 628	11	221	1, 044, 367	1, 997, 177	3, 909, 591
Furniture, chairs	37	395, 850	587	86	99	232, 005	246, 462	632, 746
Furs, dressed	1	500		2		150	1, 000	1, 300
Glass	4	1, 442, 000	695	53	114	284, 207	433, 733	790, 781
Glue	4	47, 500	30		9	10, 320	61, 250	85, 500
Grease and tallow	6	10,400	24		1	6, 800	44, 950	58, 790
Hairwork	3	500			1	120	850	3, 120
Handles, wooden	10	34, 300	42	3	1	9, 795	18, 880	43, 850
Hardware (see also Cutlery and edge tools)	6	54, 795	54			16, 900	44, 575	73, 500
Hardware, saddlery	1	25, 000	30		10	12, 000	30, 500	45, 000
Hats and caps, not including wool hats	5	3, 050	7	4	1	3, 825	8, 200	17, 620
Hones and whetstones	3	35, 000	17	3	3	9, 790	43, 750	74, 000
Hosiery and knit goods (see also Cotton goods; Woolen goods)	5	45, 000	26	201	57	24, 700	103, 280	158, 200
Iron and steel	12	2, 283, 000	1, 883		165	864, 921	3, 293, 073	4, 551, 403
Iron bolts, nuts, washers, and rivets	1	26, 000	44			13, 000	60, 000	85, 000
Iron forgings	1	5, 000	3			1, 000	9, 000	11, 000
Iron nails and spikes, cut and wrought	1	150, 000	300			170, 710	251, 332	426, 968
Iron railings, wrought	2	9, 000	13			3, 700	5, 710	13, 610
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	4	111, 000	132			44, 600	87, 691	150, 892
Jewelry	1	10, 000	3			1, 800	1, 000	3, 500
Leather, curried	93	381, 552	181		1	66, 080	1, 192, 434	1, 462, 776
Leather, tanned	105	653, 349	296		7	108, 761	971, 201	1, 266, 653
Lightning rods	1	45, 000	32			9, 000	6, 000	30, 000
Lime	24	196, 200	321		5	67, 850	97, 604	219, 715
Liquors, distilled	22	2, 300, 250	415			177, 767	2, 000, 523	2, 997, 063
Liquors, malt	63	1, 609, 179	577			257, 514	1, 092, 752	1, 990, 803
Liquors, vinous (see also Liquors, distilled)	2	3, 060	4		3	2, 540	10, 171	30, 931
Lithographing (see also Printing and publishing)	1	800	4			2, 300	400	5, 000
Lock- and gun-smithing	24	16, 750	18		1	8, 556	14, 425	39, 875
Looking-glass and picture frames	16	41, 250	44	1	6	24, 007	63, 303	110, 825
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	84	655, 546	691		26	251, 410	762, 494	1, 266, 215
Lumber, sawed	2, 022	7, 048, 088	9, 926		413	1, 571, 740	9, 627, 097	14, 260, 830
Malt	5	123, 000	22			9, 715	142, 400	182, 000

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—INDIANA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Marble and stone work	156	$338, 547	582		12	$250, 599	$427, 253	$980, 072
Masonry, brick and stone	48	44, 937	305		1	127, 684	186, 280	389, 325
Mattresses and spring beds (see also Furniture)	11	29, 300	38	5	2	15, 250	35, 290	74, 225
Millinery and lace goods	6	37, 000		69		12, 100	78, 000	132, 000
Mineral and soda waters	11	23, 500	34	1		7, 166	19, 246	37, 840
Mixed textiles (see also Cotton goods; Woolen goods)	5	685, 000	208	215	134	209, 337	503, 052	918, 150
Models and patterns	2	300	3			600	150	1, 900
Musical instruments and materials (not specified)	5	32, 850	82			33, 450	13, 000	58, 800
Musical instruments, organs and materials	5	53, 000	96	2	21	60, 400	64, 400	156, 500
Musical instruments, pianos and materials	2	77, 000	90			42, 500	43, 000	109, 000
Oil, lard	2	40, 000	10			4, 260	130, 000	146, 000
Oil, linseed	8	435, 000	103	1	2	44, 715	1, 125, 000	1, 276, 806
Oleomargarine	1	1, 000	10			1, 200	8, 000	18, 000
Painting and paperhanging	87	79, 750	314	39	3	139, 809	269, 360	531, 902
Paints (see also Varnish)	1	8, 000	1		3	1, 200	18, 000	35, 000
Paper (see also Wood pulp)	19	875, 000	291	167	26	166, 628	741, 793	1, 112, 660
Patent medicines and compounds (see also Drugs and chemicals)	15	43, 600	43	11	1	31, 300	55, 600	170, 200
Photographing	43	47, 200	45	15	2	23, 160	24, 309	94, 785
Plumbing and gasfitting	25	87, 700	133		2	61, 229	136, 110	256, 120
Printing and publishing (see also Lithographing)	99	1, 126, 320	1, 222	108	160	689, 590	703, 984	1, 832, 023
Pumps, not including steam pumps	55	251, 400	300		3	112, 299	247, 925	533, 906
Refrigerators	2	36, 000	91			25, 000	52, 000	90, 000
Regalia and society banners and emblems	2	3, 500	4	5		3, 348	6, 500	17, 048
Roofing and roofing materials	6	17, 700	21			9, 648	52, 675	90, 475
Saddlery and harness	458	898, 825	1, 157	3	30	430, 264	1, 168, 735	2, 126, 896
Safes, doors, and vaults, fire-proof	1	300	2			470	200	1, 300
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	40	744, 850	583	5	40	236, 304	908, 133	1, 437, 350
Saws	3	112, 000	64			56, 050	161, 000	291, 000
Scales and balances	1	2, 000	5			2, 400	3, 000	8, 500
Sewing-machine cases	3	514, 000	768		225	389, 243	940, 625	1, 354, 625
Shingles, split	9	745	24	2	1	1, 375	2, 445	6, 725
Shipbuilding	23	194, 250	312			211, 736	529, 840	810, 655
Shirts	9	19, 400	14	70	8	31, 460	42, 642	95, 800
Show-cases	2	2, 300	3		1	1, 620	5, 500	9, 250
Slaughtering and meat-packing, not including retail butchering establishments.	25	3, 974, 000	1, 790		25	494, 622	13, 645, 927	15, 209, 204
Soap and candles	8	39, 300	37			13, 176	73, 530	102, 622
Spectacles and eyeglasses	1	2, 000	2	1		1, 000	1, 000	3, 000
Starch	6	625, 000	310	16	21	145, 880	959, 740	1, 276, 880
Stationery goods	1	7, 500	12			3, 000	1, 500	7, 600
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	15, 000	10			4, 000	48, 000	60, 000
Stencils and brands	6	2, 750	11		2	5, 700	5, 825	21, 100
Stereotyping and electrotyping	1	5, 000	5		3	4, 000	2, 500	8, 000
Stone- and earthen-ware	27	64, 550	89	2	1	26, 255	14, 535	71, 340
Surgical appliances (see also Artificial limbs)	1	500, 000	40	10		86, 000	25, 000	150, 000
Telegraph and telephone apparatus (see also Electrical apparatus and supplies).	1	80, 000	77	6	30	44, 000	90, 000	180, 000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	319	634, 418	805	3	32	325, 447	798, 079	1, 553, 484
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	2, 000	5		1	500	400	1, 800
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	208	298, 837	820	24	85	318, 158	542, 475	1, 226, 325
Toys and games	2	15, 500	19			5, 600	15, 500	26, 500
Trunks and valises	10	29, 800	60		2	23, 587	36, 550	84, 000
Umbrellas and canes	2	850		1		100	1, 100	3, 000
Upholstering (see also Furniture)	21	24, 575	50	6	4	24, 577	62, 100	116, 789
Upholstering materials	1	4, 000	7			1, 800	1, 500	6, 000
Varnish (see also Paints)	2	85, 000	13			7, 716	95, 000	112, 000
Vinegar	9	17, 410	24			5, 895	30, 170	63, 250
Washing-machines and clothes-wringers	3	13, 100	22	5		10, 450	26, 300	62, 800
Watch and clock repairing	37	42, 775	54	1	4	29, 640	19, 545	85, 248
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	539	418, 425	669		12	207, 077	288, 112	841, 336
Windmills	1	38, 000	28			10, 300	43, 500	64, 000
Window blinds and shades	3	22, 000	28	1		10, 900	32, 000	59, 000
Wirework	1	7, 000	3		4	1, 800	15, 000	25, 000
Wood pulp	1	6, 000	15			1, 350	390	5, 850
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	12	36, 250	97	1	14	41, 352	65, 312	148, 036
Wooden ware	5	128, 700	115	32	38	58, 250	65, 250	189, 200
Woolen goods (see also Mixed textiles)	81	2, 273, 705	846	587	308	462, 681	1, 823, 390	2, 729, 347

A—IOWA, BY TOTALS OF COUNTIES.

The State	6, 921	$33, 987, 886	25, 382	1, 431	1, 559	$9, 725, 962	$48, 704, 311	$71, 045, 926
COUNTIES.								
Adair	14	32, 560	25	7	1	4, 423	32, 590	42, 017
Adams	31	40, 550	64			17, 837	174, 827	225, 999
Allamakee	88	451, 496	228	4	11	79, 919	348, 408	545, 852
Appanoose	51	78, 607	100	1	3	26, 750	196, 625	265, 103
Audubon	6	15, 100	15		1	3, 525	30, 650	39, 165

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—IOWA, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Benton	95	$221, 365	200	3	3	$53, 837	$278, 390	$418, 704
Black Hawk	133	539, 578	438	8	10	166, 749	1, 083, 281	1, 437, 027
Boone	80	254, 325	218	16	8	87, 417	390, 938	680, 053
Bremer	59	143, 650	125	12	4	36, 756	175, 483	274, 204
Buchanan	75	297, 830	174	16	10	56, 229	265, 640	422, 583
Buena Vista	28	58, 850	68	1		20, 166	140, 204	196, 008
Butler	45	139, 915	79	1	1	20, 428	251, 892	338, 738
Calhoun	25	21, 650	30			4, 695	41, 219	62, 757
Carroll	14	42, 350	38			10, 159	67, 425	100, 591
Cass	42	127, 630	174	1	5	58, 418	497, 526	635, 657
Cedar	65	125, 915	82	1	6	24, 381	131, 478	202, 349
Cerro Gordo	31	187, 800	59	7	2	22, 048	293, 880	363, 305
Cherokee	31	65, 475	69	2	1	25, 199	142, 770	192, 959
Chickasaw	60	128, 850	122	1	5	30, 603	195, 228	288, 046
Clarke	36	79, 150	69	6		27, 580	174, 420	249, 644
Clay	26	31, 875	37	1	1	12, 385	94, 841	125, 237
Clayton	209	783, 085	486	13	28	153, 173	722, 883	1, 079, 603
Clinton	172	2, 752, 492	1, 419	60	219	581, 010	2, 704, 554	4, 080, 647
Crawford	54	98, 015	115		2	41, 300	197, 712	306, 891
Dallas	63	151, 025	91	1	4	18, 510	204, 723	270, 917
Davis	72	90, 995	161		4	45, 598	159, 778	267, 425
Decatur	65	116, 480	123	2	5	23, 253	156, 388	234, 544
Delaware	155	359, 480	294	21	25	90, 499	390, 614	644, 319
Des Moines	134	1, 420, 373	1, 277	59	90	550, 293	1, 623, 936	2, 838, 053
Dickinson	2	18, 000	9			2, 025	32, 970	38, 140
Dubuque	459	3, 749, 761	2, 796	295	96	1, 399, 994	4, 235, 244	6, 885, 289
Emmet	4	4, 900	4			1, 150	11, 350	15, 115
Fayette	98	264, 976	180	8	5	45, 667	445, 400	590, 666
Floyd	81	310, 160	185	2	7	60, 425	366, 869	540, 865
Franklin	30	61, 600	76	1	1	14, 214	70, 014	106, 479
Fremont	70	208, 463	198		15	76, 655	295, 154	481, 899
Greene	33	105, 005	103		3	21, 048	116, 443	169, 952
Grundy	27	89, 750	54	2	2	18, 314	71, 879	116, 675
Guthrie	40	132, 255	77	4		20, 881	155, 888	228, 483
Hamilton	44	75, 240	73	1		19, 983	109, 154	167, 915
Hancock	1	1, 800					6, 650	7, 538
Hardin	81	296, 545	200	10	5	67, 814	311, 821	471, 384
Harrison	56	121, 575	139	1		32, 466	183, 578	267, 056
Henry	99	346, 280	237	4	12	62, 501	467, 101	623, 815
Howard	47	102, 500	85		17	23, 500	186, 569	264, 487
Humboldt	17	72, 175	31		1	8, 731	56, 010	82, 670
Ida	4	28, 000	21		3	6, 375	64, 250	80, 840
Iowa	58	263, 838	227	4	23	68, 179	343, 133	512, 364
Jackson	130	583, 630	405	25	24	121, 424	1, 469, 512	1, 788, 664
Jasper	67	158, 510	152		7	35, 784	292, 290	397, 536
Jefferson	65	175, 925	127	4	7	35, 973	286, 159	418, 603
Johnson	180	816, 466	658	27	43	191, 478	887, 633	1, 332, 549
Jones	115	276, 490	272	47		79, 307	547, 679	785, 626
Keokuk	130	270, 240	206	10	16	52, 707	380, 452	560, 500
Kossuth	28	55, 675	66	1		16, 425	79, 305	122, 466
Lee	285	2, 146, 534	1, 574	94	206	600, 910	1, 978, 312	3, 192, 058
Linn	207	1, 564, 150	1, 170	94	56	464, 596	4, 249, 617	5, 205, 859
Louisa	40	89, 800	98	2	2	26, 695	189, 806	276, 452
Lucas	59	108, 975	130	2	13	43, 681	163, 291	266, 344
Lyon	4	32, 500	8			3, 480	41, 430	49, 170
Madison	43	90, 475	78	1	6	18, 909	133, 545	205, 798
Mahaska	100	392, 381	296	11	13	105, 593	364, 273	611, 530
Marion	102	201, 835	195		16	46, 902	273, 114	395, 311
Marshall	111	692, 538	424	5	4	182, 296	1, 008, 669	1, 507, 650
Mills	29	80, 682	60		3	23, 398	209, 315	275, 235
Mitchell	81	384, 485	183	6	4	67, 385	478, 793	625, 559
Monona	33	90, 700	82	2	1	16, 294	128, 940	173, 471
Monroe	49	73, 755	126	3	4	29, 291	166, 703	249, 905
Montgomery	41	131, 475	92	5	2	32, 520	164, 895	247, 320
Muscatine	195	1, 056, 985	806	81	123	341, 404	1, 238, 421	1, 913, 149
O'Brien	12	86, 825	25			6, 135	39, 550	57, 545
Osceola (*a*)								
Page	42	89, 350	82		1	26, 908	129, 645	197, 503
Palo Alto	16	31, 500	38		3	10, 702	32, 098	57, 818
Plymouth	12	128, 500	37		1	18, 176	277, 880	356, 381
Pocahontas	2	2, 200	2			1, 000	500	3, 172
Polk	202	1, 564, 790	1, 396	75	104	715, 399	3, 023, 659	4, 530, 428
Pottawattamie	120	546, 541	685	29	5	282, 369	1, 779, 234	2, 448, 842
Poweshiek	51	244, 100	177	58	6	79, 062	211, 803	411, 010
Ringgold	16	18, 750	45	2	3	13, 350	60, 650	92, 595
Sac	21	63, 900	58	3	5	14, 922	99, 665	128, 959
Scott	241	2, 983, 157	1, 564	85	152	705, 603	3, 105, 143	4, 667, 511
Shelby	11	46, 330	63		1	15, 707	74, 611	102, 660
Sioux	7	14, 950	10		1	2, 582	19, 200	29, 530
Story	36	58, 650	62		3	19, 443	51, 988	96, 126
Tama	81	242, 334	156	1	8	53, 581	357, 141	502, 741
Taylor	32	62, 423	77		7	20, 405	143, 467	209, 458
Union	48	125, 500	147		5	62, 952	289, 217	443, 695
Van Buren	97	301, 400	228	41	16	83, 072	449, 722	655, 084
Wapello	154	1, 094, 495	943	101	23	375, 577	2, 706, 528	2, 506, 579

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—IOWA, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Warren	60	$110, 735	121		3	$24, 838	$218, 460	$314, 418
Washington	70	175, 350	145	12	1	45, 950	388, 183	513, 043
Wayne	55	62, 450	129	2	1	27, 677	158, 060	245, 757
Webster	59	171, 525	191		4	65, 478	194, 878	341, 190
Winnebago (*a*)								
Winneshiek	67	393, 786	229	10	3	66, 982	512, 590	689, 125
Woodbury	91	705, 550	449	16	14	192, 478	846, 095	1, 233, 666
Worth	10	66, 000	33			14, 600	79, 900	110, 625
Wright	4	13, 300	7			1, 500	15, 510	20, 086

a Returned as having no manufactures.

B—IOWA, BY SPECIFIED INDUSTRIES.

Industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	6, 921	$33, 987, 886	25, 382	1, 431	1, 559	$9, 725, 962	$48, 704, 311	$71, 045, 926
Agricultural implements	58	1, 185, 530	785	1	23	243, 635	601, 096	1, 271, 872
Awnings and tents	2	2, 150	4	4		950	4, 250	6, 700
Bags, paper	2	13, 500	4	1	3	2, 150	45, 000	55, 000
Baking and yeast powders (see also Drugs and chemicals)	3	7, 500	12			7, 560	38, 200	54, 500
Baskets, rattan and willow ware	4	575	1			350	1, 075	2, 275
Bellows	1	250	2			675	500	1, 500
Blacksmithing (see also Wheelwrighting)	1, 073	758, 812	1, 079	2	45	342, 066	524, 583	1, 551, 837
Bookbinding and blank-book making	19	102, 500	73	25	10	47, 438	54, 927	135, 616
Boots and shoes, including custom work and repairing	563	499, 207	760	9	7	261, 483	555, 768	1, 212, 570
Boxes, cigar	2	6, 000	5	6		3, 302	7, 580	14, 000
Boxes, fancy and paper	2	1, 100	1	4		1, 140	1, 353	3, 518
Boxes, wooden, packing	4	43, 500	55	3	17	18, 400	28, 900	64, 000
Brass castings	3	4, 400	9			4, 700	5, 900	16, 971
Brass ware	1	10, 000	10			2, 500	20, 000	28, 000
Bread and other bakery products	97	353, 633	271	45	31	134, 662	541, 629	839, 712
Brick and tile	280	478, 614	2, 063	13	175	426, 120	270, 963	944, 497
Bridges	8	685, 600	136		2	87, 808	242, 858	351, 476
Brooms and brushes	40	30, 500	75	30	15	35, 527	56, 290	112, 958
Carpentering	381	322, 263	1, 364		31	543, 381	1, 287, 218	2, 280, 490
Carpets, rag	11	2, 755	10	1		4, 351	5, 694	17, 283
Carriage and wagon materials	2	29, 000	27			13, 375	22, 700	40, 500
Carriages and wagons (see also Wheelwrighting)	208	1, 505, 645	1, 372		16	610, 017	1, 042, 758	2, 212, 197
Cheese and butter (factory)	244	657, 508	670	91	34	139, 813	1, 261, 316	1, 736, 400
Clothing, men's	167	665, 363	512	377	3	353, 100	830, 510	1, 508, 398
Clothing, women's	1	2, 000		12		2, 250	8, 000	12, 500
Coffee and spices, roasted and ground	8	38, 000	27	5	1	15, 428	95, 063	135, 000
Coffins, burial cases, and undertakers' goods	15	45, 900	36	1		13, 564	22, 500	60, 050
Confectionery	18	96, 850	49	19	10	27, 334	137, 441	225, 850
Cooperage	112	194, 539	515		4	207, 573	312, 066	660, 213
Cordage and twine	4	13, 800	30		4	9, 455	26, 604	42, 314
Corsets	1	2, 000		3		1, 000	2, 000	4, 000
Cutlery and edge tools (see also Hardware; Tools)	2	30, 000	21	2	18	8, 175	9, 647	28, 000
Dentistry, mechanical	24	17, 000	13		1	11, 647	7, 630	37, 930
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	6	11, 700	10	2	1	3, 200	14, 850	27, 350
Dyeing and cleaning	2	1, 600	2	2		1, 300	1, 150	3, 500
Engraving and die-sinking	1	2, 500	2			1, 200	1, 000	4, 000
Engraving, wood	1	100	1			160	150	1, 250
Fertilizers	2	21, 500	22			7, 650	6, 306	21, 312
Files	2	900	5			2, 400	600	4, 950
Flouring- and grist-mill products	713	7, 890, 859	2, 146		1	748, 045	16, 488, 480	19, 089, 401
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	102	1, 032, 550	1, 076	2	28	471, 574	747, 559	1, 594, 349
Fruits and vegetables, canned and preserved	5	66, 000	41	70	7	17, 648	53, 300	92, 500
Furniture (see also Mattresses and spring beds; Upholstering)	169	744, 670	723	10	19	314, 752	626, 453	1, 293, 504
Furniture, chairs	2	51, 000	121	30	21	25, 820	37, 400	76, 300
Furs, dressed	3	6, 600	4	2		1, 400	4, 600	11, 100
Glass	3	57, 000	24	2	9	2, 000	3, 248	3, 500
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	4	25, 100	14	85		23, 240	35, 915	78, 696
Glucose	1	55, 000	25			4, 102	19, 030	25, 812
Grease and tallow	14	22, 750	32			8, 720	65, 322	96, 155
Hairwork	9	7, 300	5	14	6	5, 300	9, 350	22, 000
Handles, wooden	1	1, 000	6			1, 800	500	5, 000
Hardware (see also Cutlery and edge tools; Tools)	3	3, 200	10		1	2, 500	6, 800	15, 500
Hats and caps, not including wool hats	1	1, 500	2	2		1, 000	800	2, 200
Hosiery and knit goods (see also Gloves and mittens; Woolen goods)	3	2, 200	3	3		460	1, 554	2, 908
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	4	11, 700	28			14, 100	21, 000	49, 500
Jewelry	6	12, 800	10	1		5, 050	3, 775	16, 700
Lard, refined	1	1, 000	1			200	3, 000	5, 000
Lead, bar, pipe, sheet, and shot	1	2, 800	5	1		2, 500	35, 000	52, 000
Leather, curried	10	12, 455	12		1	3, 417	47, 020	61, 611
Leather, tanned	10	14, 575	12	1	2	4, 327	24, 099	43, 974
Lightning rods	1	5, 000	6			3, 160	3, 000	9, 000
Lime	32	56, 285	98		1	23, 245	30, 959	82, 760
Lithographing (see also Printing and publishing)	2	11, 500	15			10, 850	9, 000	27, 000
Liquors, distilled	3	118, 200	75			20, 000	192, 338	288, 000
Liquors, malt	114	1, 987, 343	526			218, 017	908, 135	1, 653, 851

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—IOWA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Liquors, vinous (see also Liquors, distilled)	9	$163, 950	37	24	84	$12, 337	$35, 257	$106, 445
Lock- and gun-smithing	25	20, 900	18			9, 299	8, 025	33, 478
Looking-glass and picture frames	9	25, 000	22	3		12, 142	21, 800	40, 600
Lumber, planed (see also Sash, doors, and blinds)	12	94, 600	95		6	42, 633	161, 500	256, 800
Lumber, sawed	328	4, 946, 390	2, 526		463	825, 244	4, 141, 885	6, 185, 628
Malt	2	95, 000	19			8, 500	76, 050	100, 750
Marble and stone work	85	240, 970	317	1	3	142, 200	186, 119	499, 744
Masonry, brick and stone	43	53, 646	270		1	76, 575	119, 159	240, 797
Mattresses and spring beds (see also Furniture)	7	15, 300	24	2	1	8, 137	49, 230	73, 800
Millinery and lace goods	2	8, 000		11		2, 815	11, 000	15, 500
Mineral and soda waters	21	75, 100	50	1	15	16, 804	70, 000	116, 400
Models and patterns	3	5, 330	3			2, 247	850	4, 800
Musical instruments, organs and materials	1	300	1			275	750	2, 500
Oil, lard	1	8, 000	5			2, 000	20, 000	30, 600
Oil, linseed	7	432, 000	94	1	2	46, 330	570, 812	766, 800
Painting and paperhanging	43	38, 525	138	1	3	59, 787	80, 019	187, 916
Paints	2	55, 000	24	1	1	9, 250	58, 000	112, 000
Paper	4	305, 000	118	29	5	59, 235	82, 135	193, 075
Patent medicines and compounds (see also Drugs and chemicals)	6	19, 200	36	11		16, 950	28, 765	68, 700
Paving materials	6	5, 900	17			6, 600	7, 325	19, 000
Photographing	31	30, 350	42	13	5	25, 547	15, 353	71, 160
Pickles, preserves, and sauces	1	2, 000	4			726	7, 000	12, 000
Plumbing and gasfitting	4	9, 000	20			9, 452	14, 728	27, 372
Printing and publishing (see also Lithographing)	146	1, 125, 086	833	79	78	498, 229	514, 380	1, 399, 289
Pumps, not including steam pumps	10	23, 800	23		1	7, 531	22, 000	39, 900
Roofing and roofing materials	3	10, 250	14			4, 460	37, 050	55, 210
Saddlery and harness	451	964, 728	988	3	16	380, 552	1, 173, 862	2, 068, 486
Sash, doors, and blinds (see also Lumber, planed)	27	713, 200	526		95	238, 592	847, 002	1, 286, 072
Scales and balances	3	21, 000	12			3, 080	9, 150	13, 600
Sewing machines and attachments	1	44, 000	60	50	3	36, 000	74, 000	122, 000
Shipbuilding	1	25, 000	75			37, 000	62, 000	112, 000
Shirts	6	17, 600	20	85	4	26, 908	43, 000	84, 000
Show-cases	2	12, 600	8		1	2, 600	6, 000	11, 000
Slaughtering and meat-packing, not including retail butchering establishments.	38	1, 955, 500	1, 488		44	530, 188	9, 996, 845	11, 285, 032
Soap and candles	15	135, 500	56	5	3	23, 418	195, 800	259, 960
Sporting goods	1	300	1			312	200	800
Starch	2	99, 350	32	15		17, 500	66, 560	93, 130
Stationery goods	1	4, 000	3	10		3, 500	5, 000	10, 000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	4	57, 400	75			49, 000	63, 000	130, 800
Stereotyping and electrotyping	1	2, 000	2			1, 600	2, 000	6, 000
Stone- and earthen-ware	28	64, 250	172		11	64, 406	32, 642	139, 195
Straw goods	1	1, 000		2		300	700	2, 000
Surgical appliances	1	7 000	3	5		6, 000	5, 000	25, 000
Tinware, copperware, and sheet-iron ware	321	520, 150	614		6	256, 266	583, 786	1, 198, 804
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	25, 000	6	8		8, 000	82, 670	96, 485
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	133	263, 675	490	39	59	226, 961	376, 621	830, 097
Tools (see also Cutlery and edge tools; Hardware)	3	2, 500	9			4, 525	4, 180	12, 500
Trunks and valises	5	11, 000	19			8, 235	22, 400	41, 068
Upholstering (see also Furniture)	6	10, 550	9	5		5, 060	16, 140	26, 800
Upholstering materials	1	550	2		1	100	300	750
Vinegar	10	101, 250	45			19, 870	78, 835	171, 780
Washing-machines and clothes-wringers	7	4, 850	11	1	1	3, 940	9, 185	21, 350
Watch and clock repairing	38	38, 310	42	1	1	23, 426	10, 935	61, 106
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	328	221, 035	311		12	103, 537	167, 982	455, 723
Windmills	5	7, 750	8	1	1	3, 380	7, 300	15, 600
Window blinds and shades	2	18, 500	12	1		6, 700	7, 500	18, 500
Wire	3	131, 000	46			35, 135	319, 350	447, 500
Wirework	30	73, 760	102	1	10	36, 041	129, 115	208, 110
Wooden ware	9	26, 800	25	9	16	10, 667	36, 600	60, 700
Woolen goods (see also Gloves and mittens)	34	553, 500	307	132	60	117, 792	435, 747	679, 904

A—KANSAS, BY TOTALS OF COUNTIES.

	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	2, 803	$11, 192, 315	11, 139	392	531	$3, 995, 010	$21, 453, 141	$30, 843, 777
COUNTIES.								
Allen	55	95, 000	135	7	4	46, 449	196, 564	299, 398
Anderson	33	44, 450	48	2		15, 450	126, 177	178, 351
Arapahoe (*a*)								
Atchison	141	696, 725	784	109	25	455, 438	1, 451, 466	2, 332, 205
Barbour	10	13, 200	25		3	2, 755	6, 433	15, 305
Barton	11	55, 850	30			10, 428	45, 834	62, 260
Bourbon	67	249, 470	289	3	13	116, 010	630, 869	897, 890
Brown	32	38, 240	81	1		31, 170	118, 127	204, 228
Buffalo (*a*)								
Butler	37	94, 475	92			31, 240	171, 404	258, 692
Chase	13	42, 850	25			5, 650	60, 016	79, 081
Chautauqua	39	52, 866	69		3	17, 635	104, 207	151, 547
Cherokee	57	128, 750	171	2	3	74, 298	152, 912	311, 526
Cheyenne (*a*)								
Clark (*a*)								

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—KANSAS, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Clay	19	$85, 250	36	...	2	$17, 170	$207, 535	$243, 160
Cloud	25	29, 500	56	...	1	17, 333	138, 505	178, 275
Coffey	20	93, 600	44	...	...	11, 795	277, 034	318, 704
Comanche (a)	...	...	...	...	...	...	...	...
Cowley	49	119, 245	126	1	2	37, 125	196, 194	276, 803
Crawford	79	126, 335	260	...	1	100, 891	257, 783	467, 121
Davis	20	49, 175	44	...	5	15, 740	146, 746	195, 400
Decatur	1	500	1	...	...	40	510	750
Dickinson	32	99, 178	79	4	4	21, 058	267, 294	315, 480
Doniphan	44	160, 750	144	1	5	29, 409	302, 506	395, 209
Douglas	129	548, 635	455	32	40	179, 523	766, 212	1, 150, 116
Edwards	1	15, 000	3	...	...	2, 000	44, 200	47, 750
Elk	37	45, 680	57	1	1	10, 733	82, 977	120, 121
Ellis	7	13, 900	5	...	...	1, 479	6, 070	10, 857
Ellsworth	12	42, 050	31	4	...	10, 860	61, 760	83, 406
Foote (a)	...	...	...	...	...	...	...	...
Ford	9	41, 150	32	1	...	18, 750	41, 746	74, 440
Franklin	50	149, 840	198	1	5	71, 789	214, 492	376, 768
Gove (a)	...	...	...	...	...	...	...	...
Graham	1	600	...	...	1	30	300	500
Grant (a)	...	...	...	...	...	...	...	...
Greeley (a)	...	...	...	...	...	...	...	...
Greenwood	29	61, 690	59	...	...	16, 644	177, 884	230, 129
Hamilton (a)	...	...	...	...	...	...	...	...
Harper	5	1, 985	3	...	...	188	2, 306	4, 500
Harvey	50	81, 475	175	5	3	58, 186	386, 944	530, 126
Hodgeman (a)	...	...	...	...	...	...	...	...
Jackson	3	11, 000	9	...	...	1, 840	15, 750	19, 770
Jefferson	37	87, 865	62	...	...	18, 200	270, 868	333, 123
Jewell	24	24, 128	51	...	1	10, 107	30, 809	58, 380
Johnson	58	118, 450	140	4	11	42, 502	231, 030	327, 328
Kansas (a)	...	...	...	...	...	...	...	...
Kearney (a)	...	...	...	...	...	...	...	...
Kingman	9	21, 560	11	...	...	3, 530	13, 350	21, 888
Labette	78	235, 650	297	6	5	79, 581	544, 190	747, 463
Lane (a)	...	...	...	...	...	...	...	...
Leavenworth	219	1, 808, 530	2, 123	96	86	869, 387	2, 613, 590	4, 221, 922
Lincoln	11	42, 400	16	...	...	5, 603	71, 750	96, 850
Linn	42	67, 475	86	...	3	22, 310	179, 877	243, 461
Lyon	54	247, 024	231	7	10	69, 204	305, 010	435, 000
McPherson	28	52, 400	48	...	2	12, 643	72, 425	104, 222
Marion	34	64, 845	62	...	3	18, 252	158, 858	223, 191
Marshall	53	310, 637	193	29	17	69, 142	467, 831	668, 011
Meade (a)	...	...	...	...	...	...	...	...
Miami	60	95, 695	154	5	15	40, 214	209, 622	318, 287
Mitchell	40	130, 500	119	...	2	45, 033	257, 689	352, 951
Montgomery	44	108, 625	104	3	2	27, 436	221, 573	289, 822
Morris	32	63, 850	63	...	3	20, 102	108, 380	154, 640
Nemaha	58	84, 930	85	1	4	29, 808	110, 976	198, 165
Neosho	43	104, 665	84	...	...	17, 092	180, 230	237, 123
Ness (a)	...	...	...	...	...	...	...	...
Norton	9	23, 900	14	...	...	3, 527	21, 575	29, 578
Osage	62	100, 100	130	3	7	33, 837	163, 875	255, 394
Osborne	13	36, 925	33	...	1	4, 613	68, 535	85, 878
Ottawa	17	26, 650	21	...	...	6, 931	75, 385	96, 781
Pawnee	24	26, 450	47	...	...	11, 150	36, 075	73, 755
Phillips	24	48, 922	64	2	1	14, 182	113, 655	150, 683
Pottawatomie	51	120, 415	59	4	1	18, 158	82, 238	137, 419
Pratt	1	10, 000	3	...	...	700	20, 000	24, 000
Rawlins	1	645	2	...	...	875	600	2, 400
Reno	28	70, 765	60	...	3	14, 748	182, 696	226, 746
Republic	24	31, 975	29	...	...	7, 850	50, 652	76, 388
Rice	7	5, 600	7	...	...	2, 250	4, 550	11, 110
Riley	20	46, 750	34	...	...	10, 007	29, 420	52, 162
Rooks	2	2, 050	4	...	...	850	4, 400	8, 000
Rush	3	750	1	...	...	25	450	1, 725
Russell	14	51, 975	36	...	...	12, 403	184, 609	224, 129
Saline	38	239, 000	138	1	1	43, 948	332, 813	484, 697
Scott (a)	...	...	...	...	...	...	...	...
Sedgwick	48	259, 525	164	2	12	73, 724	655, 785	821, 092
Sequoyah (a)	...	...	...	...	...	...	...	...
Seward (a)	...	...	...	...	...	...	...	...
Shawnee	113	745, 560	732	45	64	306, 507	1, 154, 149	1, 720, 891
Sheridan (a)	...	...	...	...	...	...	...	...
Sherman (a)	...	...	...	...	...	...	...	...
Smith	11	15, 055	16	...	...	3, 894	65, 340	81, 980
Stafford (a)	...	...	...	...	...	...	...	...
Stanton (a)	...	...	...	...	...	...	...	...
Stevens (a)	...	...	...	...	...	...	...	...
Sumner	60	127, 110	127	6	2	41, 687	213, 768	322, 228
Thomas (a)	...	...	...	...	...	...	...	...
Trego	2	8, 500	4	...	...	1, 522	11, 846	15, 366
Wabaunsee	18	44, 850	23	3	3	4, 515	21, 867	35, 511
Wallace (a)	...	...	...	...	...	...	...	...
Washington	54	71, 050	72	...	5	18, 555	81, 701	135, 381

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a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—KANSAS, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Wichita (*a*)	....	....	....	....	....	....	....	....
Wilson	50	$92, 125	145	....	5	$28, 526	$168, 748	$245, 357
Woodson	14	35, 300	20	1	5	5, 863	40, 394	58, 199
Wyandotte	54	1, 993, 325	1, 659	....	136	494, 911	4, 961, 180	6, 625, 229

a Returned as having no manufactures.

B—KANSAS, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	2, 803	$11, 192, 315	11, 139	392	531	$3, 995, 010	$21, 453, 141	$30, 843, 777
Agricultural implements	14	72, 450	102	....	1	27, 962	25, 063	73, 477
Artificial limbs	1	500	2	....	....	900	600	2, 000
Bags, other than paper	1	18, 000	10	10	8	5, 000	82, 500	100, 000
Baking and yeast powders (see also Drugs and chemicals)	1	5, 000	2	1	....	1, 164	5, 000	8, 000
Blacksmithing (see also Wheelwrighting)	567	293, 857	607	....	18	194, 266	263, 183	816, 156
Bookbinding and blank-book making	2	10, 270	12	4	....	7, 027	10, 328	21, 440
Boots and shoes, including custom work and repairing	212	122, 235	295	2	8	104, 085	161, 314	402, 670
Boxes, cigar	1	7, 000	8	....	....	4, 000	12, 000	25, 000
Boxes, fancy and paper	1	500	1	....	5	1, 872	1, 500	4, 000
Brass castings	1	3, 000	5	....	....	2, 000	2, 000	5, 000
Bread and other bakery products	42	58, 925	75	3	3	31, 481	89, 295	157, 816
Brick and tile	103	125, 825	948	19	79	174, 111	90, 935	355, 668
Bridges	2	26, 800	29	....	....	11, 620	44, 000	67, 065
Brooms and brushes	20	18, 625	53	....	9	13, 231	22, 871	50, 092
Carpentering	246	223, 020	891	1	7	389, 245	1, 056, 004	1, 799, 648
Carpets, rag	5	1, 380	4	4	1	1, 310	1, 853	5, 026
Carriages and wagons (see also Wheelwrighting)	23	247, 500	587	....	....	217, 364	357, 920	745, 800
Cement	1	1, 000	9	....	....	2, 300	2, 000	5, 000
Cheese and butter (factory)	48	81, 765	70	12	6	10, 420	43, 859	72, 783
Clothing, men's	46	76, 300	149	40	....	82, 818	124, 175	275, 349
Coffee and spices, roasted and ground	2	2, 450	6	....	....	3, 125	8, 150	13, 899
Coffins, burial cases, and undertakers' goods	5	17, 300	6	....	....	3, 082	4, 000	10, 300
Confectionery	12	26, 450	40	3	4	20, 613	58, 300	138, 750
Cooperage	16	35, 550	137	....	....	30, 527	77, 415	138, 566
Cordage and twine	1	2, 000	5	....	3	1, 600	5, 000	9, 000
Dentistry, mechanical	1	600	1	....	....	501	1, 071	2, 720
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	1	30, 000	8	3	5	1, 200	15, 000	22, 500
Dyeing and cleaning	1	400	1	1	....	546	300	1, 000
Engraving, wood	1	1, 000	2	....	....	1, 950	500	2, 933
Fancy articles	2	6, 000	10	....	7	5, 568	10, 100	19, 500
Fertilizers	1	15, 000	8	....	....	500	2, 000	5, 000
Flax, dressed	1	1, 800	2	....	....	1, 300	750	3, 000
Flouring- and grist-mill products	320	3, 935, 828	1, 329	....	3	520, 300	10, 286, 121	11, 858, 022
Foundery and machine-shop products	25	463, 300	563	....	6	304, 874	386, 208	880, 294
Fruit and vegetables, canned and preserved	4	45, 700	22	106	25	20, 600	24, 500	58, 000
Furniture (see also Mattresses and spring beds; Upholstering)	75	282, 245	377	2	15	172, 432	232, 300	512, 089
Glue	1	2, 500	3	....	....	1, 169	250	2, 400
Grease and tallow	1	4, 000	3	....	....	1, 300	13, 000	19, 000
Grindstones	2	1, 100	6	....	....	990	250	1, 800
Hardware	2	5, 600	3	....	....	1, 000	650	5, 000
Iron and steel	2	450, 000	570	....	60	166, 500	724, 245	1, 004, 100
Leather, curried	1	333	1	....	....	200	1, 361	1, 813
Leather, dressed skins	1	2, 000	4	1	....	2, 500	500	6, 000
Leather, tanned	2	1, 167	3	....	....	1, 126	5, 175	7, 452
Lime	19	23, 600	57	....	1	18, 762	21, 657	58, 129
Liquors, distilled	1	25, 000	4	....	....	1, 350	14, 750	22, 000
Liquors, malt	30	463, 500	102	2	....	25, 838	133, 281	240, 120
Liquors, vinous (see also Liquors, distilled)	2	1, 200	3	1	....	75	400	1, 300
Lock- and gun-smithing	7	9, 800	6	....	....	3, 350	2, 770	10, 300
Looking-glass and picture frames	1	1, 000	3	....	....	1, 414	800	2, 644
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	4	48, 500	40	....	3	12, 960	35, 500	59, 500
Lumber, sawed	146	262, 975	507	....	9	66, 757	447, 449	682, 697
Marble and stone work	31	62, 900	196	....	....	75, 880	60, 885	265, 500
Masonry, brick and stone	17	27, 750	92	....	1	33, 078	52, 219	98, 292
Mattresses and spring beds (see also Furniture)	8	27, 790	14	6	2	5, 785	40, 203	61, 450
Mineral and soda waters	4	10, 000	10	....	....	3, 900	4, 000	11, 200
Musical instruments and materials (not specified)	1	150	1	....	....	360	125	1, 500
Oil, castor	1	2, 000	3	....	....	900	6, 000	7, 500
Oil, linseed	3	29, 000	29	....	....	9, 200	90, 400	110, 000
Painting and paperhanging	28	28, 510	66	....	2	24, 578	39, 928	85, 424
Paints	1	1, 000	....	....	....	....	920	1, 500
Paper	1	22, 000	6	3	....	584	1, 450	3, 050
Patent medicines and compounds (see also Drugs and chemicals)	2	40, 300	18	13	1	9, 666	15, 200	51, 000
Perfumery and cosmetics	1	15, 000	22	....	....	9, 185	15, 000	50, 000
Photographing	11	8, 350	11	2	....	4, 585	4, 800	17, 050
Plumbing and gasfitting	2	6, 000	8	....	....	3, 450	13, 000	18, 000
Printing and publishing	50	289, 565	353	75	79	197, 862	212, 359	519, 597
Pumps, not including steam pumps	2	3, 000	3	....	....	1, 924	7, 000	13, 024
Saddlery and harness	176	338, 615	403	2	6	155, 877	408, 383	835, 934
Salt	1	6, 000	2	....	....	700	719	5, 700

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—KANSAS, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	5	$11, 500	23	...	...	$10, 438	$19, 300	$36, 100
Sewing machines and attachments	3	1, 700	2	...	...	425	050	2, 700
Shipbuilding	1	1, 000	8	...	3	1, 900	23, 000	26, 000
Shirts	2	5, 000	10	28	3	5, 500	9, 215	18, 570
Silk and silk goods	1	9, 500	1	...	1	250	150	540
Silversmithing	3	1, 100	1	...	...	400	600	2, 700
Slaughtering and meat-packing, not including retail butchering establishments.	14	1, 669, 400	1, 017	...	53	263, 600	4, 320, 802	5, 618, 714
Soap and candles	10	51, 200	37	2	1	14, 175	125, 800	174, 158
Stone- and earthen-ware	5	8, 150	19	1	...	3, 200	1, 561	8, 780
Tinware, copperware, and sheet-iron ware	143	299, 675	296	...	3	135, 939	332, 617	629, 603
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	3, 500	4	...	3	1, 200	3, 500	5, 700
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	55	170, 100	266	4	35	124, 007	246, 732	479, 089
Trunks and valises	1	3, 000	4	...	...	1, 925	8, 000	11, 000
Upholstering (see also Furniture)	1	4, 900	4	1	...	1, 300	2, 450	4, 500
Vinegar	3	9, 700	8	...	...	3, 178	11, 400	17, 942
Washing-machines and clothes-wringers	1	120	...	...	...	...	225	500
Watch and clock repairing	10	74, 300	18	...	2	5, 880	6, 990	22, 100
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	160	108, 675	177	...	6	56, 835	99, 042	204, 909
Wire	2	10, 500	10	...	...	2, 698	19, 400	28, 400
Wirework	5	11, 200	46	...	20	17, 416	64, 982	108, 208
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	2	1, 400	3	...	...	1, 400	2, 150	5, 500
Wooden ware	1	15, 000	12	...	6	3, 500	5, 000	16, 000
Woolen goods	5	131, 925	66	40	18	25, 825	107, 251	211, 525
Zinc	2	110, 000	180	...	...	110, 000	90, 000	254, 000

A—KENTUCKY, BY TOTALS OF COUNTIES.

	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	5, 328	$45, 813, 039	30, 949	3, 529	2, 913	$11, 657, 844	$47, 461, 890	$75, 483, 377
COUNTIES.								
Adair	29	34, 700	66	...	...	5, 878	45, 921	66, 803
Allen	35	59, 100	97	4	2	20, 276	102, 086	148, 035
Anderson	40	283, 900	162	...	3	47, 615	411, 765	606, 300
Ballard	27	49, 800	89	...	...	12, 817	51, 842	93, 501
Barren	76	125, 297	193	...	6	39, 535	210, 740	317, 906
Bath	49	75, 625	74	10	1	20, 783	72, 301	132, 525
Bell	1	500	1	...	...	100	475	800
Boone	53	295, 165	107	3	6	30, 896	323, 569	506, 233
Bourbon	78	466, 825	264	3	8	94, 175	439, 380	711, 235
Boyd	60	1, 601, 100	632	6	164	314, 206	867, 904	1, 495, 694
Boyle	52	113, 105	143	...	8	40, 798	136, 918	229, 542
Bracken	32	50, 575	61	...	1	13, 883	170, 130	225, 213
Breathitt	3	4, 100	13	...	...	1, 600	5, 483	8, 400
Breckinridge	50	77, 800	105	...	5	15, 822	105, 002	156, 335
Bullitt	38	94, 775	127	...	1	27, 900	127, 065	202, 940
Butler	10	22, 050	57	...	4	12, 360	38, 242	59, 520
Caldwell	24	57, 665	53	...	10	13, 633	94, 942	134, 495
Calloway	25	32, 325	36	...	1	6, 590	114, 750	137, 200
Campbell	124	1 901, 915	1, 818	85	118	765, 850	2, 918, 561	4, 587, 675
Carroll	39	256, 155	150	53	64	48, 875	252, 003	384, 825
Carter	7	195, 100	332	...	30	104, 320	99, 815	164, 568
Casey	32	79, 985	90	...	2	27, 535	93, 705	155, 349
Christian	76	298, 200	284	...	9	85, 978	518, 695	714, 052
Clark	60	93, 280	90	...	9	13, 543	78, 232	131, 700
Clay	2	13, 500	25	...	...	7, 050	5, 550	15, 725
Clinton	14	26, 700	23	...	3	4, 315	33, 612	45, 234
Crittenden	22	30, 241	29	...	1	4, 093	32, 588	47, 609
Cumberland	4	5, 200	...	...	...	...	12, 632	14, 023
Daviess	132	1, 350, 113	606	74	99	258, 258	1, 158, 407	1, 915, 132
Edmonson	3	5, 650	7	...	...	2, 050	17, 095	22, 757
Elliott	4	3, 700	11	...	...	616	9, 070	11, 141
Estill	11	152, 700	267	...	...	32, 641	29, 771	52, 712
Fayette	112	929, 426	631	9	92	280, 216	1, 035, 385	1, 701, 867
Fleming	65	112, 316	81	2	...	15, 355	208, 849	270, 708
Floyd	2	5, 300	3	...	...	600	4, 800	6, 700
Franklin	79	1, 087, 575	484	10	57	175, 534	988, 408	1, 491, 589
Fulton	14	76, 100	115	...	4	42, 000	113, 125	201, 150
Gallatin	16	26, 400	22	...	...	4, 800	31, 490	49, 005
Garrard	34	72, 425	49	...	...	15, 544	81, 525	130, 231
Grant	78	105, 915	113	1	2	24, 192	196, 605	288, 243
Graves	62	135, 460	170	7	18	28, 177	221, 624	299, 220
Grayson	25	49, 750	78	1	...	10, 950	83, 445	117, 770
Green	26	37, 600	36	...	...	3, 775	42, 120	56, 918
Greenup	25	1, 311, 810	893	...	50	172, 215	212, 596	287, 069
Hancock	20	30, 900	57	...	...	14, 011	24, 953	55, 865
Hardin	82	126, 299	173	2	9	33, 475	245, 187	369, 731
Harlan (*a*)	...	...	...	...	...	...	...	...
Harrison	63	637, 015	166	...	4	54, 217	445, 946	652, 602
Hart	53	85, 530	97	...	5	11, 017	99, 199	140, 492
Henderson	43	174, 280	131	...	7	38, 125	254, 377	364, 094

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—KENTUCKY, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Henry	74	$167,431	134		2	$33,130	$157,790	$256,145
Hickman	29	51,668	92		4	22,760	147,960	207,531
Hopkins	32	76,125	96		8	17,782	52,342	106,892
Jackson (a)								
Jefferson	1,155	21,918,138	13,651	2,829	1,157	5,879,999	21,399,470	35,748,328
Jessamine	61	176,380	146		22	52,354	407,166	561,340
Johnson	6	8,900	4			370	3,235	5,970
Kenton	213	3,223,391	2,271	223	453	1,038,823	3,960,427	5,912,480
Knox	11	7,750	16			1,632	8,000	11,900
La Rue	23	61,900	66		6	10,851	68,944	97,238
Laurel	5	8,000	6			1,666	23,466	31,350
Lawrence	8	15,762	20		8	7,080	26,531	40,588
Lee (a)								
Leslie (a)								
Letcher (a)								
Lewis	68	127,905	242	9	25	49,682	195,734	313,888
Lincoln	61	110,285	113	5	10	25,947	116,166	174,819
Livingston	16	24,225	40			10,308	59,100	90,883
Logan	72	255,400	195	3	18	53,368	514,025	667,368
Lyon	13	586,700	330		6	107,550	79,808	181,905
McCracken	87	666,375	689	17	81	288,750	805,158	1,346,151
McLean	11	28,250	27	8	5	6,910	33,720	54,680
Madison	47	427,980	247		6	74,361	588,300	811,534
Magoffin	5	12,200	11			1,375	10,650	15,800
Marion	50	298,337	168	1	5	58,735	551,596	747,292
Marshall	6	10,300	9			1,075	9,355	13,054
Martin	3	800	4			400	800	2,550
Mason	47	865,600	499	43	99	196,630	707,007	1,222,114
Meade	33	245,130	103	38	39	33,465	186,848	267,716
Menifee	7	6,775	16		1	2,815	13,740	23,026
Mercer	81	205,400	129			41,425	243,197	389,608
Metcalfe	12	21,650	29		1	5,910	24,096	36,697
Monroe	26	57,315	36			6,862	52,815	76,205
Montgomery	56	80,145	107	3		30,354	64,207	132,956
Morgan	8	12,700	11		4	3,400	8,223	15,916
Muhlenburgh	36	53,875	107	6	23	18,111	54,122	99,448
Nelson	80	913,915	279	3	6	96,846	839,941	1,238,396
Nicholas	45	56,090	70		6	18,164	163,462	232,137
Ohio	22	53,680	58		6	11,421	53,565	85,451
Oldham	40	56,875	50	1	3	9,869	79,620	115,061
Owen	59	61,035	67	1	4	15,255	94,269	145,390
Owsley	8	7,700	14			1,245	43,480	55,877
Pendleton	61	106,530	101		8	26,388	173,158	255,075
Perry (a)								
Pike	9	11,050	15			1,610	23,170	30,452
Powell	5	10,300	17			5,365	21,260	31,670
Pulaski	34	91,570	97		5	28,363	140,698	212,532
Robertson	15	14,350	12		1	1,265	30,180	39,305
Rockcastle	16	39,875	57	1	1	20,630	123,570	185,248
Rowan (a)								
Russell	7	7,700	8		1	1,475	15,110	20,230
Scott	52	133,200	121		4	36,123	166,699	267,588
Shelby	70	134,225	116			31,442	265,785	363,295
Simpson	35	74,685	71	1	8	13,115	198,933	249,752
Spencer	15	27,100	28			3,024	73,675	89,361
Taylor	39	34,800	63			10,946	99,045	152,165
Todd	40	63,725	83		7	17,355	235,299	293,812
Trigg	28	249,800	55			14,755	102,790	137,719
Trimble	9	113,000	38		2	11,930	133,124	177,305
Union	16	41,550	39	2		13,522	44,640	72,480
Warren	54	412,580	207	62	56	96,282	281,912	501,698
Washington	62	103,225	90			16,795	179,597	240,390
Wayne	20	40,750	21			4,358	54,977	72,342
Webster	19	20,660	36		2	6,235	47,647	67,112
Whitley	7	22,000	16			3,283	29,472	40,089
Wolfe	19	21,605	18			2,425	22,795	30,825
Woodford	69	215,725	177	3	7	56,275	282,134	438,815

a Returned as having no manufactures.

B—KENTUCKY, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	5,328	$45,813,039	30,949	3,529	2,913	$11,657,844	$47,461,890	$75,483,377
Agricultural implements	86	2,296,037	999	10	24	364,385	823,392	1,647,116
Artificial limbs	1	2,500					1,000	2,800
Awnings and tents	3	15,400	15	109	2	10,500	37,800	59,650
Axle-grease	1	2,000	4			2,500	10,000	15,000
Bagging, flax, hemp, and jute	1	150,000	35	105	10	28,500	150,000	213,500
Baking and yeast powders (see also Drugs and chemicals)	2	11,000	7	3		4,604	22,000	38,000
Baskets, rattan and willow ware	10	3,600	6	2	3	2,046	2,355	9,520
Bells	2	26,000	15			5,460	12,800	34,300
Belting and hose, leather	2	19,000	5			3,300	17,000	30,000
Blacksmithing (see also Wheelwrighting)	884	424,324	924	1	15	243,604	355,244	1,104,527

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—KENTUCKY, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Bluing	1	$2,000	4	3	1	$1,500	$4,000	$7,500
Bookbinding and blank-book making	4	50,900	33	23		21,040	54,150	98,800
Boot and shoe uppers	5	14,050	23	11		18,857	69,600	102,980
Boots and shoes, including custom work and repairing	342	466,152	801	159	38	341,129	582,377	1,240,044
Boxes, cigar	3	5,500	7	7	3	5,500	14,040	23,600
Boxes, fancy and paper	1	6,000	4	40	1	5,500	5,500	20,000
Boxes, wooden, packing	8	61,022	65		5	30,772	62,572	121,350
Brass castings	6	69,600	52		9	20,020	80,020	114,276
Bread and other bakery products	128	287,325	274	35	14	101,088	495,144	795,901
Brick and tile (see also Drain and sewer pipe)	115	302,175	1,162	1	216	233,702	145,503	506,705
Bridges	1	250,000	110		15	70,000	180,000	300,000
Brooms and brushes	15	20,175	60	9	2	25,410	41,000	87,580
Buttons	1	2,000	1	2		900	1,400	3,700
Carpentering	190	342,975	796		12	322,266	802,962	1,525,994
Carpets, rag	2	325	1			100	1,500	2,900
Cars, railroad, street, and repairs	2	6,000	37			17,500	14,775	39,500
Carriage and wagon materials	7	128,140	209		18	69,352	48,865	153,043
Carriages and sleds, children's	1	25,000	25	5	5	13,246	33,653	55,899
Carriages and wagons (see also Wheelwrighting)	95	726,950	898	2	24	376,422	716,940	1,474,475
Cement	2	375,000	147			25,000	111,000	145,000
Cheese and butter (factory)	8	20,100	11	2	1	1,200	7,854	14,178
Clothing, men's	69	767,700	876	825	40	351,616	820,611	1,506,668
Clothing, women's	3	45,000	2	220	25	53,300	275,600	388,900
Coffee and spices, roasted and ground	4	59,500	25		8	22,892	217,500	296,953
Coffins, burial cases, and undertakers' goods	17	119,900	77	3		30,745	46,600	134,775
Confectionery	26	188,925	110	19	5	46,414	181,909	318,540
Cooperage	113	410,815	947		13	394,796	573,496	1,243,930
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	3	16,550	17			7,200	51,700	74,600
Cordage and twine	9	137,900	155		62	72,923	213,120	354,750
Cork cutting	1	12,000	10	5	7	3,500	18,000	24,000
Cutlery and edge tools (see also Hardware)	5	54,600	73		1	31,979	28,600	75,350
Cotton goods (see also Mixed textiles)	4	365,000	125	94	133	64,550	259,818	426,286
Dentistry, mechanical	10	32,500	8			6,075	14,700	49,500
Drain and sewer pipe (see also Brick and tile)	2	26,000	20		2	8,500	11,700	32,500
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	7	46,500	23		13	9,770	27,250	61,500
Dyeing and cleaning	4	11,550	4	3		2,300	1,750	9,970
Dyeing and finishing textiles	2	5,000	3	3		1,716	1,300	6,420
Electrical apparatus and supplies	1	1,500	2			750	1,600	4,300
Electroplating	1	2,000	4			1,600	700	4,400
Fertilizers	2	2,500	10			3,950	2,400	9,200
Files (see also Saws)	1	6,000	7			3,150	1,800	6,000
Flax, dressed	8	163,000	130		70	61,700	419,000	536,700
Flouring- and grist-mill products	652	3,685,759	1,478		7	336,419	8,406,432	9,604,147
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	50	2,283,350	1,992		39	763,392	1,690,171	3,013,079
Fruits and vegetables, canned and preserved	2	1,800					1,400	6,000
Furniture (see also Mattresses and spring beds; Upholstering)	50	542,950	687	5	38	261,550	430,605	949,810
Furniture, chairs	15	136,100	197	12	49	89,236	123,585	257,820
Glass	5	795,000	364	11	147	150,322	134,104	388,405
Glass, cut, stained, and ornamented	1	6,000	5			3,047	5,000	10,000
Glue	2	70,000	40		5	8,345	4,400	54,000
Gold and silver leaf and foil	1	500	2			850	1,000	2,200
Grease and tallow	2	18,000	5			2,450	109,482	137,600
Hairwork	6	8,400		8		2,431	10,265	25,600
Handles, wooden	10	72,100	215		13	68,845	130,148	305,986
Hardware (see also Cutlery and edge tools)	5	18,150	30		2	10,132	10,025	30,333
Hats and caps, not including wool hats	2	1,900	1	2	1	750	1,000	3,900
Ice, artificial	1	15,000	100	50		5,000	2,000	14,000
Ink	3	9,500	9	2		3,908	5,600	11,800
Instruments, professional and scientific	3	11,500	6			3,820	1,800	11,000
Iron and steel	29	5,493,035	3,821		264	1,344,400	3,223,799	5,090,029
Iron bolts, nuts, washers, and rivets	1	20,000	12			4,232	8,965	17,258
Iron nails and spikes, cut and wrought	1	25,000	13			4,680	16,148	32,000
Iron forgings	1	25,000	25		6	10,954	26,405	41,355
Iron railings, wrought	3	7,500	26			8,200	10,500	25,480
Iron work, architectural and ornamental (see also Foundery and machine-shop products)	6	30,000	37			14,454	27,440	59,993
Jewelry	11	32,899	37	2	1	18,346	36,584	67,850
Labels and tags	1	600	3		1	1,460	1,200	3,900
Lapidary work	1	100					50	600
Leather, curried	46	169,400	112			33,263	554,247	687,883
Leather, tanned	63	1,741,430	516	1	11	204,345	1,799,047	2,511,960
Lightning rods	1	2,000	3			2,000	5,000	10,000
Lime	4	42,220	40			1,900	4,817	9,837
Liquors, distilled	215	6,345,922	1,414	3	13	560,121	5,473,575	8,281,018
Liquors, malt	30	1,260,944	436	1	3	209,143	807,922	1,491,659
Liquors, vinous (see also Liquors, distilled)	2	1,250	3		5	700	400	2,400
Lithographing (see also Printing and publishing)	4	26,200	43	12	10	22,324	22,526	59,270
Lock- and gun-smithing	7	4,625	12			5,058	12,650	23,800
Looking-glass and picture frames	5	4,162	9			2,980	4,910	13,540
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	21	441,265	432		7	184,187	540,197	950,638
Lumber, sawed	670	2,299,558	2,506	1	94	671,939	2,410,743	4,064,361
Malt	2	89,000	26		1	19,000	350,000	510,000
Marble and stone work	45	186,775	281			132,469	200,306	496,980
Masonry, brick and stone	12	52,200	146		7	56,871	79,889	172,359
Mattresses and spring beds (see also Furniture)	18	23,850	46	6		19,051	47,555	94,150
Millinery and lace goods	7	61,000	3	79	5	20,240	96,600	149,900

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—KENTUCKY, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths			
Mineral and soda waters	11	$25,400	25		5	$10,697	$13,550	$39,393
Mixed textiles (see also Cotton goods; Woolen goods)	5	615,000	137	210	161	135,948	579,176	869,329
Models and patterns	1	700	3			1,944	300	3,500
Musical instruments, organs and materials	1	25,000	10		2	3,050	9,000	20,000
Musical instruments, pianos and materials	5	40,700	26			12,833	13,800	42,200
Nets and seines	1	250		2		50	500	1,200
Oil, linseed	1	75,000	12			4,500	50,000	70,000
Oleomargarine	1	400,000	75		10	10,000	200,000	250,000
Painting and paperhanging	45	44,890	177		5	68,333	81,670	204,771
Paints	2	10,800	11			4,880	20,000	34,000
Paper	2	600,000	172	113	10	82,460	303,070	619,422
Patent medicines and compounds (see also Drugs and chemicals)	12	144,850	36	10	5	15,320	168,650	363,400
Photographing	15	32,800	39	6	2	23,556	31,000	81,485
Pickles, preserves, and sauces	3	4,500	9	5		1,180	7,520	10,800
Plumbing and gasfitting	18	38,650	84		3	36,060	54,821	126,475
Printing and publishing (see also Lithographing)	48	1,401,700	740	106	86	452,113	476,214	1,289,316
Pumps, not including steam pumps	6	27,250	32		2	15,160	15,010	43,789
Refrigerators	2	7,000	8		5	5,800	6,875	17,800
Roofing and roofing materials	8	16,300	26		2	11,687	32,700	58,350
Saddlery and harness	164	582,865	660	20	32	261,543	753,346	1,370,885
Salt	3	20,300	34			8,750	9,008	21,950
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	4	148,350	71		3	27,300	121,200	166,595
Saws	1	8,000	4			2,566	1,000	8,500
Scales and balances	1	10,000	7			3,000	6,000	16,500
Shingles, split	25	10,350	100	9	19	5,975	13,375	27,452
Shipbuilding	11	88,450	157			92,171	126,550	240,015
Shirts	8	64,300	9	100		19,594	30,774	65,315
Show-cases	3	2,100	6		2	1,950	2,650	6,900
Slaughtering and meat-packing, not including retail butchering establishments.	31	2,229,500	389		8	150,576	3,644,059	4,538,888
Soap and candles	5	333,740	72	27		29,700	324,881	393,325
Sporting goods	4	15,200	17	70	5	12,700	10,650	37,075
Stationery goods	1	1,000	1		2	700	2,000	3,000
Stencils and brands	2	7,100	12			7,176	4,175	13,000
Stereotyping and electrotyping	1	5,000	7			3,900	2,500	7,000
Stone- and earthen-ware	13	18,100	52		7	13,610	8,950	33,850
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	127	320,965	344	1	12	149,656	402,866	772,488
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	28	1,069,800	1,059	530	382	344,219	2,232,030	3,734,835
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	107	356,964	560	69	160	220,949	389,007	982,514
Tobacco stemming	20	541,158	138	81	116	67,656	495,529	629,530
Toys and games	1	8,000	4	2		2,700	9,500	16,000
Trunks and valises	8	60,400	100		17	45,101	74,500	167,700
Umbrellas and canes	1	750	1	3	1	1,400	2,000	5,000
Upholstering (see also Furniture)	7	14,500	14	5		6,164	24,550	43,200
Vinegar	5	47,000	24			8,510	76,805	112,000
Watch and clock repairing	12	7,130	6			3,500	2,175	17,790
Watch cases	1	500,000	200	20	55	150,000	500,000	800,000
Wheelbarrows	1	1,200	1		2	624	1,000	3,000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	199	142,140	252	1	6	78,659	110,192	336,120
Wirework	4	56,200	107	10	7	31,790	70,764	126,785
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	8	93,700	62		36	36,299	51,456	116,967
Woolen goods (see also Mixed textiles)	98	890,750	353	253	217	166,189	852,405	1,264,988

A—LOUISIANA, BY TOTALS OF PARISHES.

The State	1,553	$11,462,468	10,171	1,335	661	$4,360,371	$14,442,506	$24,205,183
PARISHES.								
Ascension	11	21,000	39		7	10,150	21,060	45,250
Assumption	24	13,400	46		4	10,870	9,192	31,075
Avoyelles	29	30,450	34		7	6,350	12,650	30,050
Bienville	1	1,500	1			200	875	1,500
Bossier	17	22,600	27			3,055	20,806	30,608
Caddo	20	201,810	223		12	57,405	198,217	328,623
Calcasieu	21	122,800	160		16	52,540	283,430	401,825
Caldwell	2	2,350	4			375	2,156	3,500
Cameron (*a*)								
Catahoula	3	7,400	9			1,875	11,500	16,000
Claiborne	31	52,431	64			10,143	69,588	92,321
Concordia	1	500	1			400	1,000	2,000
De Soto	7	12,500	9			1,520	9,650	15,970
East Baton Rouge	13	45,850	88		9	24,400	43,250	91,800
East Carroll	3	4,000	10			1,005	1,900	4,100
East Feliciana	11	24,000	22			5,110	17,825	36,300
Franklin	1	3,000	5			300	1,000	2,000
Grant (*a*)								
Iberia	37	321,450	140		5	37,142	60,095	183,574
Iberville	28	54,375	82		1	17,995	63,810	122,350

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—LOUISIANA, BY TOTALS OF PARISHES—Continued.

Parishes.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Jackson (*a*)								
Jefferson	10	$665, 550	439	4	5	$126, 365	$530, 710	$821, 441
La Fayette	22	9, 550	17		1	3, 670	8, 921	22, 170
Lafourche	16	78, 950	81			21, 450	38, 205	90, 150
Lincoln	19	24, 705	37			3, 476	32, 544	45, 063
Livingston	5	22, 500	22		3	4, 300	27, 150	41, 760
Madison	1	8, 000	9			1, 500	14, 000	18, 000
Morehouse	16	32, 800	51		1	7, 385	22, 056	42, 850
Natchitoches	5	10, 000	17			2, 960	8, 130	15, 800
Orleans	915	8, 565, 303	7, 666	1, 286	552	3, 717, 557	10, 771, 892	18, 808, 096
Ouachita	9	33, 700	31		2	9, 850	35, 225	56, 375
Plaquemines	1	500	1			280	200	620
Point Coupée	25	15, 220	33			5, 580	22, 905	43, 490
Rapides	15	24, 599	33			7, 870	38, 785	57, 405
Red River	12	32, 650	20			2, 680	20, 550	29, 673
Richland	2	9, 000	9			1, 250	6, 350	10, 000
Sabine	1	2, 500	1			300	1, 100	2, 000
Saint Bernard	6	548, 500	39	11	2	25, 684	1, 430, 740	1, 648, 300
Saint Charles (*a*)								
Saint Helena	15	16, 400	29			2, 675	36, 515	51, 332
Saint James	10	11, 700	34		3	6, 394	5, 075	17, 800
Saint John Baptist	5	3, 900	12			2, 800	1, 725	6, 386
Saint Landry	76	65, 200	106			21, 379	65, 680	132, 948
Saint Martin	5	12, 500	16			4, 925	39, 350	50, 809
Saint Mary	17	62, 950	95		2	26, 860	138, 645	206, 845
Saint Tammany	12	12, 450	53		3	12, 530	33, 500	55, 100
Tangipahoa	9	174, 100	156	30	21	69, 870	208, 211	334, 800
Tensas (*a*)								
Terrebonne	29	34, 225	95	4	4	12, 837	35, 065	69, 290
Union	13	14, 350	32		1	6, 374	9, 261	27, 196
Vermillion	7	5, 100	23			3, 487	4, 600	10, 728
Vernon	3	4, 100	6			597	3, 600	6, 000
Washington (*a*)								
Webster	4	6, 600	14			1, 752	6, 382	11, 929
West Baton Rouge	6	9, 950	15			3, 159	9, 500	18, 300
West Carroll	1	2, 000	8			1, 000	6, 500	10, 000
West Feliciana (*a*)								
Winn	1	1, 500	7			750	1, 430	3, 690

a Returned as having no manufactures.

B—LOUISIANA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	1, 553	$11, 462, 468	10, 171	1, 335	661	$4, 360, 371	$14, 442, 506	$24, 205, 183
Agricultural implements	1	3, 000	5			600	650	2, 000
Bags, other than paper	2	900	5			1, 124	1, 850	4, 800
Baskets, rattan and willow ware	2	2, 200	7		1	3, 384	2, 900	10, 200
Blacksmithing (see also Wheelwrighting)	191	94, 035	271	1	12	103, 233	100, 099	334, 888
Bookbinding and blank-book making	6	11, 000	16		3	10, 211	5, 520	24, 369
Boot and shoe findings	9	57, 200	40	2	6	20, 270	98, 932	171, 080
Boots and shoes, including custom work and repairing	85	50, 700	281		6	120, 052	184, 659	392, 732
Boxes, fancy and paper	4	14, 600	41	12	46	29, 483	59, 400	125, 928
Boxes, wooden, packing	4	15, 200	15	12	6	7, 572	10, 220	25, 200
Brass castings	2	3, 200	11		1	2, 400	650	5, 000
Bread and other bakery products	101	109, 920	319	8	17	121, 060	542, 150	983, 960
Brick and tile	31	87, 425	305	13	40	68, 626	30, 067	133, 265
Brooms and brushes	8	14, 750	67		3	23, 195	90, 532	137, 270
Carpentering	40	67, 325	276		4	141, 494	232, 000	456, 500
Carriages and wagons (see also Wheelwrighting)	12	46, 200	118		6	60, 546	52, 200	156, 700
Cars, railroad, street, and repairs	1	3, 000	15			3, 000	6, 000	10, 000
Coffee and spices, roasted and ground	3	1, 300	3		1	1, 524	9, 510	11, 876
Coffins, burial cases, and undertakers' goods	7	2, 900	9			2, 911	4, 122	13, 866
Clothing, men's	34	190, 375	276	628	30	175, 971	743, 907	1 079, 559
Clothing, women's	6	83, 000	2	273		43, 875	113, 353	189, 278
Confectionery	21	132, 800	86	11	17	33, 754	274, 571	393, 040
Cooperage	124	129, 395	423		1	151, 830	155, 486	419, 074
Cordage and twine	2	6, 000	7		7	4, 095	12, 000	24, 000
Cordials and sirups	4	48, 000	30			11, 966	43, 000	82, 000
Cork cutting	1	30, 000	14			4, 000	20, 000	30, 000
Cotton compressing	19	2, 135, 000	560			399, 780	105, 788	747, 500
Cotton goods	2	195, 000	39	41	24	12, 572	72, 470	86, 776
Cutlery and edge tools (see also Hardware)	2	400	1			180	125	1, 350
Dentistry, mechanical	3	9, 200	6		3	5, 350	8, 250	20, 150
Drugs and chemicals (see also Patent medicines and compounds)	7	16, 700	13			4, 190	8, 850	22, 750
Dyeing and cleaning	12	6, 925	13	3	1	5, 080	3, 890	22, 850
Fertilizers	2	99, 000	64	14		25, 796	89, 258	192, 734
Flags and banners	1	1, 800		3		1, 500	3, 000	6, 000
Flouring- and grist-mill products	84	176, 380	107			22, 245	397, 440	489, 848
Food preparations (see page 39)	4	16, 000	12	1	3	5, 328	19, 600	47, 880
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	31	910, 625	916	30	31	489, 896	777, 000	1, 554, 485
Fruits and vegetables, canned and preserved	1	40, 000	20		30	12, 000	70, 000	115, 000
Furniture (see also Mattresses and spring beds; Upholstering)	37	39, 676	70	1	6	33, 501	37, 429	113, 418
Galvanizing	3	700	1			360	700	3, 050
Gold and silver, reduced and refined (not from the ore)	1	5, 000	3			1, 200	20, 000	30, 000

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—LOUISIANA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Grease and tallow	1	$20,000	3	....	....	$1,500	$35,000	$75,000
Hairwork	7	6,200	6	6	....	3,592	7,200	18,400
Hammocks	1	300	....	5	....	700	6,835	8,852
Hardware (see also Cutlery and edge tools)	2	2,500	5	....	....	1,000	2,600	5,000
Ice, artificial	4	449,500	90	....	....	41,350	54,610	166,750
Instruments, professional and scientific	3	1,600	3	....	....	1,260	1,700	5,460
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	3	1,800	10	....	....	3,477	4,200	14,500
Japanning	1	100	....	....	....	....	125	675
Leather, curried	4	3,050	3	....	....	1,028	16,342	20,366
Leather, tanned	10	9,300	13	....	2	2,941	14,984	28,470
Liquors, distilled	2	8,500	2	....	....	240	1,925	2,925
Liquors, malt	9	160,613	114	....	....	55,092	295,778	458,459
Lithographing (see also Printing and publishing)	3	2,000	8	....	....	4,500	3,250	13,500
Lock- and gun-smithing	16	3,850	12	....	....	3,000	2,465	14,370
Looking-glass and picture frames	5	7,050	6	....	1	2,892	8,575	16,559
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	8	79,500	100	....	4	44,973	163,710	270,480
Lumber, sawed	175	903,950	943	....	33	200,063	1,187,059	1,764,640
Marble and stone work	11	62,550	65	....	....	32,575	61,208	134,490
Masonry, brick and stone	18	18,500	87	....	15	36,950	31,600	92,400
Mattresses and spring beds (see also Furniture)	3	3,450	8	1	....	2,712	25,500	39,200
Mineral and soda waters	7	29,100	37	....	....	18,312	24,350	75,900
Mirrors	1	10,000	6	....	....	2,500	4,000	10,000
Oil, cottonseed and cake	12	1,557,500	1,352	19	75	422,165	2,280,910	3,739,466
Painting and paperhanging	12	10,425	98	....	....	30,412	33,800	86,000
Patent medicines and compounds (see also Drugs and chemicals)	2	1,150	3	....	....	990	4,237	8,382
Perfumery and cosmetics	2	26,000	15	4	....	5,777	8,000	49,000
Photographing	12	39,100	37	6	2	27,390	19,399	79,765
Pickles, preserves, and sauces	1	500	2	....	....	500	300	2,500
Plated and britannia ware	1	20,000	7	....	....	3,000	10,000	25,000
Plumbing and gasfitting	9	16,300	31	....	....	17,441	40,500	71,600
Printing and publishing (see also Lithographing)	25	303,050	503	4	17	407,946	226,600	764,036
Pumps, not including steam pumps	2	16,000	4	....	....	750	1,460	3,060
Rice cleaning and polishing	6	225,000	162	....	....	56,040	1,328,387	1,573,281
Saddlery and harness	27	172,100	154	1	15	76,549	207,800	377,380
Salt	1	250,000	45	....	....	11,000	....	56,160
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	7	295,000	177	....	....	87,200	254,250	451,000
Shipbuilding	38	152,100	218	....	....	113,526	162,405	343,525
Slaughtering and meat-packing, not including retail butchering establishments.	1	500,000	18	....	....	13,830	1,375,000	1,500,000
Soap and candles	12	118,450	45	....	6	19,790	89,990	142,495
Stencils and brands	2	900	3	....	1	320	800	3,000
Stone- and earthen-ware	2	2,000	7	....	....	2,950	3,100	10,500
Sugar and molasses, refined	4	385,000	190	....	....	50,000	1,340,000	1,483,000
Surgical appliances	3	1,550	5	....	....	2,070	1,675	6,000
Tinware, copperware, and sheet-iron ware	41	107,250	145	....	5	61,371	114,790	227,759
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	8	348,000	127	6	88	70,540	242,100	424,085
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	47	175,674	680	187	87	179,999	152,156	506,612
Trunks and valises	2	2,700	14	....	2	7,500	19,000	37,500
Umbrellas and canes	1	100	....	....	....	....	100	500
Upholstering (see also Furniture)	12	8,325	15	....	....	3,335	9,575	20,640
Upholstering materials	8	37,800	36	43	2	24,245	103,940	167,900
Vinegar	1	2,000	5	....	....	1,575	2,500	8,000
Watch and clock repairing	17	13,200	24	....	....	15,095	9,021	36,479
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	28	29,650	50	....	1	15,029	18,575	54,382
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	3	5,400	11	....	....	6,225	21,542	39,404

A—MAINE, BY TOTALS OF COUNTIES.

The State	4,481	$49,988,171	35,431	13,777	3,746	$13,623,318	$51,120,708	$79,829,793
COUNTIES.								
Androscoggin	253	12,009,562	5,065	4,394	745	3,033,897	8,714,373	14,789,963
Aroostook	270	941,460	1,001	22	3	190,615	1,100,175	1,744,052
Cumberland	569	8,542,710	7,650	2,853	1,052	2,584,898	11,206,063	16,540,198
Franklin	207	622,434	577	156	58	139,205	536,657	892,937
Hancock	279	898,285	943	352	234	252,030	955,222	1,584,236
Kennebec	356	5,764,547	2,985	1,096	221	1,314,171	4,691,294	7,737,822
Knox	197	1,662,584	1,171	127	3	422,994	1,491,812	2,274,359
Lincoln	126	297,575	457	....	4	98,444	413,466	614,214
Oxford	260	1,695,030	1,247	322	87	478,501	2,016,713	2,859,063
Penobscot	574	4,024,680	3,485	394	139	1,082,969	6,243,326	8,692,667
Piscataquis	136	1,000,795	917	293	20	289,731	1,092,666	1,710,479
Sagadahoc	96	931,350	1,175	45	....	461,730	1,337,059	2,089,966
Somerset	307	1,464,973	1,519	460	373	392,661	1,529,249	2,491,302
Waldo	196	496,388	602	164	6	189,258	684,157	1,107,574
Washington	319	2,212,235	2,005	117	48	536,679	3,028,474	4,224,206
York	336	7,423,563	4,542	2,982	753	2,175,535	6,020,002	10,485,755

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MAINE, BY SPECIFIED INDUSTRIES.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	4, 481	$49, 988, 171	35, 431	13, 777	3, 746	$13, 623, 318	$51, 120, 708	$79, 829, 793
Agricultural implements	28	726, 300	440	1	7	174, 075	329, 675	661, 445
Awnings and tents	2	800	5	3	....	2, 750	5, 500	9, 500
Babbitt metal and solder	1	5, 000	5	....	....	2, 191	44, 000	47, 000
Baskets, rattan and willow ware	1	300	4	....	....	700	250	2, 000
Belting and hose, leather	4	20, 200	19	....	....	10, 120	44, 600	61, 104
Blacking	1	8, 000	4	13	....	5, 000	10, 000	36, 000
Blacksmithing (see also Wheelwrighting)	562	334, 110	573	....	2	130, 103	237, 826	665, 237
Bookbinding and blank-book making	9	47, 400	44	30	....	24, 996	53, 833	97, 284
Boot and shoe cut stock	1	6, 000	51	5	....	5, 500	11, 825	17, 616
Boot and shoe findings	4	21, 500	34	15	3	10, 597	15, 870	31, 174
Boots and shoes, including custom work and repairing	203	1, 485, 400	2, 872	1, 197	105	1, 400, 959	4, 031, 200	6, 120, 342
Boxes, fancy and paper	7	54, 400	93	227	17	51, 185	30, 150	122, 590
Boxes, wooden, packing	16	98, 150	143	7	26	41, 320	59, 025	141, 125
Brass castings	8	96, 000	29	....	....	15, 102	50, 905	89, 850
Bread and other bakery products	31	155, 200	160	10	4	71, 804	233, 870	377, 554
Brick and tile (see also Drain and sewer pipe)	96	280, 549	621	....	16	106, 538	122, 887	310, 958
Brooms and brushes	11	66, 100	120	7	14	38, 500	208, 025	292, 950
Carpentering	70	137, 100	358	....	1	121, 351	189, 940	400, 020
Carpets, other than rag (see also Woolen goods)	1	300	....	....	....	....	785	1, 200
Carriage and wagon materials	6	19, 400	22	....	1	4, 950	9, 100	20, 750
Carriages and sleds, children's	1	35, 000	45	....	....	15, 886	14, 000	35, 307
Carriages and wagons (see also Wheelwrighting)	46	274, 100	322	....	....	142, 044	201, 857	460, 609
Cheese and butter (factory)	41	82, 512	48	9	1	8, 213	47, 692	75, 592
Cloth finishing	1	1, 600	....	....	....	....	300	1, 300
Clothing, men's	79	443, 475	254	1, 263	16	262, 112	637, 546	1, 130, 381
Clothing, women's	2	4, 500	....	19	....	3, 300	5, 000	15, 500
Coffee and spices, roasted and ground	7	33, 500	21	9	....	16, 611	169, 625	216, 500
Coffins, burial cases, and undertakers' goods	34	72, 600	59	2	....	26, 460	39, 952	101, 553
Confectionery	24	83, 300	71	38	....	23, 311	92, 586	166, 225
Cooperage	118	189, 913	435	....	....	105, 614	193, 234	385, 304
Cordage and twine	3	80, 800	39	3	....	10, 450	70, 030	129, 500
Corsets	1	3, 500	2	12	....	3, 800	8, 250	15, 000
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	24	15, 292, 078	3, 858	6, 481	1, 420	2, 936, 640	7, 320, 152	13, 319, 363
Cutlery and edge tools (see also Hardware; Tools)	14	68, 200	63	....	....	23, 188	33, 213	71, 687
Dentistry, mechanical	5	3, 900	1	....	....	180	1, 920	6, 210
Drain and sewer pipe (see also Brick and tile)	2	16, 000	8	....	....	4, 600	3, 800	10, 450
Drugs and chemicals (see also Patent medicines and compounds)	5	84, 400	30	2	....	10, 150	37, 950	64, 000
Dyeing and cleaning	2	2, 500	3	2	....	1, 100	1, 100	6, 000
Dyeing and finishing textiles	4	593, 500	594	45	41	166, 619	321, 989	1, 107, 616
Dyestuffs and extracts	2	115, 000	18	....	....	6, 385	23, 600	99, 900
Electroplating	3	2, 100	8	....	....	2, 550	6, 496	10, 982
Emery wheels	1	500	1	....	....	350	150	1, 000
Engraving and die-sinking	2	750	2	....	....	1, 150	300	2, 700
Engraving, steel	1	800	2	....	....	750	300	1, 200
Engraving, wood	2	5, 300	8	....	....	5, 000	3, 100	10, 000
Fancy articles	3	9, 100	10	16	1	5, 150	2, 950	12, 700
Felt goods (see also Woolen goods)	1	100, 000	41	11	2	14, 326	67, 538	120, 000
Fertilizers	13	184, 625	119	....	....	30, 410	198, 600	283, 650
Files (see also Saws)	7	11, 400	37	....	1	13, 750	9, 125	28, 275
Flavoring extracts	2	2, 400	6	....	2	1, 300	6, 500	10, 800
Flouring- and grist-mill products	261	993, 500	385	....	....	109, 882	3, 560, 926	3, 966, 023
Food preparations (see page 39)	1	....	150	100	50	8, 000	61, 000	75, 000
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	76	1, 793, 720	1, 652	4	8	681, 865	1, 131, 447	2, 232, 675
Fruits and vegetables, canned and preserved	18	926, 535	2, 349	1, 448	1, 093	216, 400	823, 005	1, 402, 100
Furnishing goods, men's	1	2, 000	3	3	1	1, 500	2, 000	4, 000
Furniture (see also Mattresses and spring beds; Upholstering)	68	310, 950	367	8	7	142, 500	282, 590	572, 275
Furniture, chairs	4	13, 700	25	13	2	10, 100	5, 100	21, 000
Glass, cut, stained, and ornamented	2	1, 500	7	....	1	3, 150	2, 800	8, 000
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	1	500	....	316	200	13, 000	24, 000	39, 000
Glue	1	4, 000	6	....	....	2, 000	11, 000	14, 000
Grindstones	1	2, 000	2	....	....	700	4, 000	5, 000
Gunpowder	2	160, 000	54	....	....	36, 400	171, 000	249, 000
Hairwork	2	700	1	3	1	350	2, 000	4, 600
Handles, wooden	15	75, 950	97	....	5	24, 626	67, 200	136, 435
Hardware (see also Cutlery and edge tools; Tools)	2	5, 000	6	1	....	1, 650	2, 300	6, 250
Hats and caps, not including wool hats	4	21, 500	12	14	....	9, 600	29, 450	51, 300
Hones and whetstones	1	2, 500	1	2	....	1, 060	3, 320	6, 680
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	1	500	1	20	....	801	1, 800	3, 000
Ink	1	100	1	....	....	40	700	1, 000
Instruments, professional and scientific	1	1, 000	2	....	....	1, 000	500	2, 000
Iron and steel	3	450, 000	683	....	17	141, 494	380, 511	583, 328
Iron forgings	3	48, 000	54	....	....	17, 075	65, 516	107, 613
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	1	4, 000	6	....	....	3, 800	4, 500	9, 250
Ivory and bone work	1	3, 000	1	....	....	850	700	2, 000
Kaolin and ground earths	2	29, 100	19	....	....	8, 750	3, 050	54, 600

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MAINE, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Lamps and reflectors	1	$1,500	2			$973	$2,200	$3,500
Lasts	3	13,000	12			4,892	2,600	10,627
Leather board (see also Paper)	5	120,000	128	10		53,500	164,000	296,000
Leather, curried	34	510,900	262	10	2	99,094	2,290,310	2,612,350
Leather, dressed skins	2	16,000	18			8,700	136,000	173,000
Leather goods	1	2,000	5			2,500	25,000	30,000
Leather, tanned	83	2,459,700	1,387		6	404,904	5,535,427	7,100,967
Lime	28	942,150	301			86,274	393,309	599,605
Lock- and gun-smithing	3	6,500	3			1,700	1,100	5,700
Looking-glass and picture frames	6	9,200	11		1	4,100	10,300	18,100
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	33	300,000	224		14	89,865	351,471	511,799
Lumber, sawed	848	6,339,396	6,480		183	1,161,142	4,951,957	7,933,868
Marble and stone work	67	137,600	260		1	96,259	71,902	245,750
Masonry, brick and stone	16	13,050	133			33,750	34,715	87,020
Matches	3	71,000	64	39	2	38,212	203,693	314,593
Mattresses and spring beds (see also Furniture)	1	2,500	2	3		1,200	3,375	5,250
Mineral and soda waters	3	8,275	28			7,000	5,000	20,000
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	15	1,290,380	487	451	133	357,595	1,238,247	1,909,937
Models and patterns	2	2,000	4			2,100	400	3,200
Musical instruments and materials (not specified)	1	400					200	600
Musical instruments, organs and materials	4	41,500	39			14,000	15,200	54,000
Oil, lubricating	1	100,000	4			2,400	6,000	15,000
Oilcloth, floor	4	695,000	289	2		124,500	535,075	713,000
Painting and paperhanging	55	36,575	135			45,510	64,565	147,850
Paints (see also Varnish)	3	30,000	17			7,030	65,938	85,532
Paper (see also Leather board; Wood pulp)	12	1,995,000	753	314		325,691	1,347,509	2,170,321
Patent medicines and compounds (see also Drugs and chemicals)	5	11,800	10	9		3,850	8,300	25,500
Photographing	18	37,800	34	13	1	16,500	16,600	60,250
Pickles, preserves, and sauces	1	1,000	2	1		1,000	1,000	5,000
Plated and britannia ware	4	64,100	45	2		18,125	15,572	41,300
Plumbing and gasfitting	10	38,500	52			21,950	64,096	108,800
Printing and publishing	48	747,600	410	216	14	297,005	976,317	1,606,098
Pumps, not including steam pumps	9	31,200	32		3	9,700	19,950	44,250
Refrigerators	1	5,000	4			2,500	3,000	8,000
Regalia and society banners and emblems	1	1,000	3			1,200	5,000	9,000
Roofing and roofing materials	1	500	2			500	800	1,800
Rules, ivory and wood	1	300	2	1		150	50	500
Saddlery and harness	127	166,165	212	2	2	72,865	225,048	303,326
Salt, ground	2	1,700	4			1,300	2,750	4,750
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	34	264,350	230		2	92,550	199,350	380,350
Saws	2	25,500	13			4,500	10,075	25,650
Shipbuilding	379	811,750	1,967			838,559	1,935,857	2,909,846
Shirts	4	53,000	11	85		26,300	57,000	86,000
Shoddy (see also Mixed textiles)	1	6,000	4	1	3	1,905	7,200	12,000
Show-cases	1	1,000	2			1,000	3,000	6,000
Silk and silk goods (see also Mixed textiles)	1	30,000	9	46	5	10,190	61,395	81,585
Slaughtering and meat-packing, not including retail butchering establishments.	6	194,500	83			34,300	1,008,605	1,093,687
Soap and candles	16	62,530	54	1		14,736	77,799	124,443
Sporting goods	2	12,200	10	1		6,825	2,400	17,900
Springs, steel, car and carriage	1	25,000	34	1		11,238	3,528	49,722
Starch	23	294,200	254			23,280	339,611	442,700
Stationery goods	1	2,500	4	1		750	2,200	5,000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	3	4,000	13			3,900	12,500	22,000
Stencils and brands	1	400					200	1,000
Stone- and earthen-ware	5	21,100	20			9,700	7,861	28,500
Straw goods	1	8,000	15	36		7,015	6,000	15,600
Sugar and molasses, beet	1	50,000	150			20,000	75,000	111,000
Sugar and molasses, refined	2	460,000	90			34,457	1,416,414	1,499,512
Tinware, copperware, and sheet-iron ware	99	259,300	227		1	90,304	192,455	400,195
Tobacco, cigars and cigarettes	26	53,635	108	22	3	45,382	59,000	152,206
Tools (see also Cutlery and edge tools; Hardware)	2	9,000	11			6,800	7,800	16,000
Toys and games	1	500	1			175	400	1,200
Trunks and valises	5	20,600	20	2		9,350	19,600	14,700
Upholstering (see also Furniture)	7	1,950	6	1		1,075	2,500	8,800
Upholstering materials	7	15,500	18			4,525	6,500	16,900
Varnish (see also Paints)	1	20,000	5			3,000	42,000	55,000
Vinegar	5	5,370	10			935	2,259	5,700
Watch and clock repairing	13	16,650	14			5,240	9,100	27,000
Wheelbarrows	1	5,000	2			600	600	2,200
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	249	222,800	324		2	85,753	137,870	247,964
Window blinds and shades	2	6,000	16	2		3,500	9,000	17,000
Wire	1	3,000	18			7,200	15,000	24,000
Wood pulp	7	439,000	212	8		80,675	160,595	306,490
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	19	141,700	153	2	11	61,007	98,980	266,390
Wooden ware	11	67,100	108	7		31,750	52,875	119,475
Wool hats (see also Woolen goods)	1	40,000	53	20	22	31,596	80,825	151,720
Woolen goods (see also Carpets, other than rag; Felt goods; Gloves and mittens; Mixed textiles; Wool hats).	93	3,876,028	1,716	1,169	270	1,044,606	4,294,042	6,086,072

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—MARYLAND, BY TOTALS OF COUNTIES.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The State	6, 787	$58, 742, 384	46, 698	21, 700	6, 547	$18, 904, 965	$66, 937, 846	$106, 780, 563
Allegany	173	2, 811, 630	1, 468	3	105	467, 156	1, 717, 239	2, 651, 616
Anne Arundel	38	80, 400	87	5	29	22, 283	105, 494	171, 699
Baltimore (city)	3, 683	38, 586, 773	34, 086	18, 137	4, 115	15, 117, 489	47, 974, 297	78, 417, 304
Baltimore	447	7, 658, 170	3, 121	1, 563	1, 026	1, 491, 739	7, 691, 566	11, 147, 294
Calvert	14	24, 500	23	....	....	3, 785	19, 320	29, 800
Caroline	80	199, 060	183	286	110	29, 847	222, 405	322, 714
Carroll	269	765, 436	560	41	40	132, 050	994. 717	1, 457, 935
Cecil	170	1, 395, 484	695	39	30	260, 807	1, 119, 600	1, 798, 515
Charles	29	49, 100	51	....	....	6, 573	42, 837	60, 999
Dorchester	69	172, 525	158	21	23	39, 508	163, 566	247, 430
Frederick	444	1, 828, 927	1, 704	332	335	315, 992	1, 995, 590	2, 806, 098
Garrett	77	378, 987	248	3	6	58, 708	280, 387	445, 974
Harford	242	1, 024, 653	1, 226	666	425	167, 476	767, 620	1, 195, 136
Howard	89	782, 466	311	213	120	125, 331	602, 085	989, 615
Kent	82	158, 760	140	115	....	35, 743	131, 579	249, 235
Montgomery	104	400, 930	147	14	5	33, 360	239, 133	323, 017
Prince George's	57	415, 638	367	117	51	96, 124	285, 091	463, 364
Queen Anne	31	151, 011	88	13	20	24, 045	169, 350	244, 011
Saint Mary's	22	69, 440	50	....	....	9, 202	98, 421	126, 441
Somerset	60	85, 450	131	....	2	30, 700	166, 089	251, 740
Talbot	104	205, 824	273	....	2	67, 630	292, 430	464, 674
Washington	317	1, 102, 549	949	114	57	235, 017	1, 424, 436	2, 161, 203
Wicomico	107	236, 975	288	3	32	59, 709	216, 285	381, 936
Worcester	79	157, 696	344	15	14	74, 691	218, 219	372, 813

B—MARYLAND, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	6, 787	$58, 742, 384	46, 698	21, 700	6, 547	$18, 904, 965	$66, 937, 846	$106, 780, 563
Agricultural implements	36	395, 400	338	....	18	117, 791	227, 190	574, 672
Artificial limbs (see also Surgical appliances)	1	100	1	....	....	472	200	1, 200
Awnings and tents	3	4, 600	11	30	....	7, 900	16, 800	36, 100
Babbitt metal and solder	2	25, 000	16	....	....	5, 200	87, 000	167, 000
Bags, other than paper	2	185, 000	26	110	10	33, 052	770, 000	850, 000
Bags, paper	3	78, 500	24	22	4	17, 704	152, 270	236, 700
Baking and yeast powders (see also Drugs and chemicals)	4	70, 600	12	14	....	16, 000	111, 040	167, 808
Baskets, rattan and willow ware	19	19, 610	28	3	139	17, 094	17, 735	48, 826
Bells	2	480, 000	355	....	180	189, 640	295, 000	580, 000
Belting and hose, leather	1	8, 500	7	....	....	2, 000	23, 000	30, 000
Billiard tables and materials	1	8, 000	28	....	....	10, 000	18, 000	33, 000
Blacking	1	25	....	....	....	....	800	1, 500
Blacksmithing (see also Wheelwrighting)	651	417, 135	847	....	10	247, 290	300, 171	942, 077
Bluing	1	1, 000	3	4	....	1, 000	3, 000	8, 000
Bookbinding and blank-book making	18	92, 256	99	94	28	61, 993	59, 904	166, 988
Boot and shoe uppers	11	7, 700	27	18	1	11, 755	17, 375	37, 675
Boots and shoes, including custom work and repairing	862	977, 912	2, 334	510	99	984, 630	1, 748, 920	3, 683, 626
Boxes, cigar	13	19, 325	22	19	9	15, 163	28, 883	58, 822
Boxes, fancy and paper	8	34, 020	28	169	10	32, 617	82, 883	140, 625
Boxes, wooden, packing	15	142, 712	320	....	44	147, 302	302, 273	533, 150
Brass castings	10	19, 500	32	....	1	16, 279	33, 741	71, 101
Brass and copper, rolled	1	40, 000	13	....	....	3, 459	46, 000	60, 000
Bread and other bakery products	341	864, 022	662	80	62	275, 759	1, 507, 877	2, 275, 227
Brick and tile	79	1, 168, 158	2, 049	....	202	478, 189	243, 284	933, 988
Bridges	2	202, 000	98	....	....	48, 972	79, 000	143, 000
Brooms and brushes	31	84, 015	213	22	36	75, 453	159, 064	297, 511
Carpentering	183	1, 176, 052	1, 567	....	11	769, 266	2, 140, 351	3, 626, 189
Carpets, other than rag (see also Woolen goods)	1	10, 000	75	....	....	9, 900	32, 000	50, 000
Carpets, rag	18	23, 600	29	2	4	10, 571	23, 639	49, 908
Carriage and wagon materials	4	35, 240	37	....	....	9, 700	15, 800	43, 500
Carriages and sleds, children's	3	15, 600	31	2	3	10, 740	33, 500	53, 080
Carriages and wagons (see also Wheelwrighting)	81	355, 599	559	....	8	209, 972	238, 250	595, 860
Cars, railroad, street, and repairs	1	5, 000	21	....	....	12, 480	10, 000	24, 728
Cement	1	50, 000	38	1	1	12, 320	2, 610	22, 328
Cheese and butter (factory)	14	22, 950	18	....	....	3, 471	60, 190	87, 956
Cleansing and polishing preparations	1	1, 500	2	....	....	256	4, 000	8, 000
Cloth finishing	2	2, 050	5	....	....	2, 000	250	6, 200
Clothing, men's	220	3, 894, 943	5, 265	5, 970	59	1, 851, 938	6, 089, 052	9, 579, 066
Clothing, women's	27	136, 250	22	482	23	84, 998	265, 192	469, 718
Coffee and spices, roasted and ground	13	124, 750	46	23	....	24, 503	221, 108	299, 874
Coffins, burial cases, and undertakers' goods	63	101, 975	81	....	1	34, 119	79, 553	200, 173
Confectionery	64	390, 665	253	93	15	119, 728	815, 692	1, 164, 755
Cooperage	72	250, 090	454	....	7	164, 122	384, 800	657, 424
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	8	20, 200	21	....	....	11, 900	15, 600	32, 250
Cordage and twine	4	18, 500	21	....	6	7, 145	22, 442	32, 455
Cork cutting	1	12, 000	5	4	5	3, 500	15, 000	30, 000
Corsets	2	18, 000	2	28	6	6, 640	14, 000	28, 000
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	20	4, 605, 816	1, 229	1, 879	947	767, 729	2, 891, 033	4, 688, 714
Cutlery and edge tools (see also Hardware)	10	22, 550	23	....	1	9, 200	11, 156	30, 596
Dentistry, mechanical	14	12, 260	11	1	1	6, 323	4, 313	32, 788

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MARYLAND, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	18	$655, 300	194	47		$80, 394	$531, 485	$881, 125
Dyeing and cleaning	28	55, 885	47	19		25, 431	31, 160	89, 162
Dyestuffs and extracts	2	3, 500	4			900	5, 100	9, 000
Electrical apparatus and supplies (see also Telegraph and telephone apparatus).	1	200	1			40	225	700
Electroplating	5	17, 525	29		2	10, 166	7, 350	36, 600
Engraving and die-sinking	7	1, 925	6			3, 300	1, 450	14, 059
Engraving, wood	4	1, 250	4			1, 800	905	6, 900
Explosives and fireworks	1	1, 500			15	300	1, 500	2, 900
Fancy articles	1	10, 000	13		7	6, 000	1, 250	10, 000
Fertilizers	48	4, 271, 870	1, 000		13	354, 102	3, 813, 758	5, 770, 198
Files (see also Saws)	5	32, 150	28		16	15, 746	9, 890	33, 330
Fire extinguishers, chemical	1	30, 000	4			2, 250	6, 840	14, 693
Flags and banners	2	2, 500	3	4	1	3, 075	6, 000	16, 000
Flavoring extracts	5	8, 200	15	4		5, 274	16, 360	31, 100
Flouring- and grist-mill products	546	3, 145, 520	898			219, 707	6, 965, 298	7, 954, 004
Food preparations (see page 39)	3	4, 650	12	2	1	2, 415	16, 000	26, 000
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	91	2, 684, 358	3, 116		34	1, 509, 997	2, 103, 112	4, 454, 317
Fruits and vegetables, canned and preserved	114	2, 412, 692	4, 025	8, 220	2, 753	990, 778	4, 506, 332	6, 245, 207
Furnishing goods, men's	2	4, 200	2	19		5, 500	17, 000	32, 000
Furniture (see also Mattresses and spring beds; Upholstering)	131	863, 727	1, 058	15	25	431, 352	836, 825	1, 663, 143
Furniture, chairs	4	151, 250	66	31	2	48, 000	130, 500	280, 000
Furs, dressed	4	30, 000	6	17		8, 125	10, 635	33, 913
Gas machines and meters	5	62, 000	82	1	17	42, 748	118, 250	206, 620
Glass	8	436, 000	524		88	234, 254	239, 682	587, 000
Glass, cut, stained, and ornamented	1	2, 000	4		1	2, 550	3, 700	9, 000
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	3	20, 500	15	41	10	8, 925	18, 800	35, 200
Glue	1	4, 000	3			800	5, 000	6, 400
Gold and silver leaf and foil	3	6, 000	16	29	2	10, 500	26, 000	49, 200
Grease and tallow	7	101, 750	22			10, 254	213, 849	259, 021
Hair work	12	12, 450	4	29		5, 654	16, 675	34, 798
Hand-knit goods	1	100	1			300	450	1, 000
Hardware (see also Cutlery and edge-tools)	5	18, 100	31		4	13, 844	14, 100	37, 504
Hats and caps, not including wool hats	8	29, 100	24	34	1	14, 050	34, 200	66, 680
Hones and whetstones	1	6, 000	6	2	2	2, 000	7, 500	12, 700
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	1	250		1		100	500	720
Housefurnishing goods	2	3, 250	1		1	600	1, 350	4, 800
Instruments, professional and scientific	6	49, 000	25	2	4	18, 244	3, 850	31, 600
Iron and steel	23	4, 962, 125	2, 656		107	905, 090	2, 888, 574	4, 470, 050
Iron bolts, nuts, washers, and rivets	1	4, 500	5			1, 816	2, 705	6, 952
Iron forgings	2	2, 500	9			1, 200	3, 550	7, 550
Iron nails and spikes, cut and wrought	1	26, 300	14			5, 352	34, 930	52, 800
Iron railings, wrought	7	6, 800	21			8, 450	15, 000	36, 300
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	1	10, 000	21			12, 235	12, 000	30, 356
Ivory and bone work	1	3, 000					3, 000	6, 000
Japanning	1	500	2	1		1, 575	1, 600	4, 500
Jewelry	4	11, 300	16	1	3	9, 744	12, 860	33, 100
Kaolin and ground earths	7	410, 400	102		3	87, 580	309, 300	559, 260
Kindling wood	11	36, 925	42		22	18, 256	36. 245	72, 296
Lamps and reflectors	2	1, 500	3			1, 452	3, 250	7, 500
Lard, refined	2	240, 000	42			20, 000	1, 445, 000	1, 744, 000
Lasts	1	2, 000	3		1	1, 904	1, 500	4, 000
Lead, bar, pipe, sheet, and shot	2	135, 000	25		2	7, 464	161, 493	192, 933
Leather, curried	48	169, 127	103		2	36, 596	388, 608	508, 458
Leather, dressed skins	1	75, 000	70	5		22, 544	156, 300	190, 000
Leather, tanned	63	802, 343	378	9	5	127, 164	1, 039, 586	1, 468, 591
Lightning rods	1	500	1			100	500	1, 000
Lime	26	87, 700	161			32, 855	50, 743	121, 340
Liquors, distilled	16	715, 500	156	1		65, 340	858, 654	1, 202, 397
Liquors, malt	53	2, 145, 590	421			200, 291	1, 001, 766	1, 820, 303
Lithographing (see also Printing and publishing)	2	128, 000	59	4	12	42, 184	39, 250	131, 144
Lock- and gun-smithing	22	28, 775	35		1	15, 932	12, 593	43, 986
Looking-glass and picture frames	31	118, 550	271	70	25	98, 653	160, 492	402, 4[illegible]
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	7	59, 500	49			20, 425	58, 425	104, 575
Lumber, sawed	369	1, 237, 694	1, 216		23	223, 786	1, 106, 795	1, 813, 332
Malt	6	705, 000	98			52, 060	547, 000	752, 000
Mantels, slate, marble, and marbleized	3	23, 000	19		2	8, 388	10, 784	30, 205
Marble and stone work	59	673, 926	863		10	336, 327	467, 243	1, 007, 893
Masonry, brick and stone	47	203, 600	655		1	266, 889	399, 777	767, 946
Mattresses and spring beds (see also Furniture)	6	7, 075	11	2		4, 867	32, 843	45, 525
Millinery and lace goods	11	79, 100	24	133	41	35, 896	148, 240	229, 460
Millstones	3	34, 700	24			11, 293	14, 242	38, 319
Mineral and soda waters	20	69, 400	90		2	34, 153	109, 085	202, 307
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	3	4, 900	6	11	5	4, 000	7, 850	20, 240
Models and patterns	3	1, 450	5			2, 050	1, 700	8, 100
Musical instruments and materials (not specified)	6	4, 900	4			1, 395	1, 975	7, 400
Musical instruments, organs and materials	3	16, 250	21		2	8, 000	24, 810	41, 000
Musical instruments, pianos and materials	4	638, 382	380		5	200, 988	157, 699	534, 099
Needles and pins	2	9, 000	8			4, 300	1, 900	9, 000
Oil, illuminating, not including petroleum refining	2	13, 500	7			1, 550	13, 600	21, 000
Oil, lard	1	75, 000	18			10, 000	500, 000	550, 000

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MARYLAND, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Oil, neat's-foot	1	$100	1	....	....	$50	$450	$1,000
Oleomargarine	1	20,000	20	....	....	5,000	55,000	85,000
Paints	11	417,200	113	....	7	47,751	245,185	412,658
Painting and paperhanging	95	103,273	285	....	8	148,726	175,307	467,617
Paper	25	475,048	298	121	46	119,876	738,140	1,028,591
Patent medicines and compounds (see also Drugs and chemicals)	34	222,825	106	109	45	68,867	438,202	647,893
Perfumery and cosmetics	5	23,410	11	27	1	7,902	15,251	42,499
Photographing	25	70,150	51	15	2	25,005	22,426	95,228
Pickles, preserves, and sauces	6	21,850	7	14	6	5,532	48,250	71,300
Pipes, tobacco	2	10,200	11	16	5	7,797	3,555	15,500
Plated and britannia ware	3	19,200	43	....	....	20,780	18,500	52,000
Plumbing and gasfitting	89	198,185	194	....	9	82,042	176,186	412,886
Printing and publishing (see also Lithographing)	66	2,045,600	797	25	111	443,989	585,857	1,477,164
Printing materials	1	4,500	2	5	1	2,570	15,000	25,000
Pumps, not including steam pumps	10	9,075	17	....	1	8,660	14,700	39,950
Refrigerators	3	16,200	24	....	....	7,099	13,040	27,990
Regalia and society banners and emblems	1	5,000	....	9	....	1,815	4,300	8,719
Roofing and roofing materials	6	89,625	46	....	1	16,769	30,450	78,917
Rubber and elastic goods	1	300	....	1	....	125	539	1,121
Saddlery and harness	154	374,075	556	2	84	249,313	459,683	1,004,851
Safes, doors, and vaults, fire-proof	1	35,000	30	....	....	13,000	10,000	35,000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	17	463,125	446	....	38	222,235	411,963	813,005
Saws	3	6,500	8	....	....	2,321	2,744	10,281
Scales and balances	3	9,200	7	....	....	4,181	2,819	11,077
Sewing machines and attachments	6	20,500	22	1	2	11,620	9,450	35,595
Shipbuilding	166	1,606,535	1,178	....	....	657,789	884,299	1,788,630
Shirts	38	313,930	328	1,284	84	307,867	425,947	949,524
Shoddy (see also Mixed textiles)	1	5,000	5	4	6	3,100	14,150	22,500
Show-cases	5	14,300	38	....	1	15,785	27,389	74,320
Silk and silk goods (see also Mixed textiles)	4	20,900	12	56	14	11,000	15,760	35,415
Silversmithing	5	101,528	38	....	....	26,979	49,792	113,061
Slaughtering and meat-packing, not including retail butchering establishments.	[illegible]	865,000	228	....	....	100,000	3,163,802	3,377,605
Soap and candles	11	271,732	93	....	6	52,495	254,006	385,790
Spectacles and eyeglasses	2	1,400	6	....	....	2,874	1,700	7,500
Sporting goods	1	1,000	....	25	....	900	600	2,000
Stationery goods	1	1,000	1	10	....	300	500	2,500
Stencils and brands	3	2,800	6	....	1	3,526	2,200	9,500
Stone- and earthen-ware	17	142,950	213	10	63	120,234	80,273	271,944
Straw goods	3	160,800	107	422	15	57,761	264,507	362,982
Sugar and molasses, refined	3	260,000	106	....	....	31,000	756,703	840,986
Surgical appliances (see also Artificial limbs)	3	5,700	35	5	....	17,000	15,600	61,500
Telegraph and telephone apparatus (see also Electrical apparatus and supplies).	1	17,500	29	....	1	12,680	37,006	53,239
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	226	1,179,267	1,369	124	302	609,113	2,332,687	3,564,994
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	10	602,600	187	740	128	165,107	1,152,906	1,531,424
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	369	623,607	1,184	118	104	499,666	711,680	1,730,604
Toys and games	1	1,500	3	1	4	2,500	1,500	4,500
Trunks and valises	15	24,150	51	....	4	19,228	36,810	75,466
Type founding	2	50,000	35	....	20	21,000	12,800	45,000
Umbrellas and canes	3	8,550	4	6	....	2,080	8,500	17,400
Upholstering (see also Furniture)	22	26,025	45	7	2	17,845	54,181	103,139
Upholstering materials	3	1,151,500	478	102	142	307,500	527,000	912,850
Vinegar	9	51,750	19	1	1	7,312	62,112	97,012
Watch and clock repairing	24	18,730	25	....	4	14,883	6,604	42,115
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	309	248,805	446	....	5	127,109	167,802	494,274
Whips	3	21,300	31	6	1	13,936	25,800	52,925
Window blinds and shades	3	5,500	24	....	....	3,200	11,500	18,900
Wirework	5	90,500	104	....	2	56,000	226,000	322,000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	9	2,910	17	....	4	8,203	9,220	27,036
Wooden ware	2	86,000	86	....	....	27,500	62,500	114,260
Woolen goods (see also Carpets, other than rag; Gloves and mittens; Mixed textiles).	14	333,760	171	100	42	59,491	349,724	488,308

A—MASSACHUSETTS, BY TOTALS OF COUNTIES.

The State	14,352	$303,806,185	228,834	105,976	17,445	$128,315,362	$386,972,655	$631,135,284
COUNTIES.								
Barnstable	139	1,529,754	740	473	19	292,470	866,050	1,506,152
Berkshire	515	13,882,594	6,692	3,521	1,151	3,732,714	11,744,047	19,876,467
Bristol	1,025	42,128,950	20,070	10,530	3,468	11,125,200	24,864,704	46,127,452
Dukes	8	20,250	50	....	....	23,106	66,914	97,839
Essex	1,971	41,718,149	38,250	19,585	2,034	21,854,758	64,822,177	103,159,439
Franklin	315	5,058,258	2,941	792	219	1,277,019	2,903,370	5,378,597
Hampden	872	27,163,158	14,361	8,987	1,682	8,355,079	23,981,415	40,654,398
Hampshire	333	7,283,518	4,335	3,057	720	2,419,401	6,603,887	11,786,406
Middlesex	2,069	53,116,628	38,917	19,198	3,020	21,706,749	81,611,183	128,031,850
Nantucket (a)	....	....	....	....	....	....	....	....
Norfolk	644	11,976,494	11,419	4,962	484	6,134,937	17,848,192	28,575,530
Plymouth	676	8,566,141	11,287	2,261	269	5,755,003	14,885,665	23,771,677
Suffolk	3,836	49,277,634	41,055	18,646	1,284	25,634,027	84,441,703	134,567,625
Worcester	1,949	42,084,657	38,717	13,964	3,095	20,004,899	52,333,348	87,601,852

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MASSACHUSETTS, BY SPECIFIED INDUSTRIES.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	14,352	$303,806,185	228,834	105,976	17,445	$128,315,362	$386,972,675	$631,135,284
Agricultural implements	29	910,000	956	1	16	365,896	634,752	1,670,242
Ammunition	1	100,000	80	100	15	58,259	114,606	198,114
Artificial feathers and flowers (see also Millinery and lace goods)	4	20,000	16	162	....	25,540	21,550	124,900
Artificial limbs (see also Surgical appliances)	4	14,000	6	....	....	5,766	3,224	14,056
Awnings and tents	8	22,700	19	43	2	24,350	52,249	92,750
Bagging, flax, hemp, and jute	5	960,000	482	390	272	246,682	531,521	963,213
Bags, other than paper	1	10,000	7	13	5	7,000	60,000	75,000
Bags, paper	4	9,200	9	14	....	4,240	17,100	28,200
Baking and yeast powders (see also Drugs and chemicals)	7	281,750	45	44	8	31,980	234,830	393,070
Baskets, rattan and willow ware	29	1,148,925	636	251	51	269,494	405,645	791,687
Bells	2	1,350	2	....	....	1,025	2,750	6,100
Belting and hose, leather	16	293,100	130	2	....	69,626	676,863	836,766
Belting and hose, linen	1	10,000	10	....	....	4,500	12,000	23,000
Billiard tables and materials	6	58,200	56	....	....	25,800	48,700	106,300
Blacking	22	91,550	67	47	....	43,346	254,905	419,926
Blacksmithing (see also Wheelwrighting)	1,030	1,074,486	1,874	....	42	820,999	796,393	2,501,006
Bluing	4	47,400	15	7	....	13,050	81,125	109,174
Bone-, ivory-, and lamp-black	1	16,000	6	....	1	3,900	20,000	32,000
Bookbinding and blank-book making	75	626,278	581	762	33	524,947	539,481	1,360,577
Boot and shoe cut stock	163	1,190,600	1,152	1,322	157	700,432	5,861,084	7,397,734
Boot and shoe findings	64	318,600	338	398	33	234,728	652,865	1,155,923
Boot and shoe uppers	3	9,380	5	20	....	7,370	15,800	27,600
Boots and shoes, including custom work and repairing	1,311	21,275,923	47,548	13,406	1,297	25,204,331	60,207,152	96,686,110
Boots and shoes, rubber	1	500,000	400	451	11	296,442	1,044,364	1,707,842
Boxes, cigar	9	23,500	39	22	8	19,802	33,136	78,515
Boxes, fancy and paper	60	296,175	220	961	27	302,856	459,575	967,218
Boxes, wooden, packing	109	608,780	909	38	31	367,118	1,068,006	1,768,308
Brass and copper, rolled	4	1,300,000	520	....	....	201,405	1,310,456	1,736,051
Brass castings	49	361,300	404	2	16	191,300	411,853	756,424
Brass ware	1	50,000	24	10	....	3,690	75,000	100,000
Bread and other bakery products	292	1,226,840	1,567	305	93	844,090	3,122,104	4,942,769
Brick and tile (see also Drain and sewer pipe; Terra-cotta ware)	114	1,668,200	2,370	9	22	465,589	521,875	1,322,628
Bridges	11	77,500	225	....	....	100,607	249,757	424,876
Brooms and brushes	58	545,500	535	274	13	290,854	821,342	1,451,660
Buttons	28	590,900	472	709	95	391,974	411,009	1,085,864
Cardboard	4	78,000	62	12	....	37,532	160,327	227,704
Carpentering	930	2,243,222	6,398	1	17	2,895,930	6,213,344	10,973,471
Carpets, other than rag (see also Woolen goods)	7	4,637,646	1,506	2,259	53	1,223,302	3,950,673	6,337,629
Carpets, rag	1	200	2	....	....	500	700	1,500
Carpets, wood	1	100	10	....	....	3,000	3,700	15,000
Carriage and wagon materials	31	413,550	360	....	....	164,895	432,151	737,626
Carriages and sleds, children's	11	109,500	182	9	10	69,725	140,684	245,200
Carriages and wagons (see also Wheelwrighting)	215	2,027,250	2,619	28	....	1,273,986	1,952,237	4,018,141
Cars, railroad, street, and repairs	12	852,250	759	10	....	232,753	1,024,960	1,480,611
Cement	4	29,400	10	....	....	6,250	22,650	60,400
Charcoal	1	800	1	....	....	450	1,000	2,000
Cheese and butter (factory)	22	97,550	46	5	1	14,277	128,845	194,110
Chocolate	3	475,000	71	69	....	56,055	655,000	1,045,000
Cleansing and polishing preparations	5	68,000	62	8	....	28,774	44,076	100,600
Clocks	1	3,000	5	....	....	3,000	3,000	8,000
Cloth finishing	1	5,000	17	....	....	7,950	500	16,321
Clothing, horse	1	3,000	5	10	....	3,400	10,500	15,000
Clothing, men's	347	5,172,043	2,740	8,313	214	3,832,214	10,846,464	17,902,662
Clothing, women's	34	389,100	233	1,978	17	470,195	1,155,652	2,020,038
Coffee and spices, roasted and ground	21	368,200	119	38	1	65,029	1,438,971	1,680,229
Coffins, burial cases, and undertakers' goods	36	369,300	219	33	4	128,981	269,402	494,435
Collars and cuffs, paper	8	527,000	69	80	....	64,526	721,542	889,739
Combs	22	256,190	451	79	25	205,162	214,474	558,860
Confectionery	76	499,175	413	345	7	288,808	1,529,340	2,251,350
Cooperage	86	336,734	596	....	11	231,089	430,157	734,329
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	9	109,200	147	....	5	87,950	122,800	262,100
Cordage and twine	29	1,533,450	893	136	60	244,697	2,195,311	2,997,395
Cordials and sirups	1	5,000	4	....	....	700	7,116	10,273
Cork cutting	5	28,434	44	28	6	23,249	68,467	124,434
Corsets	11	158,400	114	1,241	161	338,562	557,100	1,018,025
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	206	74,118,801	22,609	32,558	7,726	16,240,908	37,542,679	74,780,835
Cotton-ties	2	10,000	24	....	1	9,200	34,000	48,000
Crucibles	2	60,000	24	....	3	17,609	39,570	68,452
Cutlery and edge tools (see also Hardware; Tools)	63	2,028,722	1,686	92	179	808,788	872,878	2,132,654
Dentistry, mechanical	46	43,325	31	....	1	18,438	51,052	125,514
Drain and sewer pipe (see also Brick and tile; Terra-cotta ware)	5	50,500	20	....	....	8,225	17,050	38,500
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	38	1,120,350	384	24	5	185,274	1,035,694	1,676,630
Dyeing and cleaning	37	159,000	197	208	5	152,046	78,069	369,529
Dyeing and finishing textiles	28	8,613,500	3,953	562	430	1,815,431	4,566,174	9,482,939
Dyestuffs and extracts	5	293,000	178	....	....	95,834	557,221	812,040
Electrical apparatus and supplies (see also Telegraph and telephone apparatus).	10	165,500	90	1	1	51,068	50,506	131,259
Electroplating	33	141,350	135	6	3	61,166	86,790	253,600
Emery wheels	3	113,000	32	....	....	15,719	36,644	106,398
Enameled goods	1	70,000	37	....	....	17,286	121,582	166,888
Enameling	1	500	3	....	....	2,000	200	4,000

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MASSACHUSETTS, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Engravers' materials	1	$1, 000	3	....	....	$600	$800	$3, 500
Engraving and die-sinking	25	56, 650	143	33	5	87, 950	71, 402	235, 731
Engraving, steel	5	7, 600	11	3	2	6, 950	3, 040	18, 700
Engraving, wood	14	22, 235	67	....	2	41, 650	4, 725	89, 950
Envelopes	6	555, 000	151	735	10	235, 227	1, 598, 350	2, 070, 346
Explosives and fireworks	4	17, 500	18	12	11	11, 466	26, 313	56, 174
Fancy articles	21	190, 850	302	108	48	128, 393	140, 844	341, 393
Felt goods (see also Woolen goods)	11	820, 000	455	37	20	163, 440	1, 198, 339	1, 627, 320
Fertilizers	21	1, 738, 150	570	2	....	225, 813	1, 384, 875	2, 164, 680
Files (see also Saws)	22	98, 050	161	5	10	61, 876	30, 195	162, 305
Fire-arms	12	3, 321, 455	1, 092	1	29	619, 816	342, 655	1, 158, 227
Flavoring extracts	14	101, 765	39	44	2	33, 116	281, 991	359, 400
Flouring- and grist-mill products	350	2, 880, 365	683	2	1	290, 070	7, 814, 583	8, 774, 049
Food preparations (see page 39)	13	115, 180	107	19	....	27, 866	205, 339	288, 496
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	549	16, 466, 535	16, 367	197	224	8, 181, 740	11, 236, 199	23, 935, 604
Foundery supplies	1	5, 000	14	....	....	3, 400	6, 000	12, 000
Fruits and vegetables, canned and preserved	13	316, 400	131	245	49	98, 597	542, 600	762, 988
Furnishing goods, men's	22	96, 124	48	277	9	73, 826	306, 599	524, 165
Furniture (see also Mattresses and spring beds; Upholstering)	243	2, 464, 675	3, 846	96	43	1, 781, 351	3, 017, 469	6, 041, 618
Furniture, chairs	62	1, 948, 600	2, 104	244	45	1, 028, 087	1, 761, 779	3, 290, 837
Furs, dressed	15	65, 147	49	73	2	37, 516	409, 177	508, 250
Gas and lamp fixtures	2	25, 000	33	....	....	12, 500	25, 000	54, 000
Gas machines and meters	4	192, 000	81	2	....	47, 949	68, 289	176, 500
Glass	11	823, 000	828	58	60	383, 342	329, 864	854, 345
Glass, cut, stained, and ornamented	12	73, 650	100	16	3	60, 711	56, 630	158, 340
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	4	5, 200	16	63	1	12, 260	33, 850	51, 668
Glue	19	325, 400	242	4	2	99, 112	280, 016	447, 112
Gold and silver leaf and foil	9	26, 500	45	28	5	32, 385	105, 700	152, 475
Gold and silver, reduced and refined (not from the ore)	1	8, 000	5	....	....	2, 520	2, 000	7, 500
Graphite	2	55, 000	13	17	1	15, 525	133, 600	165, 000
Grease and tallow	14	456, 500	155	....	2	80, 355	557, 030	736, 968
Grindstones	3	30, 000	8	....	....	4, 800	42, 800	58, 000
Gunpowder (see also High explosives)	3	215, 000	42	....	....	29, 240	72, 918	140, 621
Hairwork	22	33, 700	10	75	....	22, 937	39, 960	87, 200
Hammocks	2	11, 000	9	37	3	8, 576	24, 295	49, 000
Hand-knit goods	4	8, 000	9	44	1	9, 425	7, 716	20, 060
Handles, wooden	8	5, 550	9	....	....	1, 145	1, 745	6, 590
Hand-stamps	8	25, 200	31	1	....	15, 467	29, 500	58, 856
Hardware (see also Cutlery and edge tools; Tools)	24	668, 850	528	18	22	225, 638	301, 076	737, 400
Hardware, saddlery	3	26, 000	39	1	2	17, 720	9, 500	36, 300
Hat and cap materials	4	21, 000	12	....	....	7, 200	48, 880	69, 500
Hats and caps, not including wool hats	37	199, 500	584	207	17	236, 752	401, 357	901, 666
High explosives (see also Gunpowder)	1	45, 600	15	....	....	11, 700	33, 550	60, 000
Hones and whetstones	6	30, 025	22	75	....	18, 670	23, 070	66, 200
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	57	1, 467, 375	786	2, 413	212	608, 067	1, 394, 748	2, 483, 596
Housefurnishing goods	12	94, 400	82	27	4	54, 949	177, 222	284, 783
Ink	10	211, 000	60	35	14	47, 164	113, 680	290, 200
Instruments, professional and scientific	20	148, 300	137	8	5	81, 398	56, 350	215, 640
Iron and steel	30	6, 738, 408	6, 367	21	125	2, 576, 539	6, 657, 232	10, 288, 921
Iron bolts, nuts, washers, and rivets	9	266, 000	245	9	29	123, 794	300, 150	533, 952
Iron doors and shutters	1	60, 000	100	....	....	50, 000	200, 000	300, 000
Iron forgings	9	509, 000	214	95	2	140, 708	344, 894	657, 603
Iron nails and spikes, cut and wrought	36	2, 336, 055	942	419	224	657, 287	1, 970, 352	3, 126, 275
Iron pipe, wrought	3	29, 500	17	....	....	9, 529	26, 000	40, 070
Iron railing, wrought	2	38, 500	23	....	....	9, 950	19, 560	40, 360
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	6	51, 500	101	....	....	34, 311	69, 494	202, 146
Ivory and bone work	3	21, 000	39	5	1	18, 300	13, 700	43, 500
Japanning	8	42, 160	48	14	2	32, 687	41, 919	101, 465
Jewelry	105	1, 936, 800	2, 485	743	37	1, 464, 993	1, 681, 034	4, 265, 525
Jewelry and instrument cases	3	7, 900	9	10	1	5, 920	10, 100	21, 300
Kaolin and ground earths	9	198, 500	96	....	1	29, 135	85, 676	141, 250
Kindling wood	12	32, 050	71	....	6	25, 914	37, 853	84, 648
Labels and tags	6	290, 500	76	60	....	52, 860	341, 725	455, 325
Lamps and reflectors	2	51, 500	50	4	1	26, 121	25, 000	75, 000
Lapidary work	6	45, 000	43	3	3	23, 932	61, 075	116, 700
Lard, refined	3	45, 000	25	....	....	15, 344	236, 950	262, 984
Lasts	26	230, 490	217	....	1	164, 877	110, 483	386, 903
Lead, bar, pipe, sheet, and shot	2	174, 000	25	....	....	15, 042	483, 024	578, 057
Leather board (see also Paper)	14	648, 200	169	17	10	52, 365	168, 600	291, 625
Leather, curried	194	4, 308, 169	4, 209	10	32	1, 939, 122	19, 547, 978	23, 282, 775
Leather, dressed skins	27	513, 950	589	11	12	280, 809	1, 359, 920	1, 931, 617
Leather goods	6	16, 200	13	2	1	5, 768	47, 350	92, 750
Leather, tanned	133	2, 712, 130	2, 408	....	32	1, 093, 973	11, 320, 288	13, 556, 721
Lime	8	30, 200	76	....	....	26, 250	37, 600	86, 100
Linen goods	2	330, 000	155	108	48	91, 949	341, 934	514, 451
Liquors, distilled	10	583, 840	155	....	3	67, 828	740, 060	1, 104, 391
Liquors, malt	31	3, 285, 400	1, 180	....	....	563, 547	2, 855, 046	5, 112, 227
Lithographing (see also Printing and publishing)	13	534, 550	616	98	23	352, 983	463, 360	1, 046, 676
Lock- and gun-smithing	25	33, 275	53	1	2	22, 860	24, 810	73, 660
Looking-glass and picture frames	70	199, 600	415	45	14	215, 348	374, 548	770, 908

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MASSACHUSETTS, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	39	$742, 700	518	....	5	$233, 442	$773, 973	$1, 197, 371
Lumber, sawed	606	2, 480, 340	1, 940	....	30	431, 612	1, 904, 105	3, 120, 184
Malt	1	20, 000	5	....	....	2, 500	18, 000	27, 000
Mantels, slate, marble, and marbleized	1	1, 200	1	....	....	750	1, 800	3, 600
Marble and stone work	199	1, 273, 489	2, 029	1	1	835, 244	1, 061, 482	2, 594, 182
Masonry, brick and stone	272	784, 750	3, 042	....	1	1, 309, 693	1, 793, 923	3, 711, 075
Matches	3	91, 000	57	57	1	40, 000	247, 500	313, 000
Mats and matting	3	8, 850	11	....	4	6, 000	8, 280	20, 030
Mattresses and spring beds (see also Furniture)	44	267, 212	302	157	16	188, 211	658, 433	1, 008, 793
Millinery and lace goods (see also Artificial feathers and flowers)	4	38, 500	15	109	20	33, 300	224, 900	317, 000
Millstones	1	40, 000	59	1	....	24, 000	24, 000	63, 000
Mineral and soda waters	30	180, 700	214	....	4	107, 619	220, 789	434, 303
Mirrors	2	5, 000	34	....	....	16, 800	16, 500	55, 000
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods)	69	7, 166, 800	3, 668	3, 345	485	2, 528, 476	7, 570, 885	13, 043, 829
Models and patterns	39	50, 050	125	2	1	58, 684	23, 275	136, 933
Musical instruments and materials (not specified)	10	46, 700	48	2	....	23, 042	11, 663	49, 300
Musical instruments, organs and materials	31	1, 324, 866	1, 466	37	17	876, 785	1, 028, 501	2, 354, 243
Musical instruments, pianos and materials	45	1, 905, 700	1, 473	21	10	890, 721	1, 132, 847	2, 652, 876
Needles and pins	11	185, 200	212	55	26	109, 719	83, 268	257, 413
Nets and seines	3	58, 000	19	38	1	20, 500	101, 000	135, 500
Oil, illuminating, not including petroleum refining	3	90, 000	11	....	....	6, 500	300, 000	345, 000
Oil, lubricating	5	89, 000	32	6	....	17, 800	170, 000	247, 600
Oil, neat's-foot	5	14, 900	19	....	....	5, 930	73, 300	89, 750
Oilcloth, floor	3	46, 000	83	1	....	36, 830	151, 826	219, 910
Oleomargarine	1	3, 000	28	2	....	6, 875	50, 000	65, 000
Painting and paperhanging	617	670, 528	2, 530	4	17	1, 064, 367	1, 076, 024	2, 902, 719
Paints (see also Varnish)	18	596, 100	209	8	2	105, 805	733, 393	987, 960
Paper (see also Cardboard; Collars and cuffs, paper; Envelopes; Leather board; Wood pulp).	96	11, 722, 046	3, 523	3, 563	62	2, 467, 359	9, 213, 221	15, 188, 196
Paperhangings	1	5, 000	1	....	3	1, 750	2, 000	4, 900
Patent medicines and compounds (see also Drugs and chemicals)	40	521, 350	247	132	7	187, 607	664, 486	1, 456, 376
Paving materials	12	34, 000	102	....	....	33, 242	38, 582	88, 544
Pencils, lead	2	5, 500	5	4	....	2, 115	2, 500	7, 000
Pens, gold	2	900	1	....	....	900	1, 050	4, 300
Perfumery and cosmetics	11	83, 100	39	23	1	21, 990	187, 920	330, 600
Photographic apparatus	2	5, 500	6	....	....	2, 190	1, 200	4, 350
Photographing	126	310, 450	330	188	6	189, 319	179, 529	575, 952
Photographing materials	1	15, 000	12	3	....	10, 000	25, 000	40, 000
Pickles, preserves, and sauces	8	50, 675	35	27	2	26, 452	146, 708	236, 852
Plated and britannia ware (see also Silverware)	6	366, 000	578	151	10	366, 800	252, 110	672, 000
Plumbing and gasfitting	210	485, 700	1, 005	4	22	492, 969	939, 539	1, 862, 071
Pocket-books	8	39, 900	63	90	5	44, 350	74, 210	156, 603
Postal cards	1	20, 000	10	18	....	10, 000	200, 000	190, 000
Printing and publishing (see also Lithographing)	280	3, 712, 869	3, 819	980	195	2, 774, 818	2, 621, 983	7, 757, 260
Printing materials	4	15, 300	12	1	2	8, 460	12, 000	28, 050
Pumps, not including steam pumps	15	38, 450	33	....	....	11, 893	18, 640	43, 895
Refrigerators	7	56, 850	70	....	....	25, 425	48, 400	98, 400
Regalia and society banners and emblems	2	700	3	4	....	1, 750	750	4, 500
Roofing and roofing materials	60	213, 925	317	....	....	147, 981	369, 529	657, 264
Rubber and elastic goods	22	1, 811, 000	881	897	63	649, 016	2, 722, 916	4, 206, 465
Rules, ivory and wood	1	500	....	....	....	....	50	1, 900
Saddlery and harness	294	520, 625	966	43	10	372, 914	750, 912	1, 497, 600
Safes, doors, and vaults, fire-proof	3	52, 000	170	....	....	69, 800	186, 000	310, 000
Salt	5	9, 000	8	....	....	1, 030	20	3, 800
Sand and emery paper and cloth	2	46, 000	23	6	....	11, 620	49, 029	79, 374
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	56	740, 345	777	4	30	353, 951	816, 398	1, 389, 326
Saws	8	135, 800	108	....	....	50, 861	112, 496	205, 951
Scales and balances	5	70, 000	55	1	4	30, 570	26, 440	77, 613
Screws	9	163, 000	202	7	14	72, 587	123, 452	253, 590
Sewing machines and attachments	12	1, 032, 200	976	18	17	445, 377	634, 229	1, 366, 696
Shipbuilding	276	1, 765, 450	1, 328	....	....	804, 571	1, 173, 640	2, 281, 666
Shirts	20	150, 050	66	428	9	111, 519	326, 554	564, 500
Shoddy (see also Mixed textiles)	30	460, 500	334	105	32	173, 439	1, 308, 715	2, 305, 985
Show-cases	6	11, 800	18	....	1	9, 200	11, 360	32, 380
Silk and silk goods (see also Mixed textiles)	22	1, 306, 900	353	1, 285	188	521, 725	1, 990, 515	3, 764, 260
Silversmithing	5	4, 250	11	2	....	5, 811	4, 176	16, 235
Silverware (see also Plated and britannia ware)	3	8, 300	9	....	....	3, 000	8, 385	13, 960
Slaughtering and meat-packing, not including retail butchering establishments.	77	2, 904, 440	1, 258	....	5	653, 149	20, 657, 330	22, 951, 782
Smelting and refining (base scrap-metal, not from the ore)	1	300	4	....	....	800	8, 400	11, 000
Soap and candles	119	2, 005, 325	655	29	30	306, 539	3, 492, 604	4, 489, 555
Soda-water apparatus	3	95, 000	189	5	6	73, 335	279, 638	487, 306
Spectacles and eyeglasses	13	96, 200	237	18	16	124, 675	147, 778	330, 859
Sporting goods	13	303, 000	41	245	25	69, 125	268, 552	398, 890
Springs, steel, car, and carriage	6	7, 450	21	....	....	6, 750	21, 500	40, 509
Stamped ware (see also Tinware, copperware, and sheet-iron ware)	2	185, 000	262	73	6	141, 000	193, 000	378, 000
Starch	2	50, 000	22	....	....	12, 175	81, 553	109, 710
Stationery goods	11	53, 800	76	11	3	43, 935	110, 848	221, 703
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	18	1, 068, 000	717	....	17	369, 556	536, 984	1, 196, 544
Stencils and brands	16	33, 300	30	4	4	16, 975	16, 060	58, 294
Stereotyping and electrotyping (see also Type founding)	6	43, 000	98	2	....	61, 721	36, 408	122, 630
Stone- and earthen-ware	18	187, 000	194	13	4	94, 825	50, 740	244, 336

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MASSACHUSETTS, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Straw goods	33	$2, 361, 960	2, 531	5, 185	93	$1, 968, 232	$4, 117, 162	$6, 898, 628
Sugar and molasses, refined	5	1, 979, 500	525			288, 860	21, 482, 764	22, 880, 439
Surgical appliances (see also Artificial limbs)	9	33, 200	40	21	3	36, 230	50, 430	126, 900
Taxidermy	4	2, 300	8	2		3, 500	5, 900	15, 800
Telegraph and telephone apparatus (see also Electrical apparatus and supplies).	2	112, 000	185		15	90, 600	239, 625	409, 930
Terra-cotta ware (see also Brick and tile; Drain and sewer pipe)	1	16, 000	20		2	10, 000	3, 235	14, 558
Tinware, copperware, and sheet-iron ware (see also Coppersmithing; Stamped ware).	375	1, 323, 253	1, 559	84	19	731, 647	1, 426, 392	2, 901, 133
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	7	257, 400	60	158	9	46, 131	118, 139	217, 778
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	271	675, 111	1, 000	408	27	595, 355	1, 111, 135	2, 074, 219
Tools (see also Cutlery and edge tools; Hardware)	49	614, 527	484	11	10	252, 244	204, 936	625, 709
Toys and games	14	136, 500	232	40	25	105, 613	73, 485	256, 172
Trunks and valises	25	111, 500	177	6		92, 163	251, 511	430, 391
Type founding (see also Stereotyping and electrotyping)	4	147, 200	111	86	5	100, 263	67, 443	222, 000
Umbrellas and canes	4	27, 600	22	15		15, 010	36, 425	89, 814
Upholstering (see also Furniture)	83	172, 857	271	57	3	153, 757	324, 807	611, 968
Upholstering materials	2	8, 500	12			3, 500	14, 000	22, 500
Varnish (see also Paints)	7	85, 500	24			14, 239	230, 350	306, 500
Veneering	1	25, 000	19			4, 530	4, 150	25, 000
Vinegar	23	166, 200	86		2	27, 976	124, 150	186, 920
Washing-machines and clothes-wringers	2	40, 150	17			9, 600	61, 200	123, 000
Watch and clock materials	3	13, 500	10	9		6, 700	2, 160	14, 820
Watch and clock repairing	63	71, 900	78	1		40, 029	30, 012	123, 720
Watch cases	5	65, 000	103	16	3	86, 142	274, 480	427, 371
Watches	5	1, 880, 500	1, 029	575		912, 845	730, 081	1, 915, 913
Whalebone and rattan	4	24, 500	31	21	2	19, 115	41, 044	69, 417
Wheelbarrows	1	1, 000	2			575	700	1, 500
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	378	418, 456	647		2	264, 638	288, 020	861, 165
Whips	47	630, 410	333	153	8	226, 784	381, 293	962, 892
Window blinds and shades	19	171, 750	161	45	12	66, 650	209, 377	335, 932
Wire	8	1, 742, 000	2, 442	22	12	961, 400	2, 987, 900	4, 539, 399
Wirework	26	328, 375	299	130	19	172, 928	452, 454	761, 881
Wood pulp	6	100, 350	66			19, 760	93, 128	167, 683
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	118	666, 360	969	21	37	413, 236	637, 795	1, 350, 018
Wooden ware	26	342, 550	385	13	39	156, 541	269, 937	524, 680
Woolen goods (see also Carpets, other than rag; Felt goods; Gloves and mittens; Mixed textiles; Wool hats; Worsted goods).	167	24, 680, 782	13, 146	8, 210	2, 265	7, 457, 115	27, 839, 583	45, 099, 203
Wool hats (see also Woolen goods)	6	430, 325	578	214	101	313, 935	829, 100	1, 438, 041
Worsted goods (see also Woolen goods)	23	6, 195, 247	1, 813	3, 340	630	1, 870, 030	6, 465, 476	10, 466, 016
Zinc	2	15, 000	12			2, 250	32, 000	38, 500

A—MICHIGAN, BY TOTALS OF COUNTIES.

The State	8, 873	$92, 930, 959	68, 445	4, 784	4, 362	$25, 313, 682	$92, 900, 269	$150, 715, 025
COUNTIES.								
Alcona	6	146, 000	97		5	31, 325	152, 192	224, 792
Allegan	222	1, 007, 960	754	26	46	255, 314	1, 609, 306	2, 328, 811
Alpena	41	812, 950	679	9	43	206, 152	930, 135	1, 452, 037
Antrim	14	571, 750	276		6	105, 458	230, 943	445, 474
Baraga	8	91, 500	53		1	17, 500	170, 071	245, 675
Barry	90	272, 000	296	6	11	76, 953	404, 158	589, 895
Bay	151	5, 659, 644	3, 081	22	193	1, 113, 393	5, 633, 431	8, 100, 163
Benzie	29	360, 700	236		10	67, 603	400, 607	552, 295
Berrien	197	1, 245, 116	1, 566	176	96	497, 727	1, 696, 117	2, 641, 519
Branch	129	489, 665	608	51	38	221, 374	644, 156	1, 179, 014
Calhoun	147	2, 166, 050	1, 222	112	20	456, 934	1, 987, 101	3, 238, 515
Cass	132	445, 770	399	57	13	129, 223	592, 448	886, 768
Charlevoix	16	66, 300	49	1		10, 705	48, 595	73, 618
Cheboygan	15	807, 000	170			40, 122	395, 855	579, 532
Chippewa	4	314, 500	134	3	5	34, 600	84, 950	141, 995
Clare	8	25, 277	99			32, 820	80, 972	170, 150
Clinton	120	390, 310	451	9	13	144, 306	563, 220	1, 009, 277
Crawford	4	15, 200	34			7, 175	31, 750	59, 750
Delta	17	924, 600	608	2	1	204, 747	501, 501	735, 451
Eaton	157	451, 240	569	3	20	142, 964	463, 581	831, 941
Emmet	19	215, 300	125	2	9	39, 437	134, 219	218, 430
Genesee	191	1, 456, 906	923	55	32	323, 823	1, 527, 951	2, 201, 120
Gladwin	4	2, 300	11			915	3, 285	7, 655
Grand Traverse	38	684, 550	551	1	4	117, 210	345, 610	590, 502
Gratiot	66	289, 925	358	7	4	106, 505	312, 799	535, 567
Hillsdale	221	658, 812	661	53	20	199, 655	1, 161, 051	1, 648, 411
Houghton	28	256, 937	162	1	16	58, 453	205, 872	354, 588
Huron	89	572, 800	774		27	188, 352	526, 019	899, 159
Ingham	249	957, 210	1, 135	11	46	328, 034	1, 177, 374	1, 967, 820
Ionia	148	805, 350	844	18	15	228, 244	987, 919	1, 544, 296
Iosco	37	1, 365, 900	738		63	216, 920	1, 395, 995	2, 197, 530
Isabella	39	291, 540	142	3		31, 205	144, 317	233, 206
Isle Royale (a)								
Jackson	273	1, 987, 057	1, 494	265	17	592, 845	2, 173, 136	3, 620, 731
Kalamazoo	219	1, 658, 176	1, 242	172	66	481, 495	1, 548, 982	2, 703, 375

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—MICHIGAN, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Kalkaska	11	$26, 100	51			$19, 300	$78, 805	$149, 403
Kent	542	6, 132, 904	5, 758	358	489	2, 257, 035	5, 294, 673	9, 578, 779
Keweenaw	3	15, 300	20		3	4, 625	8, 525	16, 400
Lake	24	129, 200	229	5		69, 338	135, 132	276, 003
Lapeer	165	997, 702	931	44	11	286, 390	1, 398, 667	2, 177, 553
Leelanaw	24	130, 000	221	1		14, 909	63, 213	111, 374
Lenawee	348	1, 683, 588	1, 260	111	51	394, 299	1, 603, 886	2, 636, 748
Livingston	86	291, 760	248	1	12	62, 681	372, 972	546, 907
Mackinac	3	495, 000	125	2		33, 750	72, 667	163, 574
Macomb	194	573, 677	789	1	44	227, 926	716, 752	1, 265, 419
Manistee	74	2, 694, 900	1, 301	4	129	467, 546	1, 468, 843	2, 937, 501
Manitou	5	6, 150	28			3, 750	3, 741	8, 960
Marquette	76	1, 272, 425	827	2	26	261, 617	790, 531	1, 246, 975
Mason	44	3, 722, 200	740		47	236, 469	1, 293, 584	2, 120, 749
Mecosta	47	580, 700	420		1	149, 803	516, 480	876, 314
Menominee	19	1, 556, 900	592	13	58	240, 567	1, 461, 516	2, 233, 543
Midland	30	186, 700	212		16	66, 469	248, 880	434, 352
Missaukee	5	12, 500	26			2, 250	6, 200	14, 905
Monroe	130	503, 710	575	11	56	149, 511	527, 284	868, 703
Montcalm	253	1, 905, 400	2, 548	34	19	915, 988	3, 280, 979	5, 440, 109
Muskegon	181	5, 755, 360	2, 969	27	221	1, 080, 810	5, 408, 600	9, 027, 241
Newaygo	65	802, 800	620	4	16	232, 221	1, 106, 814	1, 704, 132
Oakland	332	829, 302	680	235	117	209, 128	1, 248, 878	1, 916, 152
Oceana	52	641, 200	549	3	4	159, 961	383, 294	696, 986
Ogemaw	2	22, 000	7			2, 170	7, 100	11, 900
Ontonagon	2	41, 000	23		8	6, 000	31, 000	57, 500
Osceola	52	456, 325	306	7	15	98, 116	373, 195	583, 454
Oscoda (*a*)								
Otsego	6	373, 000	110			32, 725	124, 700	218, 500
Ottawa	176	2, 173, 650	1, 255	10	127	409, 090	2, 629, 587	3, 865, 754
Presque Isle	9	29, 300	31			3, 057	8, 321	18, 166
Roscommon	1	100, 000	25			12, 000	45, 000	70, 000
Saginaw	428	5, 155, 235	4, 036	95	398	1, 478, 131	5, 905, 209	9, 312, 465
Saint Clair	209	1, 229, 615	950	18	64	323, 565	1, 483, 573	2, 194, 342
Saint Joseph	222	1, 049, 171	804	21	6	222, 652	1, 171, 019	1, 811, 489
Sanilac	78	193, 575	285	3	6	69, 900	335, 808	555, 966
Schoolcraft	3	671, 000	40			15, 000	75, 800	154, 000
Shiawassee	140	552, 398	588	6	8	172, 051	627, 516	1, 037, 354
Tuscola	128	320, 737	380	9	13	90, 873	451, 945	722, 162
Van Buren	175	941, 455	1, 255	8	25	308, 509	1, 173, 567	1, 818, 740
Washtenaw	277	1, 693, 614	1, 283	146	41	456, 641	2, 026, 095	3, 018, 568
Wayne	1, 088	18, 791, 561	14, 598	2, 540	1, 487	7, 178, 196	19, 984, 231	33, 469, 759
Wexford	36	745, 550	409		4	149, 175	681, 069	1, 137, 042

a Returned as having no manufactures.

B—MICHIGAN, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	8, 873	$92, 930, 959	68, 445	4, 784	4, 362	$25, 313, 682	$92, 900, 269	$150, 715, 025
Agricultural implements	143	2, 488, 287	1, 958	3	43	650, 192	1, 337, 945	3, 102, 638
Artificial limbs (see also Surgical appliances)	1	6, 000	4			3, 500	560	6, 500
Awnings and tents	1	500	2			300	1, 000	1, 700
Baking and yeast powders (see also Drugs and chemicals)	8	44, 000	39	12	3	20, 896	109, 300	178, 600
Baskets, rattan and willow ware	11	24, 600	37	12	22	24, 100	17, 295	58, 000
Belting and hose, leather	2	10, 500	11		5	5, 640	49, 000	74, 000
Billiard tables and materials	2	18, 000	17			11, 500	24, 000	42, 000
Blacking	4	7, 650	13	1		3, 130	11, 000	23, 060
Blacksmithing (see also Wheelwrighting)	965	692, 108	1, 113		17	358, 604	503, 784	1, 539, 195
Bookbinding and blank-book making	8	158, 300	65	57	9	36, 258	54, 215	128, 788
Boot and shoe findings	1	500	2	2	1	945	1, 200	5, 000
Boot and shoe uppers	3	7, 300	22	12	2	12, 150	20, 500	42, 200
Boots and shoes, including custom work and repairing	646	826, 567	1, 536	74	32	646, 164	1, 235, 946	2, 437, 556
Boxes, cigar	9	48, 200	47	39	35	30, 945	72, 772	134, 555
Boxes, fancy and paper	5	12, 900	15	41	5	15, 410	39, 750	73, 000
Boxes, wooden, packing	23	221, 880	444	43	99	141, 259	301, 592	544, 045
Brass castings	3	19, 500	60		1	22, 150	19, 271	50, 101
Bread and other bakery products	113	433, 325	401	27	46	223, 095	1, 065, 907	1, 540, 465
Brick and tile	179	710, 259	1, 730	45	158	346, 845	236, 878	822, 475
Bridges	1	300, 000	194		96	75, 000	269, 050	357, 023
Brooms and brushes	31	141, 050	162	87	102	88, 386	163, 699	305, 177
Carpentering	162	427, 700	1, 303	10	10	481, 161	996, 904	1, 747, 738
Carpets, rag	7	2, 100	7		1	1, 768	3, 050	8, 188
Carriage and wagon materials	17	109, 925	167			47, 782	80, 976	179, 031
Carriages and sleds, children's	3	13, 000	22	1	7	10, 450	11, 800	31, 900
Carriages and wagons (see also Wheelwrighting)	208	1, 739, 991	1, 934	2	52	769, 814	1, 272, 623	2, 741, 143
Cars, railroad, street, and repairs	3	736, 896	778		16	405, 448	906, 211	1, 466, 256
Cement	1	75, 000	20			5, 000	9, 000	13, 000
Charcoal	59	153, 425	692	2	2	195, 207	123, 457	417, 264
Cheese and butter (factory)	74	129, 925	88	23	3	21, 103	218, 479	317, 877

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MICHIGAN, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Clothing, men's	136	$1, 407, 625	658	1, 064	4	$631, 163	$1, 851, 037	$3, 029, 478
Clothing, women's	4	14, 800		60		13, 780	14, 300	36, 100
Coffee and spices, roasted and ground	5	72, 450	33	6	1	19, 650	159, 000	213, 000
Coffins, burial cases, and undertakers' goods	13	100, 600	120	1	5	50, 698	72, 279	184, 308
Combs	1	6, 000	11	1		3, 500	6, 500	12, 000
Confectionery	21	308, 475	187	94	10	103, 361	624, 750	802, 273
Cooperage	265	558, 569	1, 280		56	409, 186	827, 671	1, 584, 469
Cordage and twine	1	1, 000	2			700	800	4, 000
Corsets	7	88, 950	36	322	16	80, 610	204, 700	391, 300
Cotton goods (see also Hosiery and knit goods)	3	72, 000	36	88	14	20, 800	48, 500	86, 000
Cutlery and edge tools (see also Hardware; Tools)	9	39, 000	50		3	23, 002	26, 710	68, 212
Dentistry, mechanical	30	41, 300	16	3	1	8, 996	20, 010	65, 467
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	38	216, 150	192	21	16	66, 609	115, 761	447, 611
Dyeing and cleaning	6	16, 200	10	14		9, 228	5, 700	22, 100
Electrical apparatus and supplies (see also Telegraph and telephone apparatus).	1	3, 000	1			150	500	1, 400
Electroplating	5	2, 750	16	1		5, 263	5, 295	14, 300
Emery wheels	1	20, 000	30			15, 000	35, 000	70, 000
Engraving and die-sinking	2	1, 900	1			780	700	3, 600
Explosives and fireworks	1	4, 000	2	1	2	1, 400	4, 275	7, 161
Fancy articles	1	500	2			3, 120	6, 500	13, 000
Fertilizers	1	50, 000	35			10, 694	10, 136	27, 081
Files (see also Saws)	7	20, 750	60		14	23, 278	29, 440	68, 900
Flavoring extracts	1	25, 000	8	1	11	7, 000	30, 000	50, 000
Flouring- and grist-mill products	706	7, 704, 464	2, 254		1	726, 289	20, 668, 615	23, 546, 875
Food preparations (see page 39)	1	3, 000	8			1, 800	2, 000	5, 500
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	220	5, 558, 197	3, 623		118	1, 558, 560	2, 469, 754	5, 271, 142
Fruits and vegetables, canned and preserved	12	61, 100	113	138	34	23, 377	76, 568	129, 315
Furniture (see also Mattresses and spring beds; Upholstering)	195	2, 442, 286	3, 015	31	208	1, 141, 050	1, 541, 559	3, 514, 176
Furniture, chairs	10	371, 650	393	51	118	100, 731	143, 692	279, 792
Furs, dressed	2	1, 600	4	7		4, 400	9, 800	24, 000
Galvanizing	1	7, 000	15			2, 217	8, 491	20, 200
Gas machines and meters	1	75, 000	35			22, 000	20, 000	56, 000
Glass	1	65, 000	50		4	30, 000	35, 113	90, 000
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	7	10, 800	10	19		7, 000	9, 950	25, 287
Glue	1	3, 000	2			600	1, 000	3, 000
Grease and tallow	1	600	1			300	4, 500	5, 000
Grindstones	2	45, 000	168			40, 000	23, 600	77, 000
Gunpowder (see also High explosives)	1	75, 000	18			10, 000	75, 000	90, 000
Hairwork	5	6, 700	1	20		5, 320	5, 300	16, 500
Handles, wooden	22	74, 300	152		13	43, 580	47, 265	151, 800
Hardware (see also Cutlery and edge tools; Tools)	10	66, 500	69		7	23, 738	45, 315	102, 889
Hats and caps, not including wool hats	10	303, 350	106	143	3	76, 419	132, 875	303, 250
High explosives (see also Gunpowder)	1	25, 000	10			9, 000	34, 000	44, 000
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	11	147, 389	80	706	176	92, 324	226, 627	377, 249
Housefurnishing goods	4	47, 500	68	32	12	39, 600	64, 480	128, 600
Ink	1	1, 000	2			700	2, 000	5, 000
Instruments, professional and scientific	4	12, 800	11			4, 925	4, 896	15, 374
Iron and steel	22	4, 175, 386	3, 054		35	922, 597	3, 279, 420	4, 591, 613
Iron bolts, nuts, washers, and rivets	1	100, 000	58		40	38, 030	188, 988	283, 947
Iron forgings	1	50, 000	50		15	36, 000	90, 000	150, 000
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	2	2, 900	14			6, 500	7, 500	18, 350
Jewelry	10	89, 802	57		4	40, 915	59, 251	138, 600
Kindling wood	1	13, 000	12		8	5, 600	7, 000	10, 000
Lasts	1	5, 000	15			7, 000	3, 500	15, 000
Leather, curried	44	256, 311	113	3		51, 950	812, 065	996, 932
Leather, dressed skins	1	4, 000	9	3	2	1, 800	4, 000	8, 000
Leather, tanned	66	1, 081, 489	458	3		222, 228	1, 450, 559	2, 029, 653
Lime	18	158, 800	91			28, 834	67, 616	121, 416
Liquors, malt	113	2, 212, 848	633	6	4	285, 726	1, 225, 886	2, 184, 392
Liquors, vinous	1	3, 600	2			250	700	1, 570
Lock- and gun-smithing	19	17, 775	21			8, 264	5, 650	28, 784
Looking-glass and picture frames	30	310, 850	315	80	63	155, 042	262, 655	563, 737
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	54	578, 500	513		35	202, 011	629, 630	1, 076, 049
Lumber, sawed	1, 649	39, 260, 428	22, 732	143	1, 360	6, 967, 905	32, 251, 372	52, 449, 928
Malt	1	30, 000	7			3, 000	27, 000	33, 000
Marble and stone work	86	292, 550	423	1	11	206, 809	274, 446	674, 780
Masonry, brick and stone	39	61, 540	330		2	100, 210	153, 898	309, 334
Matches	2	260, 000	95	205	75	80, 000	130, 000	237, 500
Mattresses and spring beds (see also Furniture)	18	32, 085	47	2	2	16, 471	53, 005	93, 408
Mineral and soda waters	13	25, 995	29	1	5	8, 423	16, 166	40, 800
Models and patterns	6	8, 800	12		1	7, 830	3, 275	18, 709
Musical instruments, organs and materials	4	137, 000	139		27	64, 850	83, 177	202, 179
Musical instruments, pianos and materials	1	4, 000	4			2, 200	1, 500	5, 500
Needles and pins	2	180, 000	28	37	6	27, 600	64, 500	150, 000
Oil, essential	57	24, 530	105			6, 750	30, 968	82, 123
Oil, lubricating	1	52, 000	8			2, 700	3, 560	12, 000
Paints (see also Varnish)	1	50					100	500
Painting and paperhanging	71	144, 525	453		11	184, 957	278, 027	567, 570
Paper (see also Wood pulp)	21	1, 033, 338	428	132	29	214, 812	730, 614	1, 204, 664
Patent medicines and compounds (see also Drugs and chemicals)	20	89, 800	52	38	6	28, 847	58, 180	158, 982

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MICHIGAN, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Pens, gold	1	$200	1			$400	$500	$2,000
Perfumery and cosmetics	4	25,500	20	9	5	12,900	42,000	94,000
Photographing	47	83,300	71	22	4	39,146	46,305	152,683
Pickles, preserves, and sauces	1	3,000	3		3	2,000	6,000	12,000
Pipes, tobacco	2	1,700	13	8	2	6,460	2,500	15,400
Plumbing and gasfitting	26	209,700	222		3	113,933	225,572	449,494
Printing and publishing	114	1,374,625	1,151	111	157	623,175	503,890	1,576,523
Pumps, not including steam pumps	30	93,137	55		1	20,522	36,546	103,651
Refrigerators	3	10,600	17		1	11,480	11,100	27,316
Regalia and society banners and emblems	2	10,000	5	11	1	4,420	22,000	42,000
Roofing and roofing materials	11	48,350	85		5	32,562	98,094	160,790
Rules, ivory and wood	1	800	1			200	400	800
Saddlery and harness	335	509,336	660	2	12	254,461	662,314	1,276,616
Safes, doors, and vaults, fire-proof	1	195,000	150			55,600	95,000	165,400
Salt	86	2,147,209	1,416		52	541,852	1,009,733	2,271,918
Salt, ground	1	7,000	7	7	6	5,000	19,000	30,000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	126	1,624,257	1,474		97	566,004	1,278,996	2,440,402
Saws	7	40,900	24		4	15,116	34,200	64,480
Scales and balances	2	1,200	8		1	6,170	2,300	9,200
Sewing machines and attachments	2	2,800	6			3,600	3,500	11,000
Shipbuilding	72	476,775	1,537			745,933	1,089,985	2,034,636
Shirts	12	16,000	40	85	1	26,785	36,445	79,871
Show-cases	3	34,200	30		1	12,453	16,770	40,060
Silversmithing	1	3,000	2			400	1,500	2,900
Slaughtering and meat-packing, not including retail butchering establishments.	12	573,000	162		10	89,527	1,712,479	2,065,634
Soap and candles	15	62,742	54	2		20,610	74,060	124,738
Spectacles and eyeglasses	3	45,000	53	5	19	23,400	24,500	71,000
Sporting goods	2	23,000	59	12	11	27,000	18,000	59,000
Springs, steel, car and carriage	2	100,000	90		5	30,000	168,000	230,000
Stamped ware (see also Tinware, copperware, and sheet-iron ware)	1	600					300	1,200
Steam fittings and heating apparatus (see Foundery and machine-shop products).	1	651	2			634	4,586	6,039
Stencils and brands	7	10,200	19			11,000	11,000	35,600
Stone- and earthen-ware	8	26,500	34			12,900	6,678	30,950
Surgical appliances (see also Artificial limbs)	1	500	2			600	500	2,220
Telegraph and telephone apparatus (see also Electrical apparatus and supplies).	1	6,000	9			4,299	20,000	35,000
Tinware, copperware, and sheet-iron ware (see also Stamped ware)	291	470,020	652	1	32	290,004	515,677	1,114,874
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	6	545,000	238	175	130	126,725	964,554	1,519,146
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	162	694,392	1,298	156	156	541,727	968,410	2,146,089
Tools (see also Cutlery and edge tools; Hardware)	4	11,100	10			4,103	5,462	16,549
Toys and games	1	4,000	6		6	1,500	500	3,000
Trunks and valises	4	38,500	81		14	44,610	83,358	147,400
Umbrellas and canes	1	12,000	3	3	2	2,650	7,500	15,000
Upholstering (see also Furniture)	15	72,670	94	5	10	40,697	140,844	226,767
Upholstering materials	3	13,500	7		4	4,200	7,806	18,425
Varnish (see also Paints)	3	504,000	62		6	43,100	304,500	452,000
Veneering	1	3,000	4			1,000	1,000	4,000
Vinegar	12	36,900	36		1	6,745	9,205	42,910
Washing-machines and clothes-wringers	8	46,375	67	4	1	18,199	22,525	58,400
Watch and clock repairing	37	48,050	46	1		24,559	11,807	63,124
Wheelbarrows	2	22,000	23			7,000	12,000	28,500
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	416	462,875	615		13	197,746	258,378	754,242
Whips	3	7,000	8	4	5	3,900	3,540	11,350
Windmills	11	89,750	85	1		26,455	94,300	159,340
Window blinds and shades	5	39,200	73	20	28	23,100	49,750	85,000
Wirework	7	88,100	136	10	22	70,600	99,400	196,624
Wood pulp	3	90,000	69		3	25,400	118,000	175,000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	18	36,850	45		8	20,736	18,800	70,064
Wooden ware	21	839,550	918	45	135	329,933	398,250	869,993
Woolen goods (see also Gloves and mittens)	39	558,800	203	114	30	76,240	356,614	481,517

A—MINNESOTA, BY TOTALS OF COUNTIES.

	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	3,493	$31,004,811	18,937	1,636	674	$8,613,094	$55,660,681	$76,065,198
COUNTIES.								
Aitkin (*a*)								
Anoka	32	612,400	323	3	4	99,616	1,353,531	1,740,331
Becker	11	124,800	35			18,530	159,600	202,374
Beltrami (*a*)								
Benton	5	63,200	15			7,700	13,100	22,500
Big Stone	6	4,650	2			375	2,475	6,900
Blue Earth	122	774,235	465	4	19	168,015	819,918	1,188,679
Brown	27	182,005	106	1	3	41,995	380,263	493,486
Carlton	5	148,000	113			42,500	169,200	271,500
Carver	52	215,475	236		39	60,482	260,275	409,787
Cass	1	115,000	40			16,000	75,000	108,300
Chippewa	7	33,850	9			1,948	35,716	45,223
Chisago	36	137,050	71		1	25,431	161,648	237,946
Clay	13	88,175	64			24,738	138,766	215,608
Cook (*a*)								

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—MINNESOTA, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Cottonwood	18	$50,000	38			$9,493	$82,536	$113,204
Crow Wing	11	39,950	49			14,310	48,505	97,080
Dakota	65	467,725	282	1	2	94,143	766,771	982,199
Dodge	20	91,690	42			10,686	135,480	168,472
Douglas	35	63,675	73	1		20,295	138,282	202,122
Faribault	49	152,475	119	1	1	45,632	403,141	522,891
Fillmore	124	777,875	311	4	1	123,229	1,139,091	1,380,489
Freeborn	25	55,200	54	1	3	18,345	130,796	174,292
Goodhue	141	1,105,260	707	13	16	286,082	1,869,051	2,448,278
Grant	4	24,600	9			2,835	28,490	41,047
Hennepin	442	9,853,166	5,119	457	186	2,732,799	25,431,152	31,601,970
Houston	56	299,400	86	7		28,809	656,824	807,352
Isanti	7	16,900	18			3,245	37,250	52,940
Itasca (a)								
Jackson	10	33,300	14			2,374	35,500	45,529
Kanabec	2	4,000	3			551	2,130	3,532
Kandiyohi	11	54,550	27			6,775	76,150	94,712
Kittson	3	2,500	7			520	2,020	3,875
Lac-qui-parle (a)								
Lake	3	11,500	15			2,642	7,725	14,008
Le Sueur	62	167,100	131		2	34,549	362,075	491,617
Lincoln (a)								
Lyon	34	52,200	55			15,345	108,640	153,324
McLeod	58	109,150	71			24,717	137,940	215,821
Marshall (a)								
Martin	2	11,000	3			450	21,522	24,141
Meeker	36	194,725	76		4	29,433	325,429	403,413
Mille Lacs	7	27,450	30			9,240	68,180	89,334
Morrison	25	89,270	44	2	3	12,704	85,168	134,048
Mower	30	170,200	73	1	3	26,938	252,651	324,812
Murray	5	13,050	6		1	1,600	30,050	36,080
Nicollet	77	147,315	124		3	39,789	246,075	365,639
Nobles	2	24,500	11			3,050	32,722	37,400
Olmsted	97	475,031	333	7	3	112,609	548,477	790,973
Otter Tail	41	302,562	121	1	4	41,388	355,205	483,268
Pine	8	56,700	78			18,900	88,450	144,250
Pipe Stone (a)								
Polk	12	66,300	54			15,947	117,400	153,008
Pope	12	21,000	16			2,770	39,400	50,162
Ramsey	597	4,392,391	4,094	1,092	258	2,329,920	5,826,867	10,853,863
Redwood	23	39,325	18			6,400	37,266	78,157
Renville	8	51,400	28	1		7,000	180,380	213,447
Rice	159	975,325	537	13	14	220,077	2,191,914	2,917,416
Rock	4	15,400	8			2,200	30,310	38,958
Saint Louis	17	280,900	317	12	3	61,145	110,928	203,783
Scott	82	426,125	252	1	12	103,621	988,411	1,255,274
Sherburne	13	95,800	46		12	15,972	129,833	203,799
Sibley	12	63,400	43			13,622	169,294	214,509
Stearns	104	486,825	363	1	3	132,927	714,860	1,062,231
Steele	75	268,175	180	1	1	82,131	496,863	704,985
Stevens	14	44,000	29			9,500	59,000	78,185
Swift	21	64,650	29		1	9,980	136,430	175,742
Todd	17	48,125	35	2		8,442	86,745	116,135
Traverse	1	300	1			104	25	500
Wabasha	90	519,175	281		4	107,924	1,095,067	1,423,086
Wadena	9	20,350	10			2,300	19,770	28,850
Waseca	32	191,980	119		4	33,123	432,645	519,167
Washington	154	3,149,785	1,847	5	40	789,292	3,162,204	4,801,531
Watonwan	11	21,550	12			2,650	7,915	17,860
Wilkin	2	11,200	4			1,150	11,343	14,135
Winona	132	2,104,951	892	2	23	345,384	1,903,239	2,884,026
Wright	62	144,520	103	2	1	24,066	378,772	496,313
Yellow Medicine	5	59,000	11			4,550	110,830	169,270

a Returned as having no manufactures.

B—MINNESOTA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	3,493	$31,004,811	18,937	1,636	674	$8,613,094	$55,660,681	$76,065,198
Agricultural implements	32	2,315,222	1,196	1		507,085	975,890	2,340,288
Awnings and tents	4	11,950	9	20	4	8,060	96,700	131,400
Bags, other than paper	1	2,000	4	1		1,200	20,000	24,000
Baking and yeast powders (see also Drugs and chemicals)	1	500			1	150	500	1,800
Baskets, rattan and willow ware	2	300	2			500	200	2,000
Bells	1	500	2			500	400	1,600
Blacksmithing (see also Wheelwrighting)	437	371,100	499		3	182,100	265,767	765,807
Bookbinding and blank-book making	6	50,000	44	27	8	35,241	33,269	98,941
Boot and shoe uppers	1	10,000	2	3		2,650	25,000	40,000
Boots and shoes, including custom work and repairing	271	681,046	681	37	23	334,637	768,117	1,422,053
Boxes, cigar	3	4,500	6	3		2,602	4,750	9,500
Boxes, fancy and paper	4	2,600	3	4	7	2,485	2,600	8,800
Boxes, wooden, packing	1	1,000	6		2	2,500	3,000	6,000
Brass castings	3	17,000	15			8,506	32,178	47,250
Bread and other bakery products	46	133,450	122	17	7	58,345	342,260	494,755

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MINNESOTA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years	Children and youths.			
Brick and tile (see also Drain and sewer pipe)	87	$281, 705	928	5	77	$200, 208	$114, 610	$502, 975
Brooms and brushes	10	9, 600	22	2	....	10, 960	23, 372	46, 200
Buttons	1	1, 000	....	....	....	....	200	600
Carpentering	138	234, 575	1, 008	....	2	436, 651	985, 797	1, 722, 877
Carpets, rag	4	410	1	....	1	450	850	2, 650
Carriages and sleds, children's	1	800	3	....	....	400	150	1, 200
Carriages and wagons (see also Wheelwrighting)	51	423, 800	475	....	....	218, 190	306, 620	728, 017
Cheese and butter (factory)	27	71, 149	31	5	2	7, 680	38, 262	62, 094
Clothing, men's	115	467, 875	539	536	14	406, 361	910, 137	1, 662, 855
Clothing, women's	9	31, 200	1	80	....	24, 100	93, 350	147, 900
Coffee and spices, roasted and ground	6	113, 500	16	6	9	13, 725	128, 450	180, 500
Coffins, burial cases, and undertakers' goods	2	3, 100	3	....	....	1, 480	3, 000	7, 500
Confectionery	14	66, 850	46	6	1	24, 730	120, 400	176, 350
Cooperage	72	301, 650	680	....	41	322, 559	529, 299	1, 007, 643
Corsets	2	5. 000	....	14	....	4, 425	7, 900	14, 750
Cotton goods (see also Hosiery and knit goods)	1	5, 000	4	12	6	6, 400	30, 000	40, 000
Cutlery and edge tools (see also Tools)	2	2, 000	3	....	....	1, 800	400	5, 160
Dentistry, mechanical	18	16, 950	8	....	1	3, 982	9, 360	46, 830
Drain and sewer pipe (see also Brick and tile)	2	15, 000	7	....	....	3, 000	4, 300	10, 700
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	8	28, 550	12	....	....	4, 600	19, 750	40, 800
Dyeing and cleaning	5	12, 150	4	1	....	2, 550	2, 350	10, 450
Electroplating	1	200	1	....	....	50	100	800
Engraving and die-sinking	1	4, 000	2	....	....	1, 100	1, 500	5, 600
Engraving, wood	1	200	....	....	....	....	200	1, 800
Explosives and fireworks	1	500	....	....	....	....	2, 000	3, 000
Fertilizers	1	50, 000	18	....	....	8, 424	89, 500	100, 000
Files (see also Saws)	1	1, 000	5	....	....	3, 500	500	4, 500
Flavoring extracts	1	6, 000	3	1	....	2, 500	14, 000	20, 000
Flouring- and grist-mill products	436	10, 510, 362	2, 634	....	....	1, 371, 646	37, 155, 429	41, 519, 004
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	61	927, 550	846	....	1	422, 940	860, 340	1, 606, 518
Furnishing goods, men's	2	150, 000	74	436	10	138, 350	318, 090	499, 250
Furniture (see also Mattresses and spring beds; Upholstering)	74	408, 855	437	2	7	190, 684	247, 585	587, 800
Furniture, chairs	3	1, 325	5	....	1	2, 000	2, 650	6, 300
Furs, dressed	10	130, 300	33	66	2	41, 370	180, 250	373, 800
Glass, cut, stained, and ornamented	1	100	1	....	....	300	200	1, 000
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	3	12, 500	11	28	1	15, 250	17, 500	40, 000
Hairwork	1	3, 000	....	1	....	250	1, 500	3, 000
Handles, wooden	1	500	4	....	....	200	500	1, 000
Hats and caps, not including wool hats	1	500	1	....	....	350	200	1, 800
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	1	8, 000	8	4	....	2, 819	5, 000	10, 000
Housefurnishing goods	5	108, 000	44	25	1	35, 740	321, 467	510, 270
Instruments, professional and scientific	1	3, 000	4	....	....	2, 950	700	5, 200
Iron and steel (*a*)	1	150, 000	180	....	....	25, 275	....	....
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	3	19, 500	60	....	....	27, 500	41, 000	108, 117
Ivory and bone work	1	1, 500	1	....	....	300	200	3, 000
Kindling wood	1	3, 000	....	2	....	900	6, 500	9, 250
Leather, curried	6	25, 650	23	....	....	12, 160	116, 925	141, 685
Leather, dressed skins	1	10, 000	18	....	....	4, 500	50, 000	60, 000
Leather, tanned	6	32, 450	26	....	....	13, 910	86, 853	111, 000
Lightning rods	2	4, 000	12	....	....	4, 450	2, 050	11, 200
Lime	14	39, 875	78	....	....	22, 052	17, 715	61, 340
Liquors, distilled	1	5, 200	2	....	....	760	8, 335	12, 500
Liquors, malt	101	1, 389, 900	416	8	11	150, 952	647, 345	1, 153, 122
Lithographing (see also Printing and publishing)	3	14, 000	14	1	1	9, 785	19, 657	37, 525
Lock- and gun-smithing	19	20, 100	17	....	....	8, 700	9, 250	35, 650
Looking-glass and picture frames	7	15, 550	12	....	....	4, 250	19, 800	34, 100
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	18	300, 500	283	....	....	131, 392	398, 450	657, 377
Lumber, sawed	234	6, 771, 145	2, 732	22	100	924, 473	4, 529, 055	7, 366, 033
Malt	4	30, 500	18	....	....	9, 485	49, 300	74, 000
Marble and stone work	35	105, 100	177	....	....	80, 323	82, 280	221, 175
Masonry, brick and stone	81	145, 770	871	....	....	304. 665	293, 450	735, 818
Mattresses and spring beds (see also Furniture)	4	10, 000	19	3	....	7, 300	18, 000	39, 500
Millinery and lace goods	3	13, 500	....	34	....	9, 500	33, 000	60, 500
Mineral and soda waters	13	31, 100	39	....	1	12, 936	26, 300	61, 200
Models and patterns	3	2, 800	5	....	....	2, 716	800	6, 000
Musical instruments and materials (not specified)	3	2, 000	6	....	....	4, 500	1, 200	8, 000
Musical instruments, organs and materials	3	2, 300	5	....	....	1, 995	1, 300	5, 600
Oil, linseed	2	210, 000	60	....	....	30, 000	277, 000	352, 000
Oil, lubricating	1	5, 000	1	....	....	600	3, 500	4, 350
Painting and paperhanging	47	38, 285	157	....	5	57, 855	95, 360	226, 300
Paper	2	310, 000	61	22	....	34, 000	118, 150	183, 900
Patent medicines and compounds (see also Drugs and chemicals)	9	26, 550	17	8	5	3, 828	9, 700	32, 000
Photographing	34	65, 275	44	10	4	24, 630	25, 640	100, 676
Pickles, preserves, and sauces	1	2, 000	2	....	....	1, 000	2, 500	5, 700
Plumbing and gasfitting	16	63, 850	87	....	....	44, 031	127, 400	213, 350
Printing and publishing (see also Lithographing)	78	817, 845	599	33	107	409, 104	351, 941	1, 013, 664
Pumps, not including steam pumps	8	16, 500	33	....	....	14, 762	19, 650	51, 500
Regalia and society banners and emblems	1	2, 000	1	....	....	300	2, 000	3, 000
Saddlery and harness	194	325, 389	405	....	3	169, 839	459, 185	859, 955
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	29	562, 000	592	1	42	265, 896	734, 125	1, 344, 618

a Repairing.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MINNESOTA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Saws	1	$300	2			$1,500	$2,000	$5,000
Scales and balances	1	400	2			1,000	1,000	2,500
Shipbuilding	1	10,000	16			8,000	2,500	15,000
Shirts	6	13,700	10	63		21,800	28,700	67,500
Show-cases	2	5,000	12		1	6,600	9,100	18,300
Silversmithing	1	2,500	3			1,000	1,000	3,000
Slaughtering and meat-packing, not including retail butchering establishments.	12	230,000	92		4	41,700	716,153	887,532
Soap and candles	6	92,900	30	9		14 050	72,000	128,640
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	2	16,000	32			25,000	35,000	90,000
Stencils and brands	2	1,900	2			1,500	1,100	4,600
Stereotyping and electrotyping (see also Type founding)	2	7,500	[illegible]			3,850	3,010	12,700
Stone- and earthen-ware	3	28,000	24			11,962	8,525	31,000
Tinware, copperware, and sheet-iron ware	145	201,131	312		5	157,836	334,814	665,999
Tobacco, cigars and cigarettes	54	142,362	221	2	42	142,368	211,250	562,234
Tools (see also Cutlery and edge tools)	1	500	4			2,500	1,200	5,500
Toys and games	1	1,000	10		50	2,880	2,500	9,000
Trunks and valises	4	22,500	41		5	26,500	49,000	96,000
Type founding (see also Stereotyping and electrotyping)	1	12,000	3	2	2	5,000	3,600	12,000
Upholstering (see also Furniture)	6	2,700	7			2,300	4,400	12,800
Vinegar	4	27,000	14			6,160	16,640	57,500
Washing-machines and clothes-wringers	2	1,500	5			2,530	1,000	6,000
Watch and clock repairing	51	55,375	61		2	32,761	18,795	94,050
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	179	240,035	314		2	126,080	160,861	440,414
Windmills	2	2,000	4			1,200	3,300	7,200
Wirework	2	3,300	2			1,200	701	3,454
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	4	10,650	22			6,350	11,350	22,300
Wooden ware	1	15,000	12			1,500	2,000	4,000
Woolen goods (see also Gloves and mittens)	13	190,500	106	73	50	46,108	155,867	253,378

A—MISSISSIPPI, BY TOTALS OF COUNTIES.

The State	1,479	$4,727,600	4,887	413	527	$1,192,645	$4,667,183	$7,518,302
COUNTIES.								
Adams	52	427,325	317	54	46	100,868	274,801	504,765
Alcorn	65	66,910	130		9	28,410	99,056	167,441
Amite	44	40,700	56		1	5,478	41,373	56,785
Attala	55	70,440	131			17,573	90,718	131,614
Benton	19	24,250	43		8	5,160	34,264	51,969
Bolivar	20	24,475	51			5,728	24,402	43,950
Calhoun	20	33,240	38			4,507	47,095	60,380
Carroll	21	38,300	46	19	11	14,840	23,533	44,638
Chickasaw	19	35,150	42			6,517	86,640	103,512
Choctaw	29	23,150	53			5,946	47,800	65,440
Claiborne	1	3,000	5			500	2,000	3,000
Clarke	20	120,240	81	47	27	23,071	120,551	173,526
Clay	24	34,800	59			10,559	67,375	91,033
Coahoma	3	38,700	56		4	16,500	46,700	70,600
Copiah	50	1,006,510	252	232	175	134,880	403,264	787,844
Covington	12	15,000	18			3,177	21,444	29,263
De Soto	32	30,980	52			5,003	28,320	47,696
Franklin	8	5,970	10	2		1,154	3,964	7,350
Greene	2	4,880	11		1	1,295	12,008	16,320
Grenada	23	27,800	44		1	7,107	22,528	38,718
Hancock	10	93,600	69		14	21,585	66,346	98,550
Harrison	14	78,450	87		8	20,200	123,910	200,650
Hinds	14	218,000	206		14	48,278	94,461	196,450
Holmes	24	31,100	45			6,310	36,761	53,458
Issaquena	1	1,000	3			150	1,400	2,750
Itawamba	9	15,880	12			2,268	20,048	27,694
Jackson	14	116,000	96	4	3	40,215	258,722	363,760
Jasper	12	13,500	22			1,260	16,541	20,955
Jefferson	16	18,150	45		1	6,150	8,775	23,675
Jones	4	3,200	6			433	7,202	9,305
Kemper	20	23,600	29			4,800	54,090	72,180
La Fayette	30	48,900	41			5,795	69,078	86,033
Lauderdale	43	186,600	344	18	11	59,663	300,658	431,461
Lawrence	14	17,300	15			1,340	19,359	25,270
Leake	16	15,550	19			1,950	38,200	44,960
Lee	37	30,925	57		5	4,844	54,080	71,283
Le Flore	3	8,700	11			750	5,925	8,700
Lincoln	25	140,600	132			22,910	122,870	200,015
Lowndes	36	162,300	198	2		36,019	177,423	264,536
Madison	13	57,250	25			4,482	31,389	39,747
Marion (*a*)								
Marshall	34	130,975	139		13	42,528	108,657	204,305
Monroe	53	84,270	100	4	9	21,685	121,160	184,580
Montgomery	18	21,380	55		10	9,610	29,170	51,568
Neshoba	15	21,600	23			2,801	37,064	44,613

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—MISSISSIPPI, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Newton	21	$31, 075	59		5	$5, 810	$42, 268	$63, 450
Noxubee	36	99, 775	113	6	18	17, 141	139, 706	199, 142
Oktibbeha	15	88, 000	116	1	8	25, 062	43, 010	81, 929
Panola	31	49, 590	70		3	12, 405	51, 520	83, 517
Perry	5	5, 150	6			295	4, 225	5, 540
Pike	20	53, 200	58		8	13, 345	83, 498	124, 489
Pontotoc	13	28, 260	33		2	2, 738	30, 904	39, 885
Prentiss	24	17, 275	38			7, 062	53, 715	68, 005
Quitman (*a*)								
Rankin	27	19, 000	52		4	3, 781	30, 907	44, 669
Scott	7	9, 400	14			2, 264	6, 780	11, 497
Sharkey (*a*)								
Simpson	4	8, 600	11		2	1, 425	13, 850	19, 800
Smith	17	15, 800	22			1, 911	20, 588	25, 400
Sumner	9	15, 100	22			2, 222	6, 580	11, 625
Sunflower (*a*)								
Tallahatchie	15	23, 075	35			2, 369	18, 765	25, 774
Tate	19	34, 450	70		11	16, 597	39, 061	71, 363
Tippah	32	28, 010	52		1	5, 191	46, 156	70, 936
Tishomingo	20	51, 150	51	13	8	9, 962	60, 999	85, 074
Tunica	1	4, 000	3			300	1, 150	2, 850
Union	18	41, 100	49		1	3, 375	44, 996	56, 741
Warren	59	196, 475	315		17	185, 968	266, 361	598, 274
Washington	9	143, 200	122	3	62	40, 600	102, 340	188, 563
Wayne	24	39, 750	102	6		28, 110	136, 805	206, 583
Wilkinson	8	4, 225	6			1, 522	3, 250	9, 150
Winston	10	11, 900	21			1, 808	23, 221	28, 024
Yalobusha	15	22, 250	44			10, 602	22, 400	51, 443
Yazoo	26	77, 140	129	2	6	26, 481	73, 003	122, 237

a Returned as having no manufactures.

B—MISSISSIPPI, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	1, 479	$4, 727, 600	4, 887	413	527	$1, 192, 645	$4, 667, 183	$7, 518, 302
Agricultural implements	12	31, 900	61			16, 025	32, 120	68, 640
Baking and yeast powders	1	2, 000	3		1	200	500	1, 500
Blacksmithing (see also Wheelwrighting)	156	62, 925	204	3	4	43, 173	53, 650	166, 291
Boots and shoes, including custom work and repairing	85	61, 795	167	4	1	49, 245	86, 643	192, 312
Bread and other bakery products	8	13, 460	37	5	2	11, 360	16, 725	48, 150
Brick and tile	54	106, 125	593	4	112	89, 053	42, 979	194, 870
Brooms and brushes	1	3, 500	4			1, 000	1, 500	3, 000
Carpentering	41	23, 175	128		3	39, 642	91, 400	170, 316
Carriages and wagons (see also Wheelwrighting)	20	129, 500	150		6	57, 812	75, 520	191, 500
Clothing, men's	4	2, 110	11			4, 200	4, 950	13, 300
Coffins, burial cases, and undertakers' goods	2	3, 200	5			3 400	10, 300	15, 950
Confectionery	5	3, 900	22	1	2	8, 249	14, 350	34, 500
Cooperage	2	150	3			1, 250	750	2, 600
Cotton compressing	1	7, 000	15			1, 500	350	3, 250
Cotton goods	9	1, 130, 640	183	324	215	136, 304	345, 649	691, 415
Flouring- and grist-mill products	525	889, 950	848			96, 423	1, 535, 602	1, 762, 523
Foundery and machine-shop products	17	130, 500	140		7	59, 468	70, 426	172, 200
Furniture (see also Mattresses and spring beds; Upholstering)	[illegible]	13, 150	53	1		13, 250	14, 400	35, 800
Furniture, chairs	3	485	4			420	475	1, 900
Glass (*a*)	1	25, 000						
Hairwork	1	600	1			100	74	550
Leather, curried	26	26, 300	29		1	6, 860	74, 103	102, 436
Leather, tanned	34	37, 690	54		1	12, 688	66, 995	106, 260
Lock- and gun-smithing	7	3, 850	3			1, 604	1, 675	7, 450
Lumber, planed (see also Sash, doors, and blinds)	6	15, 200	33		5	9, 310	51, 800	71, 350
Lumber, sawed	295	922, 595	1, 123		47	197, 867	1, 219, 116	1, 920, 335
Marble and stone work	6	5, 000	23			8, 883	10, 765	34, 688
Masonry, brick and stone	5	3, 000	14			3, 475	1, 300	7, 700
Mattresses and spring beds (see also Furniture)	6	2, 300	8			2, 661	3, 825	8, 450
Mineral and soda waters	1	1, 000	1			310	250	1, 160
Oil, cottonseed and cake	8	450, 000	440	3	66	94, 860	371, 080	560, 363
Painting and paperhanging	4	2, 375	10		1	3, 470	8, 300	19, 170
Paints	1	200	3			500	1, 000	3, 000
Photographing	1	1, 000	1	1		400	500	1, 800
Plumbing and gasfitting	2	2, 800	7			5, 025	5, 000	17, 000
Printing and publishing	11	96, 500	123		2	58, 721	38, 661	138, 500
Saddlery and harness	21	63, 150	48			20, 767	47, 269	114, 838
Sash, doors, and blinds (see also Lumber, planed)	2	14, 500	30			10, 715	12, 500	29, 850
Shingles, split	1	125	10			900	400	2, 000
Shipbuilding	3	2, 500	4			2, 860	1, 950	5, 500
Stone- and earthen-ware	2	4, 700	28			8, 800	2, 810	19, 500
Tar and turpentine, not including farm products	11	18, 500	47	6		13, 510	59, 650	97, 000
Tinware, copperware, and sheet-iron ware	24	58, 900	56		3	28, 655	60, 825	125, 800
Tobacco, cigars and cigarettes	1	500	1			250	600	1, 400
Upholstering (see also Furniture)	1	500	1			200	500	1, 000
Watch and clock repairing	6	2, 350					1, 150	4, 200
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	29	19, 500	47		2	14, 180	15, 150	47, 380
Woolen goods	8	331, 500	111	61	46	53, 100	211, 646	299, 605

a Building.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—MISSOURI, BY TOTALS OF COUNTIES.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The State	8, 592	$72, 507, 844	54, 200	5, 474	4, 321	$24, 309, 716	$110, 798, 392	$165, 386, 205
Adair	47	77, 685	131	......	17	31, 974	157, 000	257, 100
Andrew	64	137, 755	158	......	3	25, 360	312, 397	401, 409
Atchison	27	53, 050	56	1	......	11, 145	88, 434	121, 275
Audrain	22	100, 600	86	4	9	26, 070	215, 645	282, 155
Barry	18	39, 510	23	......	......	2, 936	57, 427	69, 593
Barton	21	30, 950	52	1	......	14, 395	89, 038	126, 424
Bates	69	90, 940	148	3	6	38, 587	259, 814	373, 961
Benton	33	49, 975	40	......	......	7, 230	112, 135	146, 248
Bollinger	33	83, 845	116	......	......	23, 471	129, 546	182, 315
Boone	72	237, 281	238	......	......	59, 831	563, 418	721, 112
Buchanan	283	1, 812, 450	2, 687	100	170	1, 111, 692	6, 433, 896	8, 794, 473
Butler	14	44, 100	106	......	1	24, 159	145, 040	208, 024
Caldwell	49	95, 975	102	......	......	22, 783	172, 124	242, 106
Callaway	64	120, 500	119	2	17	27, 900	219, 013	313, 684
Camden	9	18, 350	14	......	......	1, 420	24, 893	20, 475
Cape Girardeau	168	518, 412	416	3	27	113, 356	866, 161	1, 163, 174
Carroll	43	123, 480	103	......	1	26, 353	210, 483	285, 923
Carter	3	23, 000	40	......	......	8, 500	31, 250	63, 500
Cass	36	154, 210	120	8	4	35, 755	353, 326	464, 958
Cedar	20	28, 200	44	......	......	5, 642	32, 010	47, 567
Chariton	51	111, 400	121	1	5	24, 803	130, 965	210, 713
Christian	16	18, 650	23	......	4	3, 205	33, 215	46, 644
Clark	11	23, 900	15	......	5	3, 855	22, 875	39, 900
Clay	49	129, 125	142	11	5	32, 513	282, 171	378, 915
Clinton	72	98, 625	164	2	4	45, 489	157, 767	287, 878
Cole	72	435, 147	1, 034	31	3	223, 935	1, 260, 138	1, 721, 384
Cooper	75	283, 865	275	2	41	75, 382	410, 980	624, 788
Crawford	19	419, 200	698	......	26	56, 550	335, 957	580, 712
Dade	22	34, 500	29	......	......	4, 921	70, 864	91, 311
Dallas	8	16, 300	12	......	......	2, 625	77, 558	90, 624
Daviess	73	114, 832	154	1	4	37, 140	265, 686	403, 653
De Kalb	28	27, 700	49	......	......	9, 371	48, 683	78, 797
Dent	22	133, 622	47	......	......	9, 995	39, 396	67, 140
Douglas	29	46, 000	48	......	......	8, 738	49, 249	81, 304
Dunklin	15	33, 600	46	......	......	5, 658	36, 361	50, 992
Franklin	103	490, 575	227	......	19	63, 471	672, 719	846, 999
Gasconade	59	164, 475	116	......	1	18, 372	215, 918	285, 090
Gentry	91	91, 060	135	......	10	27, 885	181, 435	275, 021
Greene	80	311, 270	243	48	45	102, 984	346, 718	571, 555
Grundy	47	90, 425	96	4	4	24, 742	175, 728	252, 472
Harrison	51	90, 365	104	......	......	24, 492	112, 157	182, 233
Henry	82	190, 680	219	9	17	92, 030	296, 601	484, 192
Hickory	22	17, 375	28	......	......	3, 941	46, 313	63, 811
Holt	38	109, 415	110	2	5	24, 316	192, 311	250, 493
Howard	44	96, 950	100	......	3	25, 980	165, 730	234, 431
Howell	14	19, 575	24	......	2	3, 948	39, 998	54, 190
Iron	40	1, 568, 650	75	......	4	22, 290	135, 930	201, 544
Jackson	292	2, 401, 805	2, 337	238	218	1, 482, 614	4, 166, 643	6, 983, 505
Jasper	118	460, 430	429	19	15	161, 162	756, 162	1, 081, 371
Jefferson	68	1, 444, 500	557	41	15	209, 390	443, 036	782, 078
Johnson	76	225, 360	148	5	1	46, 186	554, 570	684, 944
Knox	51	87, 995	61	7	3	11, 678	79, 606	137, 137
Laclede	18	53, 950	53	6	1	13, 116	81, 573	111, 207
La Fayette	62	251, 850	207	......	10	61, 110	339, 800	496, 195
Lawrence	46	130, 410	77	......	1	18, 843	88, 580	143, 354
Lewis	83	131, 500	190	......	11	37, 825	253, 006	360, 125
Lincoln	35	70, 350	73	......	......	14, 410	97, 809	142, 287
Linn	128	121, 560	180	4	12	35, 391	237, 330	380, 204
Livingston	89	214, 925	263	13	28	85, 185	420, 152	637, 869
McDonald	13	30, 200	28	......	......	3, 613	41, 769	55, 409
Macon	96	144, 140	247	......	1	70, 004	220, 244	373, 392
Madison	34	54, 500	82	......	2	15, 255	92, 332	135, 305
Maries	8	14, 200	12	......	4	1, 835	9, 925	14, 870
Marion	157	940, 625	820	1	58	287, 414	1, 905, 550	2, 697, 403
Mercer	63	76, 170	109	2	1	26, 039	103, 595	174, 880
Miller	14	22, 300	19	......	......	4, 897	43, 163	56, 864
Mississippi	30	49, 690	100	......	5	16, 024	108, 800	168, 540
Moniteau	35	78, 675	87	3	7	18, 613	46, 738	91, 236
Monroe	73	141, 175	177	3	......	37, 730	193, 468	299, 685
Montgomery	65	146, 740	135	10	24	26, 860	231, 320	313, 363
Morgan	32	81, 640	52	6	......	9, 946	118, 364	146, 961
New Madrid	18	39, 870	52	......	1	10, 676	51, 925	89, 362
Newton	55	108, 765	193	......	5	59, 633	218, 795	351, 042
Nodaway	92	197, 185	207	6	13	59, 569	308, 651	483, 982
Oregon	7	15, 400	14	......	......	1, 895	16, 550	23, 071
Osage	43	47, 300	67	......	......	15, 184	67, 285	112, 235
Ozark	5	6, 800	9	......	......	1, 000	16, 361	21, 038
Pemiscot	8	10, 275	26	......	......	3, 631	21, 250	31, 725
Perry	57	197, 220	133	......	1	41, 640	411, 906	521, 823
Pettis	57	169, 275	200	4	7	71, 047	295, 187	448, 591

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—MISSOURI, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Phelps	32	$703, 975	81	4	....	$27, 136	$247, 883	$322, 893
Pike	137	451, 300	421	62	108	164, 685	761, 999	1, 138, 179
Platte	40	153, 050	144	....	1	35, 130	319, 211	398, 893
Polk	33	47, 385	87	....	6	12, 555	162, 127	201, 557
Pulaski	17	33, 800	38	....	....	6, 529	81, 206	104, 276
Putnam	32	63, 110	108	....	....	26, 056	71, 537	144, 399
Ralls	28	36, 650	46	2	4	9, 298	73, 955	108, 026
Randolph	67	131, 700	164	....	6	36, 751	295, 345	425, 159
Ray	60	144, 965	116	....	2	25, 949	168, 563	250, 680
Reynolds	17	52, 750	70	....	....	13, 875	80, 713	123, 725
Ripley	9	8, 100	16	....	....	2, 965	14, 940	26, 003
Saint Charles	88	615, 555	565	32	158	183, 492	1, 352, 819	1, 685, 653
Saint Clair	20	30, 800	26	....	2	4, 959	40, 700	57, 395
Saint François	42	350, 390	114	....	....	36, 472	216, 607	303, 459
Sainte Genevieve	46	151, 380	122	....	5	43, 546	483, 083	608, 386
Saint Louis	47	112, 175	101	....	1	32, 458	452, 907	567, 722
Saint Louis (city)	2, 924	50, 832, 885	33, 980	4, 761	3, 084	17, 743, 532	75, 379, 867	114, 333, 375
Saline	72	174, 305	161	....	....	37, 145	281, 772	398, 411
Schuyler	47	100, 350	119	8	6	27, 908	94, 175	168, 638
Scotland	36	74, 775	92	....	4	27, 505	139, 516	216, 486
Scott	34	122, 950	120	....	5	25, 823	162, 290	248, 476
Shannon	6	8, 350	15	....	....	2, 169	16, 884	24, 161
Shelby	69	64, 455	111	1	1	27, 514	111, 319	185, 307
Stoddard	25	69, 500	116	....	....	21, 276	134, 036	189, 927
Stone	9	20, 100	20	....	....	2, 775	53, 575	65, 435
Sullivan	46	139, 050	102	2	3	20, 141	173, 775	242, 041
Taney	10	13, 000	18	....	....	1, 453	28, 465	33, 668
Texas	16	31, 800	55	....	....	7, 868	60, 845	82, 513
Vernon	35	76, 650	118	....	4	32, 862	213, 158	290, 200
Warren	52	84, 475	97	....	2	17, 526	185, 130	249, 524
Washington	41	205, 590	73	....	....	18, 363	132, 937	182, 423
Wayne	38	124, 525	178	....	....	49, 299	315, 871	460, 747
Webster	25	50, 600	59	1	9	18, 500	100, 759	140, 033
Worth	29	44, 220	58	....	3	8, 075	56, 250	85, 304
Wright	7	8, 850	12	....	....	1, 521	16, 255	20, 816

B—MISSOURI, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	8, 592	$72, 507, 844	54, 200	5, 474	4, 321	$24, 309, 716	$110, 798, 392	$165, 386, 205
Agricultural implements	74	645, 772	713	....	13	276, 536	599, 015	1, 141, 822
Artificial feathers and flowers	3	36, 000	9	50	15	25, 450	66, 000	147, 250
Artificial limbs (see also Surgical appliances)	1	2, 000	3	....	....	2, 000	2, 000	6, 000
Awnings and tents	11	129, 400	50	167	5	57, 200	259, 885	403, 740
Babbitt metal and solder	1	10, 000	5	....	....	3, 000	3, 000	7, 500
Bagging, flax, hemp, and jute	3	370, 000	149	161	76	150, 216	545, 900	867, 395
Bags, other than paper	3	575, 000	90	110	8	82, 000	1, 466, 000	1, 730, 000
Bags, paper	5	88, 750	14	30	43	30, 450	177, 800	238, 100
Baking and yeast powders (see also Drugs and chemicals)	12	176, 900	74	28	18	56, 914	288, 400	468, 500
Baskets, rattan and willow ware	7	9, 015	13	....	....	6, 140	3, 960	18, 020
Belting and hose, leather	1	100, 000	60	....	....	31, 000	91, 000	210, 000
Billiard tables and materials	2	48, 000	7	....	....	2, 840	25, 800	51, 500
Blacksmithing (see also Wheelwrighting)	1, 249	827, 105	1, 436	....	26	510, 890	727, 585	2, 122, 068
Bluing	3	7, 700	8	....	3	2, 950	9, 400	18, 100
Bone-, ivory-, and lamp-black	1	60, 000	25	....	5	12, 000	25, 000	50, 000
Bookbinding and blank-book making	15	145, 500	159	58	9	87, 800	114, 100	282, 087
Boot and shoe uppers	3	12, 000	13	....	....	7, 052	17, 460	29, 200
Boots and shoes, including custom work and repairing	560	1, 063, 615	1, 474	227	206	678, 324	1, 586, 222	2, 938, 857
Boxes, cigar	6	57, 550	51	22	11	34, 100	47, 700	105, 600
Boxes, fancy and paper	6	27, 500	27	44	19	23, 300	45, 800	91, 200
Boxes, wooden, packing	16	66, 100	128	....	5	58, 426	141, 730	251, 400
Brass castings	14	186, 100	149	....	8	70, 087	395, 275	570, 450
Bread and other bakery products	227	864, 520	773	90	73	405, 064	2, 159, 908	3, 250, 192
Brick and tile (see also Drain and sewer pipe; Terra-cotta ware)	230	989, 415	2, 271	8	458	705, 975	388, 364	1, 602, 522
Bridges	2	1, 440	11	....	....	4, 520	2, 940	12, 500
Brooms and brushes	48	113, 200	199	3	112	102, 159	178, 515	350, 165
Carpentering	449	569, 050	2, 166	....	10	1, 172, 409	2, 677, 721	5, 027, 011
Carpets, rag	4	400	4	....	....	1, 150	1, 200	7, 100
Carriage and wagon materials	5	138, 000	217	....	3	97, 768	139, 690	280, 600
Carriages and sleds, children's	1	250	....	....	....	....	250	810
Carriages and wagons (see also Wheelwrighting)	119	1, 054, 050	1, 557	8	66	699, 892	1, 183, 478	2, 483, 738
Cars, railroad, street, and repairs	8	424, 200	926	....	50	411, 591	1, 405, 460	1, 931, 609
Cement	1	1, 000	3	....	....	400	200	1, 100
Charcoal	11	2, 860	66	....	....	14, 030	3, 997	28, 638
Cheese and butter (factory)	30	123, 990	38	12	7	8, 464	65, 950	96, 128
Clothing, men's	170	1, 450, 254	1, 368	1, 681	13	882, 726	2, 104, 997	3, 822, 477
Clothing, women's	15	172, 111	75	514	30	141, 174	316, 143	586, 899
Coffee and spices, roasted and ground	7	240, 000	95	2	4	41, 090	416, 500	598, 000
Coffins, burial cases, and undertakers' goods	19	48, 600	31	4	....	14, 793	127, 140	186, 017
Confectionery	46	319, 260	234	190	25	174, 574	835, 540	1, 247, 235

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MISSOURI, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Cooperage	182	$609, 260	1, 227	....	97	$510, 654	$1, 017, 617	$1, 904, 822
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	4	4, 500	11	....	1	6, 800	14, 000	27, 500
Cordage and twine	15	14, 075	42	....	40	18, 423	42, 250	80, 164
Cordials and sirups	2	3, 200	3	....	....	1, 652	25, 800	30, 960
Cork cutting	1	18, 000	2	5	....	5, 200	10, 000	18, 000
Corsets	3	720	2	[illegible]	....	1, 450	2, 410	6, 460
Cotton goods (see also Hosiery and knit goods)	4	890, 500	123	207	182	99, 080	377, 131	524, 580
Cutlery and edge tools (see also Hardware; Tools)	5	5, 000	21	....	....	10, 196	8, 850	26, 650
Dentistry, mechanical	15	9, 660	7	3	1	5, 034	8, 450	39, 870
Dentists' materials	1	200	....	....	....	....	300	1, 000
Drain and sewer pipe (see also Brick and tile; Terra-cotta ware)	2	50, 300	9	....	....	3, 350	16, 120	25, 500
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	21	722, 450	236	64	32	130, 475	680, 545	1, 220, 211
Dyeing and cleaning	5	16, 450	17	6	1	6, 950	2, 650	23, 900
Dyeing and finishing textiles	3	16, 000	14	5	4	7, 500	5, 500	22, 200
Electroplating	9	17, 900	30	1	2	13, 225	9, 920	45, 200
Engraving and die-sinking	8	9, 975	16	....	1	7, 585	11, 250	31, 800
Engraving, steel	10	72, 100	47	2	3	25, 050	62, 500	120, 900
Engraving, wood	3	12, 200	22	....	2	11, 350	1, 370	21, 070
Explosives and fireworks	1	900	....	....	2	200	2, 000	4, 000
Fertilizers	2	108, 000	64	....	2	36, 720	210, 000	380, 000
Files (see also Saws)	6	38, 900	35	....	....	17, 142	7, 870	34, 300
Flavoring extracts	1	2, 000	2	....	....	1, 500	3, 000	7, 000
Flouring- and grist-mill products	872	7, 883, 675	3, 375	....	1	1, 200, 493	28, 202, 782	32, 438, 831
Food preparations (see page 39)	4	17, 100	13	....	....	4, 800	11, 375	30, 840
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	97	4, 027, 163	3, 902	....	42	2, 093, 224	3, 147, 187	6, 798, 832
Fruits and vegetables, canned and preserved	4	44, 000	61	8	1	15, 614	79, 902	155, 250
Furniture (see also Mattresses and spring beds; Upholstering)	157	1, 178, 682	1, 387	11	76	642, 476	1, 219, 165	2, 380, 563
Furniture, chairs	12	332, 063	324	1	118	146, 247	179, 167	449, 812
Furs, dressed	2	35, 000	7	26	3	5, 800	29, 530	47, 000
Glass	6	1, 430, 000	709	36	220	381, 098	351, 871	919, 827
Glass, cut, stained, and ornamented	3	11, 000	16	....	....	9, 450	7, 100	27, 600
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	4	14, 200	30	35	4	18, 030	19, 350	46, 700
Glue	6	36, 850	27	....	4	14, 120	43, 575	77, 300
Gold and silver, reduced and refined (not from the ore)	1	350, 000	125	....	....	67, 747	4, 038, 925	4, 158, 606
Grease and tallow	7	44, 250	22	....	....	10, 150	72, 220	117, 300
Hairwork	9	17, 700	6	24	....	7, 625	20, 250	42, 200
Hammocks	1	1, 000	....	6	2	500	700	2, 500
Handles, wooden	8	3, 800	14	....	....	3, 850	3, 020	13, 700
Hand-stamps	1	2, 000	2	....	....	850	1, 000	5, 000
Hardware (see also Cutlery and edge tools; Tools)	11	210, 300	113	....	1	51, 971	103, 156	192, 462
Hats and caps, not including wool hats	10	60, 900	51	83	4	44, 365	80, 740	182, 531
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	4	29, 400	3	114	1	19, 300	41, 575	85, 000
Ice, artificial	1	60, 000	17	....	....	4, 800	7, 000	21, 000
Ink	3	9, 600	8	....	....	3, 568	7, 290	16, 234
Instruments, professional and scientific	4	54, 660	22	....	....	12, 700	35, 725	81, 450
Iron and steel	22	9, 152, 472	2, 989	....	150	734, 575	3, 249, 558	4, 660, 530
Iron bolts, nuts, washers, and rivets	4	235, 000	123	....	14	60, 498	301, 937	493, 560
Iron forgings	2	85, 000	123	....	....	40, 000	110, 000	199, 000
Iron railing, wrought	6	23, 400	34	....	5	20, 760	25, 360	63, 400
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	5	34, 800	54	....	....	21, 850	34, 860	77, 610
Jewelry	8	52, 000	55	....	7	37, 600	98, 000	189, 500
Jewelry and instrument cases	1	900	....	....	....	....	1, 500	3, 000
Kaolin and ground earths	1	100	4	....	....	1, 400	200	2, 000
Labels and tags	3	10, 300	12	....	....	7, 868	10, 910	25, 500
Lamps and reflectors	7	291, 600	139	....	20	74, 139	376, 540	519, 300
Lard, refined	2	53, 000	48	....	20	30, 000	24, 000	174, 000
Lead, bar, pipe, sheet, and shot	2	205, 000	26	....	....	13, 000	460, 000	548, 000
Leather, curried	15	72, 500	66	....	....	22, 804	276, 034	336, 623
Leather, dressed skins	1	1, 000	1	....	....	140	1, 000	1, 600
Leather, tanned	26	137, 850	107	3	8	43, 817	321, 805	435, 072
Lightning rods	3	54, 000	16	....	....	7, 250	14, 491	39, 292
Lime	17	172, 050	135	....	7	52, 100	86, 575	186, 075
Liquors, distilled	20	230, 100	54	....	5	35, 338	354, 973	527, 530
Liquors, malt	64	4, 942, 700	1, 394	....	108	699, 616	2, 852, 236	5, 048, 077
Liquors, vinous (see also Liquors, distilled)	9	459, 950	49	2	....	23, 135	94, 230	185, 900
Lithographing (see also Printing and publishing)	5	71, 500	94	6	17	51, 265	83, 344	214, 989
Lock- and gun-smithing	25	21, 425	28	....	2	12, 924	12, 590	41, 924
Looking-glass and picture frames	22	327, 400	135	1	22	83, 351	107, 825	282, 682
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	26	409, 350	546	2	41	245, 963	774, 442	1, 267, 636
Lumber, sawed	881	2, 867, 970	3, 408	....	95	669, 644	3, 215, 292	5, 265, 617
Malt	1	30, 000	8	....	....	4, 800	90, 000	100, 000
Mantels, slate, marble, and marbleized	2	13, 600	11	....	2	6, 550	17, 550	27, 700
Marble and stone work	115	376, 800	697	....	21	330, 011	354, 958	1, 003, 544
Masonry, brick and stone	79	95, 440	473	....	1	243, 484	264, 221	683, 900
Mattresses and spring beds (see also Furniture)	11	24, 950	59	23	13	32, 659	94, 036	172, 300
Mineral and soda waters	27	152, 000	128	5	28	57, 076	102, 390	274, 100
Models and patterns	4	13, 700	11	....	1	7, 600	1, 920	21, 400
Musical instruments and materials (not specified)	10	61, 500	12	1	1	6, 050	9, 425	31, 250
Musical instruments, organs and materials	3	10, 600	9	....	....	6, 000	5, 200	16, 600
Musical instruments, pianos and materials	7	21, 350	19	....	....	10, 398	8, 060	27, 200

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—MISSOURI, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Oil, castor	2	$185, 000	56			$25, 404	$158, 000	$312, 000
Oil, cottonseed and cake	2	80, 000	55			18, 750	80, 000	140, 000
Oil, lard	3	96, 000	25			13, 050	505, 750	539, 000
Oil, lubricating	1	2, 000	3			1, 000	7, 000	9, 000
Oil, neat's-foot	2	400, 300	11			3, 946	92, 666	102, 300
Painting and paperhanging	156	392, 180	975	15	19	443, 944	610, 594	1, 404, 122
Paints (see also Varnish)	16	1, 808, 350	568	10	4	270, 532	2, 186, 480	2, 825, 860
Patent medicines and compounds (see also Drugs and chemicals)	27	1, 402, 700	207	90	15	139, 996	502, 735	1, 197, 090
Paving materials	2	155, 000	21		2	4, 780	12, 500	30, 800
Perfumery and cosmetics	1	2, 000	2			1, 252	600	2, 500
Photographic apparatus	1	15, 000	6			2, 000	6, 000	15, 000
Photographing	40	100, 750	78	22	6	55, 538	62, 100	219, 694
Pickles, preserves, and sauces	3	48, 200	58	25	25	41, 999	134, 200	211, 200
Pipes, tobacco	1	2, 000	12		9	4, 000	2, 000	12, 000
Plated and britannia ware	1	40, 000	25			15, 000	7, 000	35, 000
Plumbing and gasfitting	63	126, 475	251		7	130, 599	227, 958	516, 683
Printing and publishing (see also Lithographing)	131	2, 949, 660	2, 380	250	161	1, 538, 564	1, 515, 048	4, 452, 962
Pumps, not including steam pumps	11	530, 600	112		2	66, 680	703, 670	932, 550
Refrigerators	4	43, 700	106		15	54, 950	203, 300	344, 500
Regalia and society banners and emblems	2	2, 100	1	3		900	5, 100	7, 000
Roofing and roofing materials	7	66, 200	84			52, 750	87, 450	189, 550
Saddlery and harness	355	1, 898, 723	1, 954	12	87	793, 536	2, 345, 485	3, 976, 175
Safes, doors, and vaults, fire-proof	2	5, 800	12			6, 060	6, 000	19, 000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	15	600, 795	677		43	279, 911	696, 671	1, 232, 670
Saws	2	245, 000	80			56, 000	130, 000	281, 000
Shingles, split	1	600	2			144	200	900
Shipbuilding	14	247, 900	293			196, 005	313, 392	565, 187
Shirts	20	130, 700	56	357	1	110, 136	146, 700	332, 852
Show-cases	6	29, 100	90	4	1	37, 235	19, 750	109, 450
Silk and silk goods	1	4, 000	3	2		750	630	2, 500
Silversmithing	4	22, 350	16			7, 300	24, 450	43, 050
Slaughtering and meat-packing, not including retail butchering establishments.	65	2, 327, 500	1, 743		103	657, 918	12, 352, 907	14, 628, 630
Soap and candles	19	766, 927	273	2	3	104, 061	1, 336, 376	1, 704, 941
Sporting goods	1	3, 000		13		1, 404	7, 000	15, 000
Stamped ware (see also Tinware, copperware, and sheet-iron ware)	1	800, 000	403	87		170, 000	550, 000	850, 000
Stationery goods	1	150, 000	45	5		30, 000	40, 000	100, 000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	60, 000	55			25. 750	45, 500	100, 780
Stencils and brands	6	4, 750	11		2	5, 925	5, 565	21, 425
Stereotyping and electrotyping (see also Type founding)	1	10, 000	15		7	6, 616	4, 890	18, 060
Stone- and earthen-ware	32	82, 000	169	1	13	65, 350	46, 490	159, 518
Sugar and molasses, refined	1	840, 000	250		2	112, 270	4, 173, 100	4, 475, 740
Surgical appliances (see also Artificial limbs)	2	10, 250	4	3	1	3, 939	2, 780	17, 100
Tar and turpentine, not including farm products	1	85, 000	3	2	4	1, 500	2, 500	5, 000
Telegraph and telephone apparatus	2	25, 000	14			9, 000	14, 400	36, 000
Terra-cotta ware (see also Brick and tile; Drain and sewer pipe)	2	150, 000	77			33, 000	89, 400	187, 785
Tinware, copperware, and sheet-iron ware (see also Coppersmithing; Stamped ware).	297	656, 860	772	18	62	338, 597	864, 643	1, 687, 320
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	43	1, 440, 200	1, 008	231	515	493, 559	4, 243, 614	5, 286, 338
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	284	443, 562	886	15	136	424, 363	612, 393	1, 524, 381
Tools (see also Cutlery and edge tools; Hardware)	2	20, 150	11			8, 500	8, 400	31, 500
Toys and games	2	800	1			60	400	1, 350
Trunks and valises	17	123, 600	178		13	87, 205	225, 575	383, 660
Type founding (see also Stereotyping and electrotyping)	2	190, 000	105	40		75, 000	48, 000	151, 899
Umbrellas and canes	4	1, 400	3			1, 020	1, 150	4, 370
Upholstering (see also Furniture)	23	210, 925	55	5	6	24, 230	67, 500	162, 427
Upholstering materials	1	14, 100	3			900	5, 400	10, 000
Varnish (see also Paints)	3	26, 500	10			8, 962	35, 000	54, 600
Vinegar	20	307, 150	145	21	17	86, 420	344, 500	675, 400
Washing-machines and clothes-wringers	2	300	2			450	450	1, 900
Watch and clock repairing	37	51, 445	34		1	16, 867	19, 850	68, 351
Watch cases	1	4, 000	15			12, 000	200, 000	300, 000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	331	243, 760	435	1	4	153, 437	233, 729	620, 287
Whips	[illegible]	11, 660	43			11, 139	19, 960	39, 414
Window blinds and shades	1	1, 500	[illegible]		2	1, 400	6, 500	10, 000
Wire	3	378, 600	494		51	229, 480	651, 000	973, 000
Wirework	8	153, 700	134	4	38	60, 890	112, 620	371, 600
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	19	29, 225	42		2	19, 183	19, 995	84, 707
Wooden ware	3	187, 100	211		53	85, 300	227, 100	336, 600
Woolen goods (see also Hosiery and knit goods; Gloves and mittens)	98	726, 150	412	144	133	109, 877	681, 711	930, 961

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—MONTANA TERRITORY, BY TOTALS OF COUNTIES.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The Territory	196	$899, 390	574	3	1	$318, 759	$1, 006, 442	$1, 835, 867
Beaver Head	11	15, 400	9	....	....	4, 801	11, 296	25, 604
Choteau	9	18, 700	41	....	....	27, 233	24, 106	61, 902
Custer	3	3, 500	6	....	....	2, 160	2, 600	7, 289
Dawson (a)	....	....	....	....	....	....	....	....
Deer Lodge	49	254, 025	158	1	....	97, 431	235, 816	489, 731
Gallatin	22	129, 900	68	....	....	28, 454	195, 320	296, 530
Jefferson	7	58, 000	31	....	....	13, 529	152, 770	247, 765
Lewis and Clarke	28	236, 600	135	1	....	86, 031	134, 158	289, 585
Madison	34	78, 675	71	1	1	39, 580	150, 655	259, 476
Meagher	9	18, 540	23	....	....	6, 645	24, 475	42, 960
Missoula	24	86, 050	32	....	....	12, 895	75, 156	115, 025

a Returned as having no manufactures.

B—MONTANA TERRITORY, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	196	$899, 390	574	3	1	$318, 759	$1, 006, 442	$1, 835, 867
Blacksmithing (see also Wheelwrighting)	34	43, 015	68	....	....	47, 402	56, 950	145, 500
Boots and shoes, including custom work and repairing	17	12, 925	24	....	....	17, 336	19, 141	54, 048
Bread and other bakery products	1	1, 400	2	....	....	1, 000	8, 000	12, 000
Brick and tile	5	17, 500	68	....	....	21, 400	11, 400	43, 150
Carpentering	11	15, 800	24	....	....	19, 340	27, 050	61, 800
Carriages and wagons (see also Wheelwrighting)	2	20, 000	20	....	....	15, 000	13, 000	42, 000
Cheese and butter (factory)	3	10, 250	6	....	....	470	4, 700	7, 900
Clothing, men's	2	2, 300	4	....	....	4, 500	6, 000	13, 000
Confectionery	2	1, 200	2	....	....	650	1, 700	3, 600
Flouring- and grist-mill products	15	159, 500	52	....	....	25, 765	357, 365	475, 467
Foundery and machine-shop products	5	87, 000	19	....	....	16, 303	38, 900	65, 650
Furniture	11	23, 150	18	....	....	9, 750	8, 600	28, 000
Furs, dressed	1	1, 500	2	1	....	800	2, 500	5, 000
Hairwork	1	1, 500	....	1	....	75	1, 200	2, 600
Jewelry	2	1, 200	2	....	....	4, 800	16, 000	26, 000
Liquors, malt	17	170, 500	32	....	....	10, 825	40, 928	72, 442
Lumber, planed (see also Sash, doors, and blinds)	4	43, 000	33	....	....	24, 999	26, 900	59, 515
Lumber, sawed	36	208, 200	142	....	....	47, 945	278, 098	527, 695
Mineral and soda waters	2	5, 500	6	....	....	3, 400	5, 100	16, 500
Painting and paperhanging	1	300	1	....	....	500	2, 000	4, 000
Printing and publishing	1	2, 000	3	1	1	1, 800	1, 500	4, 500
Saddlery and harness	9	44, 300	22	....	....	21, 546	25, 410	68, 850
Sash, doors, and blinds (see also Lumber, planed)	2	3, 200	2	....	....	1, 650	3, 000	6, 700
Tinware, copperware, and sheet-iron ware	6	14, 500	13	....	....	14, 503	44, 500	69, 500
Watch and clock repairing	4	6, 250	5	....	....	4, 500	4, 200	13, 750
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	2	3, 400	4	....	....	2, 500	2, 300	6, 700

A—NEBRASKA, BY TOTALS OF COUNTIES.

COUNTIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	1, 403	$4, 881, 150	4, 464	120	209	$1, 742, 311	$8, 208, 478	$12, 627, 336
Adams	30	63, 500	111	....	....	33, 797	85, 967	170, 564
Antelope	15	39, 100	23	....	....	8, 516	65, 125	88, 865
Blackbird	1	1, 000	3	....	....	700	2, 600	4, 200
Boone	11	20, 300	14	....	....	4, 220	41, 350	55, 250
Buffalo	18	60, 900	49	....	....	16, 340	124, 550	168, 625
Burt	37	45, 550	71	....	....	18, 590	73, 843	127, 334
Butler	26	50, 000	49	1	....	13, 015	60, 365	102, 114
Cass	46	110, 600	154	2	3	61, 579	246, 577	393, 386
Cedar	7	4, 400	7	....	....	1, 320	3, 130	6, 615
Chase (a)	....	....	....	....	....	....	....	....
Cheyenne	1	200	1	....	....	500	200	975
Clay	39	55, 445	113	1	....	27, 796	78, 142	137, 605
Colfax	17	80, 125	47	....	2	19, 767	161, 229	221, 721
Cuming	33	179, 800	106	5	8	27, 059	66, 893	124, 841
Custer (a)	....	....	....	....	....	....	....	....
Dakota	15	33, 100	40	....	....	8, 850	59, 725	85, 834
Dawson (a)	....	....	....	....	....	....	....	....
Dixon	10	12, 800	13	....	....	2, 215	4, 975	13, 700
Dodge	26	97, 650	76	3	....	29, 030	121, 955	193, 839
Douglas	187	1, 978, 575	1, 565	66	162	757, 156	2, 910, 529	4, 754, 672
Dundy (a)	....	....	....	....	....	....	....	....
Fillmore	20	30, 130	37	....	....	13, 055	130, 772	173, 828
Franklin	11	33, 030	21	....	1	5, 287	109, 464	134, 813
Frontier (a)	....	....	....	....	....	....	....	....
Furnas	25	31, 450	50	....	....	12, 934	55, 405	82, 200

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—NEBRASKA, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Gage	31	$89, 200	61	3		$19, 612	$143, 048	$205, 238
Gosper (*a*)								
Greeley	2	3, 125	2			800	5, 700	7, 540
Hall	69	90, 050	129	4		65, 851	218, [illegible]64	369, 127
Hamilton	7	9, 900	18		1	5, 420	8, 767	19, 624
Harlan	22	27, 900	67	2		13, 080	78, 671	109, 840
Hayes (*a*)								
Hitchcock	5	2, 100	2			250	1, 675	5, 700
Holt	1	6, 000	1			250	2, 350	3, 200
Howard	14	21, 750	36		4	9, 066	62, 953	85, 057
Jefferson	14	55, 100	23			7, 219	75, 902	102, 746
Johnson	14	40, 300	42			10, 165	139, 314	170, 455
Kearney (*a*)								
Keith (*a*)								
Knox	9	29, 400	18		3	5, 344	41, 688	58, 453
Lancaster	107	253, 125	365	17	2	202, 040	673, 716	1, 112, 079
Lincoln	26	74, 200	60	2	1	20, 217	65, 114	120, 020
Madison	31	78, 025	46	1		16, 465	234, 678	285, 925
Merrick	15	51, 700	20	1	2	5, 781	46, 352	64, 362
Nance (*a*)								
Nemaha	43	53, 360	94			24, 555	133, 850	204, 546
Nuckolls	4	34, 500	16			5, 679	70, 219	92, 500
Otoe	74	169, 610	188	2	7	67, 603	424, 675	611, 319
Pawnee	23	32, 950	43			11, 330	48, 705	79, 987
Phelps (*a*)								
Pierce (*a*)								
Platte	23	36, 350	63		1	22, 553	57, 248	113, 750
Polk	19	25, 350	48		1	10, 050	67, 042	95, 943
Red Willow (*a*)								
Richardson	85	133, 025	147			37, 234	218, 128	329, 551
Saline	26	88, 200	91	6	4	23, 270	143, 191	207, 396
Sarpy	14	62, 425	25			7, 075	101, 941	124, 261
Saunders	32	86, 575	60		3	16, 768	170, 300	221, 403
Seward	30	115, 600	65	1	1	18, 615	175, 014	242, 232
Sherman	2	450	6		1	250	250	1, 100
Sioux (*a*)								
Stanton	1	350	5			225	190	500
Thayer	12	37, 100	17			6, 899	137, 417	161, 078
Valley (*a*)								
Washington	30	111, 275	59		1	18, 759	96, 740	147, 100
Wayne	2	1, 200	2			550	400	2, 100
Webster	24	88, 750	56	3	1	13, 895	93, 530	139, 100
Wheeler (*a*)								
York	17	44, 550	39			13, 715	68, 550	93, 114
Unorganized territory (*a*)								

a Returned as having no manufactures.

B—NEBRASKA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	1, 403	$4, 881, 150	4, 464	120	209	$1, 742, 311	$8, 208, 478	$12, 627, 336
Agricultural implements	13	37, 550	54			15, 050	30, 030	77, 032
Billiard tables and materials	1	400	1			200	1, 800	2, 400
Blacksmithing (see also Wheelwrighting)	245	159, 595	309		1	98, 867	121, 740	303, 509
Boots and shoes, including custom work and repairing	102	92, 195	134			48, 895	77, 077	188, 332
Boxes, wooden, packing	1	9, 000	1	3		1, 500	4, 000	12, 000
Brass castings	1	2, 000	6			2, 600	3, 500	7, 300
Bread and other bakery products	17	33, 400	48	6	4	21, 355	77, 630	136, 834
Brick and tile	87	130, 740	585	3	74	150, 189	102, 078	349, 478
Bridges	2	7, 500	34			25, 400	85, 000	123, 500
Brooms and brushes	5	5, 675	16			4, 480	4, 638	12, 850
Carpentering	164	76, 105	463	2	2	178, 605	556, 467	968, 402
Carpets, rag	4	375	3	1		900	3, 065	5, 500
Carriages and wagons (see also Wheelwrighting)	5	68, 000	71			33, 200	80, 200	134, 000
Cheese and butter (factory)	21	81, 165	28	7	2	5, 921	27, 791	46, 322
Clothing, men's	28	55, 950	78	20	1	51, 731	85, 780	181, 858
Clothing, women's	1	12, 000		12	2	3, 800	30, 000	40, 000
Coffee and spices, roasted and ground	1	6, 000	2	1	1	1, 600	20, 000	30, 000
Coffins, burial cases, and undertakers' goods	1	2, 500	1			300	2, 000	3, 000
Confectionery	4	2, 400	4			1, 200	4, 300	8, 800
Cooperage	5	23, 000	41			25, 500	48, 387	78, 600
Corsets	1	300		3		700	2, 000	4, 000
Dentistry, mechanical	2	650					600	1, 600
Drugs and chemicals (see also Patent medicines and compounds)	2	20, 500	12			6, 300	16, 000	162, 200
Dyeing and cleaning	1	200	1			350	200	1, 000
Fertilizers	2	7, 000	13		1	2, 820	2, 500	7, 000
Flouring- and grist-mill products	170	1, 615, 070	506			165, 085	3, 532, 942	4, 193, 086
Foundery and machine-shop products	12	73, 600	106			52, 843	54, 548	142, 000
Furniture (see also Upholstering)	30	49, 700	43	2	1	15, 992	52, 508	96, 388
Furs, dressed	1	1, 500	1	2		1, 500	1, 000	3, 000
Iron and steel	1	100, 000	90		10	50, 000	114, 500	82, 000

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—NEBRASKA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Jewelry	3	$49,000	25		2	$14,500	$105,000	$210,000
Lime	1	500	2			500	300	1,200
Liquors, distilled	1	200,000	50			17,775	150,000	225,000
Liquors, malt	23	427,200	143			56,663	210,109	393,870
Lock- and gun-smithing	2	1,400	4			1,125	1,150	4,850
Looking-glass and picture frames	1	3,000	3		1	1,500	3,500	6,000
Lumber, planed (see also Sash, doors, and blinds)	1	15,000	5			1,500	3,000	5,000
Lumber, sawed	38	93,375	136		4	29,313	164,878	265,062
Marble and stone work	17	20,700	52			23,720	47,230	96,250
Masonry, brick, and stone	9	25,575	144		12	41,900	70,536	138,100
Mineral and soda waters	3	16,000	15		6	3,100	7,000	19,000
Oil, linseed	1	100,000	19			10,500	85,000	125,000
Painting and paperhanging	14	32,875	74		5	34,481	41,489	106,100
Paints	1	100,000	40			17,000	200,000	350,000
Paper	1	40,000	13		3	1,561	2,350	5,000
Patent medicines and compounds (see also Drugs and chemicals)	1	5,000	3			1,200	12,000	26,000
Photographing	4	20,000	17	3		7,900	25,200	60,200
Plumbing and gasfitting	2	4,000	7			3,300	10,000	18,000
Printing and publishing	22	191,250	217	31	53	167,438	167,860	419,461
Rubber and elastic goods	1	2,000	1			300	1,000	1,500
Saddlery and harness	114	214,230	215	2	1	83,039	276,474	477,364
Safes, doors, and vaults, fire-proof	1	1,000	7			3,000	2,000	6,000
Sash, doors, and blinds (see also Lumber, planed)	1	3,000	4			1,800	1,200	4,000
Shipbuilding	1	300	6		3	1,400	7,000	9,000
Shirts	2	8,600	12	14		8,600	18,000	33,000
Show-cases	2	3,300	3			1,700	3,700	7,000
Slaughtering and meat-packing, not including retail butchering establishments.	12	330,700	189		2	64,717	1,097,839	1,359,397
Soap and candles	4	10,000	11		2	2,900	10,520	20,700
Stone- and earthen-ware	1	4,500	13			2,724	1,000	4,815
Tinware, copperware, and sheet-iron ware	71	132,675	151		2	64,228	165,050	320,680
Tobacco, cigars and cigarettes	21	56,350	77	5	14	46,002	81,104	183,317
Upholstering (see also Furniture)	2	1,700	3	2		2,050	3,800	6,400
Vinegar	2	2,000	3			1,400	2,990	7,250
Washing-machines and clothes-wringers	1	900	1			100	400	900
Watch and clock repairing	7	3,350	7			3,725	2,150	10,850
Windmills	3	7,000	7			1,700	4,400	9,900
Window blinds and shades	1	250		1		54	1,200	1,600
Wheelwrighting (see also Blacksmithing)	76	70,750	121			46,053	67,020	176,049
Wirework	5	9,600	13			4,960	12,748	21,530

A—NEVADA, BY TOTALS OF COUNTIES.

The State	184	$1,323,300	556	5	16	$461,807	$1,049,794	$2,179,626
COUNTIES.								
Churchill	1	28,000	10			3,000	2,800	15,000
Douglas	10	121,775	31			10,365	144,377	220,607
Elko	12	41,400	17			5,517	47,115	66,735
Esmeralda	16	132,500	45			32,676	80,096	328,231
Eureka	14	75,100	50			41,207	73,315	135,970
Humboldt	5	91,000	19			8,584	114,728	131,110
Lander	4	23,200	4			904	3,909	6,650
Lincoln	13	27,250	17			5,482	21,709	40,996
Lyon	2	26,000	7			10,025	22,569	43,885
Nye	7	11,100	15	3		3,695	3,077	14,319
Ormsby	1	5,000	7			2,675	9,950	18,009
Roop	2	12,300	5		2	1,600	3,000	8,580
Storey	52	576,675	234	1	14	276,956	251,390	736,056
Washoe	29	132,800	87			57,116	248,009	375,028
White Pine	16	19,200	8	1		2,605	23,750	38,450

B—NEVADA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	184	$1,323,300	556	5	16	$461,807	$1,049,794	$2,179,626
Blacksmithing (see also Wheelwrighting)	36	57,300	77			71,227	82,418	200,595
Bookbinding and blank-book making	1	500					100	900
Boots and shoes, including custom work and repairing	24	16,840	22	1		17,670	22,410	61,677
Brass castings	1	150					300	500
Bread and other bakery products	4	3,100	7	1		6,052	22,821	37,800
Brick and tile	2	1,200	13			3,974	1,245	8,355
Carpentering	6	2,000	4			1,250	6,000	13,600
Carriages and wagons (see also Wheelwrighting)	1	25,000	13			14,850	15,000	35,000
Cheese and butter (factory)	2	3,200	3			130	875	1,587
Clothing, men's	3	1,900	1			500	2,100	4,100

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—NEVADA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Coffee and spices, roasted and ground	1	$1,000	2			$100	$700	$1,000
Coffins, burial cases, and undertakers' goods	3	8,500	3			3,885	2,245	17,712
Drugs and chemicals	2	124,000	22			22,230	35,175	207,160
Flouring- and grist-mill products	7	163,000	31			9,975	369,117	405,089
Foundery and machine-shop products	5	237,225	109			129,309	109,922	320,955
Furniture (see also Mattresses and spring beds; Upholstering)	2	9,500	5			2,400	11,350	16,350
Liquors, malt	33	186,170	59			23,363	88,488	157,531
Lock- and gun-smithing	1	10,000	1			1,250	500	2,500
Lumber, sawed	9	132,000	35			9,892	162,810	243,200
Marble and stone work	1	1,500	1			800	1,000	2,326
Mattresses and spring beds (see also Furniture)	1	250	1			180	600	2,000
Mineral and soda waters	1	3,000	3			990	1,000	3,600
Painting and paperhanging	1	100	1			190	100	1,500
Plumbing and gasfitting	4	6,415	5		1	4,115	1,012	10,496
Printing and publishing	4	73,500	48		9	84,240	5,250	108,012
Saddlery and harness	2	12,000	5			6,244	6,500	25,200
Salt	7	45,300	31	3	2	9,688	5,800	92,640
Sash, doors, and blinds	1	20,000	21			10,000	10,000	40,000
Soap and candles	1	9,500	3			3,286	8,806	14,540
Tinware, copperware, and sheet-iron ware	4	154,300	22		4	16,900	69,000	107,800
Tobacco, cigars and cigarettes	1	1,000					500	1,000
Upholstering (see also Furniture)	2	1,100	1			300	450	2,700
Watch and clock repairing	4	1,700	1			1,132	2,000	7,500
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	6	5,050	6			5,685	3,700	21,700
Wirework	1	6,000					500	3,000

A—NEW HAMPSHIRE, BY TOTALS OF COUNTIES.

	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	3,181	$51,112,263	29,356	16,184	3,291	$14,814,793	$43,552,462	$73,978,028
COUNTIES.								
Belknap	112	1,400,750	1,309	995	194	653,559	1,600,245	2,963,892
Carroll	148	860,475	833	129	29	265,826	1,240,367	1,811,313
Cheshire	317	3,758,815	3,438	833	252	1,299,427	4,502,889	7,768,943
Coos	194	2,107,250	1,218	17	27	336,010	1,397,362	2,490,356
Grafton	465	2,155,956	1,912	542	64	633,869	2,595,146	4,117,710
Hillsborough	517	20,814,729	8,247	7,577	960	5,130,178	13,789,849	23,671,908
Merrimack	449	6,089,215	3,580	1,477	628	1,875,042	4,974,274	8,742,560
Rockingham	612	4,369,858	3,328	1,127	217	1,503,371	4,013,922	7,034,989
Strafford	186	8,134,515	4,648	2,965	804	2,730,542	8,029,025	13,039,753
Sullivan	181	1,420,700	843	522	116	386,969	1,409,383	2,336,604

B—NEW HAMPSHIRE, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	3,181	$51,112,263	29,356	16,184	3,291	$14,814,793	$43,552,462	$73,978,028
Agricultural implements	17	196,700	178			75,068	91,476	212,850
Artificial feathers and flowers	1	50	1	2		1,000	100	1,300
Baskets, rattan and willow ware	2	2,750	7			3,250	1,575	6,575
Belting and hose, leather	5	286,094	127		6	60,974	433,185	606,944
Blacksmithing (see also Wheelwrighting)	324	262,458	336		2	107,655	157,340	474,123
Bookbinding and blank-book making	6	14,000	11	8	2	8,250	11,525	25,100
Boot and shoe cut stock	2	2,600	3	13	3	3,100	7,200	13,000
Boot and shoe findings	5	67,000	74	50	4	37,600	32,450	88,500
Boots and shoes, including custom work and repairing	261	1,758,290	3,648	1,036	70	1,882,951	4,992,400	7,619,921
Boxes, fancy and paper	10	50,580	84	30	1	27,800	57,000	117,000
Boxes, wooden, packing	29	98,700	212	11	20	64,760	100,500	219,700
Brass castings	4	23,500	25			12,285	24,325	44,597
Bread and other bakery products	26	49,935	76	9		36,692	180,086	294,108
Brick and tile (see also Drain and sewer pipe)	67	120,845	642			118,408	90,251	282,725
Brooms and brushes	13	19,015	21	4		5,005	15,165	29,311
Cardboard	1	15,000	8		1	2,500	5,000	10,000
Carpentering	100	223,228	445		2	182,238	439,657	855,372
Carriage and wagon materials	10	69,800	55			20,185	74,480	138,660
Carriages and wagons (see also Wheelwrighting)	30	618,857	436	2		196,337	253,275	559,932
Cars, railroad, street, and repairs	1	10,000	200			55,000	125,000	201,659
Charcoal	7	37,300	89			23,525	33,100	87,700
Cheese and butter (factory)	2	10,400	1	3		780	20,683	27,887
Clocks	1	500	2			700	400	1,200
Clothing, men's	61	183,750	125	456		132,081	494,681	731,389
Clothing, women's	1	1,000		4		250	1,200	1,800
Coffins, burial cases, and undertakers' goods	10	21,450	14	1	1	[illegible],016	11,500	25,080
Confectionery	8	22,300	27	10	5	15,070	57,854	98,500
Cooperage	32	142,050	248			83,694	92,698	226,281
Cordage and twine	1	15,000	4	3		1,908	7,320	13,196
Corsets	1	1,000	4	8		2,000	2,000	5,000

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—NEW HAMPSHIRE, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	41	$19, 993, 584	5, 138	9, 631	1, 749	$4, 322, 622	$10, 329, 184	$18, 226, 573
Cutlery and edge tools (see also Hardware; Tools)	12	255, 600	257	6	6	100, 492	108, 364	270, 444
Dentistry, mechanical	10	8, 900	8	....	....	3, 212	4, 530	19, 600
Drain and sewer pipe (see also Brick and tile)	2	4, 500	4	....	....	1, 158	3, 794	7, 500
Drugs and chemicals (see also Patent medicines and compounds)	6	17, 200	13	....	....	2, 178	26, 293	37, 991
Dyeing and cleaning	1	1, 000	1	....	....	150	200	1, 200
Dyeing and finishing textiles	4	2, 987, 085	637	111	106	372, 873	795, 553	1, 568, 100
Electrical apparatus and supplies	1	2, 000	5	....	....	1, 875	1, 000	4, 500
Electroplating	2	3, 000	3	....	....	1, 550	2, 400	5, 700
Emery wheels	1	6, 400	3	....	....	1, 600	1, 324	6, 639
Fancy articles	1	5, 000	7	3	....	4, 000	3, 400	11, 000
Felt goods (see also Woolen goods)	1	12, 000	18	4	19	7, 000	29, 420	50, 000
Files (see also Saws)	4	9, 000	20	....	1	9, 660	5, 695	22, 356
Flouring- and grist-mill products	181	712, 555	253	....	....	78, 284	2, 259, 718	2, 542, 784
Foundery and machine-shop products	71	1, 260, 635	1, 416	21	52	567, 825	1, 010, 495	2, 024, 656
Furnishing goods, men's	1	50	1	....	....	100	300	900
Furniture (see also Mattresses and spring beds; Upholstering)	36	333, 235	573	3	33	202, 064	314, 650	741, 238
Furniture, chairs	6	200, 500	157	15	7	53, 500	67, 940	159, 300
Glass	1	50, 000	80	8	14	25, 600	34, 000	70, 000
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	25	187, 300	171	300	1	92, 574	302, 142	478, 825
Glue	1	3, 000	4	....	....	1, 250	2, 500	6, 000
Grease and tallow	3	15, 500	12	....	....	4, 429	22, 925	41, 200
Hairwork	1	700	1	....	....	300	1, 000	1, 600
Handles, wooden	9	21, 950	33	....	1	9, 770	7, 970	33, 700
Hardware (see also Cutlery and edge tools; Tools)	2	14, 500	9	5	6	5, 600	4, 400	13, 500
Hats and caps, not including wool hats	4	5, 350	401	....	....	8, 300	10, 700	27, 450
Hones and whetstones	4	26, 100	45	....	....	10, 648	6, 700	32, 500
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	24	1, 224, 000	540	1, 098	115	536, 117	1, 249, 600	2, 362, 779
Instruments, professional and scientific	3	34, 800	10	....	....	4, 670	5, 000	18, 100
Iron and steel	2	650, 000	289	....	1	127, 690	523, 355	807, 340
Iron bolts, nuts, washers, and rivets	2	32, 500	19	....	1	6, 000	29, 700	39, 500
Iron forgings	1	12, 000	8	....	....	5, 500	19, 500	32, 000
Kindling wood	1	200	....	....	....	....	50	600
Lasts	2	4, 000	11	....	....	4, 400	2, 900	9, 000
Leather board (see also Paper)	4	78, 000	39	....	....	13, 800	65, 375	96, 675
Leather, curried	37	351, 850	260	17	....	114, 769	1, 824, 797	2, 161, 734
Leather, patent and enameled	1	15, 000	15	....	....	9, 000	55, 000	150, 000
Leather, tanned	53	603, 450	445	18	....	199, 146	1, 732, 564	2, 315, 616
Liquors, distilled	1	25, 000	4	....	....	1, 700	20, 500	31, 500
Liquors, malt	5	845, 000	304	....	....	138, 719	701, 523	1, 265, 477
Lock- and gun-smithing	3	62, 800	104	3	5	37, 500	35, 300	100, 500
Looking-glass and picture frames	6	19, 250	17	....	1	5, 253	7, 187	19, 432
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	22	80, 900	114	8	2	40, 276	81, 726	162, 429
Lumber, sawed	680	3, 745, 790	3, 056	....	48	548, 556	2, 272, 991	3, 842, 012
Mantels, slate, marble, and marbleized	1	20, 000	2	....	....	673	1, 300	2, 000
Marble and stone work	55	153, 331	351	1	....	157, 887	91, 119	374, 603
Masonry, brick and stone	12	13, 100	122	....	....	39, 738	58, 977	117, 728
Mattresses and spring beds (see also Furniture)	1	200	1	....	....	25	350	550
Mineral and soda waters	3	6, 500	9	....	....	2, 925	5, 300	11, 951
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	20	1, 321, 400	653	581	284	494, 945	1, 456, 647	2, 703, 281
Musical instruments and materials (not specified)	2	12, 500	11	1	....	6, 000	5, 500	19, 000
Musical instruments, organs and materials	3	18, 200	29	....	....	12, 948	12, 141	30, 713
Musical instruments, pianos and materials	3	18, 000	32	....	....	8, 894	15, 994	30, 380
Needles and pins	5	19, 250	46	33	5	23, 280	5, 560	37, 625
Painting and paperhanging	45	67, 325	148	18	....	71, 754	87, 024	215, 062
Paper (see also Cardboard; Leather board; Wood pulp)	25	1, 197, 000	497	202	3	249, 612	1, 131, 425	1, 731, 170
Patent medicines and compounds (see also Drugs and chemicals)	9	45, 350	21	11	....	14, 672	52, 028	135, 594
Paving materials	2	2, 500	5	....	....	1, 227	551	3, 249
Photographing	23	53, 820	30	31	....	23, 267	24, 826	81, 022
Pickles, preserves, and sauces	1	2, 000	3	....	....	1, 250	5, 000	8, 000
Plumbing and gasfitting	7	28, 000	36	....	....	24, 720	64, 880	110, 128
Printing and publishing	29	270, 050	151	42	5	88, 088	91, 076	264, 750
Printing materials	2	6, 500	6	....	....	2, 100	4, 250	13, 400
Pumps, not including steam pumps	4	5, 800	13	....	....	2, 886	6, 498	16, 475
Refrigerators	1	25, 000	25	....	....	10, 000	15, 000	50, 000
Roofing and roofing materials	2	3, 150	4	....	....	520	2, 200	4, 810
Rubber and elastic goods	1	450	1	....	....	200	300	800
Rules, ivory and wood	1	600	1	....	....	624	75	2, 200
Saddlery and harness	82	203, 350	202	5	1	83, 786	211, 267	381, 551
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	28	263, 700	366	....	7	141, 530	237, 402	444, 119
Saws	1	200	1	1	....	500	800	1, 500
Sewing machines and attachments	1	5, 000	4	....	....	1, 500	2, 000	5, 000
Shipbuilding	15	15, 330	26	....	....	12, 243	14, 369	30, 070
Shoddy (see also Mixed textiles)	3	17, 300	13	8	2	5, 700	38, 900	49, 600
Silk and silk goods (see also Mixed textiles)	1	8, 000	2	5	1	2, 500	11, 625	15, 000
Silverware	1	125, 000	20	....	....	12, 500	63, 400	200, 000
Soap and candles	22	54, 700	41	....	....	17, 289	61, 170	104, 541
Spectacles and eyeglasses	1	25, 000	35	....	....	15, 000	30, 000	50, 000
Springs, steel, car, and carriage	1	8, 000	7	....	....	3, 500	10, 000	17, 000
Starch	20	56, 256	76	....	....	4, 499	49, 977	66, 800

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—NEW HAMPSHIRE, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Stationery goods	4	$204, 800	62	18	3	$37, 050	$266, 897	$355, 015
Stone- and earthen-ware	5	61, 000	61	2	4	28, 825	12, 640	61, 000
Surgical appliances	3	17, 150	19	2	....	6, 900	4, 100	25, 000
Tinware, copperware, and sheet-iron ware	89	220, 050	251	4	....	108, 873	225, 924	463, 997
Tobacco, cigars and cigarettes	22	19, 285	41	12	1	18, 169	24, 912	65, 940
Tools (see also Cutlery and edge tools; Hardware)	1	12, 000	20	....	....	7, 104	5, 621	16, 368
Toys and games	9	24, 000	29	9	7	10, 949	14, 033	33, 128
Upholstering (see also Furniture)	5	4, 800	10	2	....	5, 020	10, 325	19, 475
Upholstering materials	12	51, 800	47	....	....	16, 646	13, 084	47, 175
Veneering	1	2, 500	2	....	....	300	600	4, 000
Vinegar	4	7, 700	12	....	....	1, 012	9, 000	17, 500
Washing-machines and clothes-wringers	1	1, 000	1	....	....	624	500	2, 444
Watch and clock materials	1	10, 000	10	10	35	4, 800	6, 500	36, 000
Watch and clock repairing	10	11, 650	10	....	....	4, 086	2, 580	11, 398
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	110	128, 400	138	1	1	42, 576	60, 162	175, 699
Wirework	3	2, 900	9	....	....	2, 000	1, 100	6, 700
Wood pulp	7	298, 600	338	....	11	138, 350	256, 900	759, 853
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	36	255, 625	484	2	125	167, 055	189, 464	468, 943
Wooden ware	49	322, 950	421	2	26	132, 260	206, 163	431, 290
Woolen goods (see also Felt goods; Gloves and mittens; Mixed textiles; Worsted goods).	58	4, 510, 271	2, 288	1, 361	378	1, 181, 738	4, 993, 709	8, 113, 839
Worsted goods (see also Woolen goods)	2	2, 628, 584	505	919	107	512, 881	1, 582, 226	2, 694, 232

A—NEW JERSEY, BY TOTALS OF COUNTIES.

The State	7, 128	$106, 226, 593	86, 787	27, 099	12, 152	$46, 083, 045	$165, 285, 779	$254, 380, 236
COUNTIES.								
Atlantic	66	588, 600	268	119	41	113, 802	419, 669	664, 569
Bergen	186	2, 026, 303	1, 811	376	265	757, 490	2, 186, 434	3, 553, 579
Burlington	333	3, 001, 130	2, 047	765	272	829, 882	2, 930, 077	4, 471, 952
Camden	373	7, 728, 510	4, 693	1, 552	499	2, 398, 668	6, 340, 659	11, 009, 206
Cape May	36	60, 250	105	....	....	31, 478	89, 655	164, 411
Cumberland	302	3, 319, 155	3, 054	1, 494	717	1, 409, 901	2, 730, 908	5, 111, 023
Essex	1, 568	28, 817, 405	26, 509	6, 142	2, 985	15, 335, 849	47, 724, 275	76, 772, 350
Gloucester	165	1, 907, 286	1, 329	69	208	590, 128	1, 045, 803	2, 357, 652
Hudson	802	15, 366, 125	10, 432	3, 748	1, 203	6, 038, 347	52, 996, 058	66, 337, 124
Hunterdon	374	1, 973, 625	1, 113	198	49	418, 215	2, 040, 428	3, 104, 070
Mercer	589	7, 952, 795	7, 528	1, 197	1, 241	3, 469, 054	8, 626, 127	14, 617, 850
Middlesex	278	4, 943, 270	4, 045	2, 517	541	1, 979, 250	5, 391, 913	9, 587, 832
Monmouth	277	900, 558	842	182	64	267, 028	1, 259, 801	1, 806, 395
Morris	243	2, 223, 092	1, 511	221	36	502, 880	1, 878, 737	3, 075, 191
Ocean	72	225, 010	214	21	10	55, 139	220, 755	359, 041
Passaic	413	14, 378, 492	12, 091	6, 906	3, 294	7, 705, 223	16, 535, 229	29, 833, 832
Salem	178	993, 366	1, 126	360	45	372, 247	1, 210, 197	1, 867, 120
Somerset	141	793, 975	882	333	2	414, 570	1, 740, 436	2, 539, 524
Sussex	185	1, 321, 826	700	65	24	271, 852	1, 457, 629	2, 239, 124
Union	300	3, 813, 665	4, 547	780	550	2, 425, 742	4, 936, 878	10, 099, 789
Warren	247	3, 892, 155	1, 940	54	106	696, 300	3, 524, 111	4, 808, 602

B—NEW JERSEY, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	7, 128	$106, 226, 593	86, 787	27, 099	12, 152	$46, 083, 045	$165, 285, 779	$254, 380, 236
Agricultural implements	40	208, 300	204	....	2	61, 972	95, 437	242, 984
Artificial feathers and flowers (see also Millinery and lace goods)	5	5, 300	32	2	7	7, 500	575	14, 100
Awnings and tents	2	600	8	....	....	1, 700	2, 900	6, 100
Bagging, flax, hemp, and jute	3	380, 000	281	272	139	195, 007	335, 560	574, 835
Bags, paper	5	14, 550	15	27	....	8, 429	28, 550	50, 275
Baskets, rattan and willow ware	18	13, 825	42	28	15	15, 135	17, 035	46, 099
Belting and hose, leather	8	42, 700	37	....	5	17, 134	78, 296	112, 145
Billiard tables and materials	1	1, 000	2	....	2	1, 250	650	3, 500
Blacking	1	8, 000	2	....	....	500	1, 200	3, 000
Blacksmithing (see also Wheelwrighting)	744	482, 961	922	....	17	332, 229	409, 608	1, 207, 951
Bookbinding and blank-book making	5	21, 200	35	11	21	26, 904	36, 650	69, 350
Boot and shoe findings	3	12, 500	7	4	1	2, 457	13, 271	19, 530
Boot and shoe uppers	4	18, 100	11	6	2	10, 072	30, 940	51, 000
Boots and shoes, including custom work and repairing	398	1, 153, 390	2, 795	834	128	1, 422, 681	3, 069, 804	5, 262, 671
Boots and shoes, rubber	3	600, 000	546	438	15	275, 997	1, 419, 849	2, 306, 465
Boxes, cigar	4	3, 650	8	7	8	4, 140	9, 200	18, 166
Boxes, fancy and paper	16	135, 200	104	422	69	147, 754	184, 650	477, 600
Boxes, wooden, packing	15	232, 300	135	15	22	73, 324	214, 577	376, 990
Brass and copper, rolled	3	366, 000	91	....	45	49, 600	223, 000	304, 500
Brass castings (see also Bronze castings)	21	501, 350	560	4	10	261, 309	222, 240	641, 596
Bread and other bakery products	330	737, 700	752	45	95	384, 798	1, 818, 174	2, 708, 311
Brick and tile	107	1, 731, 300	2, 575	26	148	665, 482	559, 037	1, 672, 533
Bridges	2	185, 709	175	....	....	52, 484	298, 448	41[illegible], 291
Bronze castings (see also Brass castings)	1	60, 000	90	6	6	37, 000	75, 000	124, 000
Brooms and brushes	83	52, 750	102	33	11	51, 705	76, 930	176, 342

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—NEW JERSEY, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Buttons	25	$211, 600	544	261	171	$331, 130	$297, 500	$797, 205
Card cutting and designing	4	4, 800	27		4	9, 550	4, 690	18, 350
Carpentering	319	750, 865	2, 615	6	35	1, 227, 686	2, 135, 190	3, 995, 361
Carpets, other than rag (see also Woolen goods)	2	103, 000	120	65	58	48, 000	109, 425	179, 500
Carpets, rag	45	26, 375	52	1		14, 841	33, 350	72, 208
Carriage and wagon materials	26	341, 775	292		2	139, 219	192, 086	498, 306
Carriages and sleds, children's	1	25, 000	7	1	1	5, 000	8, 000	17, 000
Carriages and wagons (see also Wheelwrighting)	129	1, 024, 740	1, 298	15	28	585, 752	755, 429	1, 808, 593
Celluloid and celluloid goods	5	1, 209, 000	452	174	109	242, 498	388, 262	1, 251, 540
Cement	4	215, 300	76			34, 045	79, 650	140, 700
Charcoal	23	19, 075	50			10, 625	11, 750	31, 105
Cheese and butter (factory)	11	42, 170	30	1	1	8, 395	85, 491	123, 063
Cigar molds	1	800	3		3	1, 820	2, 210	7, 820
Clocks	1	30, 000	35	25	5	30, 000	10, 000	47, 000
Clothing, men's	186	1, 096, 709	1, 191	1, 974	74	988, 216	2, 870, 279	4, 737, 525
Clothing, women's	5	22, 200	11	41	1	13, 325	47, 800	79, 300
Coal-tar	1	275, 000	63			30, 000	190, 000	300, 000
Coffee and spices, roasted and ground	7	116, 000	33	3		19, 079	240, 060	319, 888
Coffins, burial cases, and undertakers' goods	34	151, 770	74	1	7	47, 583	67, 015	166, 470
Combs	2	6, 500	13	2	1	4, 800	4, 800	10, 800
Confectionery	57	195, 550	223	44	35	112, 252	592, 942	883, 325
Cooperage	27	190, 300	338		13	123, 788	405, 421	697, 374
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	1	30, 000	27		3	20, 000	100, 000	175, 000
Cordage and twine	5	381, 400	114	67	43	71, 745	630, 943	756, 521
Cork cutting	2	50, 200	43		20	15, 900	50, 400	77, 400
Corsets	9	104, 100	53	340	74	115, 698	213, 880	371, 633
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	24	3, 961, 145	1, 262	2, 809	765	1, 309, 997	2, 284, 819	5, 039, 519
Crucibles	2	950, 000	575			211, 000	482, 000	800, 000
Cutlery and edge tools (see also Hardware; Tools)	30	345, 311	591	3	90	306, 275	261, 038	723, 640
Dentistry, mechanical	34	71, 800	33	6	10	18, 658	46, 234	155, 217
Dentists' materials	3	3, 800	2			600	950	2, 400
Drugs and chemicals (see also Patent medicines and compounds)	41	3, 830, 750	1, 215	27	30	598, 743	3, 528, 204	4, 993, 965
Dyeing and cleaning	13	118, 350	131	28	42	65, 700	83, 275	178, 200
Dyeing and finishing textiles	18	1, 473, 000	1, 788	249	161	925, 612	1, 642, 933	3, 365, 769
Dyestuffs and extracts	6	119, 000	75			26, 383	200, 814	249, 352
Electric lights	1	200, 000	60		15	35, 000	50, 000	150, 000
Electroplating	2	3, 000	7			2, 800	3, 500	11, 000
Engraving and die-sinking	15	80, 075	70	7	9	49, 984	17, 422	101, 928
Engraving, steel	1	500, 000	100		50	30, 000	35, 000	70, 000
Explosives and fireworks	2	65, 000	39	40	30	34, 000	37, 400	88, 000
Fancy articles	16	191, 500	342	44	172	294, 619	172, 533	569, 800
Felt goods (see also Woolen goods)	6	313, 000	250	21	15	86, 170	516, 195	685, 386
Fertilizers	21	1, 045, 500	782	40	21	338, 045	1, 853, 700	2, 423, 805
Files (see also Saws)	9	72, 600	202	8	52	102, 350	83, 262	214, 551
Flax, dressed	1	500	2			400	950	2, 100
Flouring- and grist-mill products	481	3, 879, 083	934		2	285, 626	7, 303, 244	8, 459, 944
Food preparations (see page 39)	3	2, 500	6			1, 594	11, 200	15, 500
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam-fittings and heating apparatus)	188	7, 431, 421	7, 746	102	357	3, 432, 453	6, 138, 852	11, 282, 748
Foundery supplies	5	15, 500	11			6, 198	7, 600	20, 660
Fruit-jar trimmings	1	150, 000	230	93	25	104, 501	318, 708	485, 503
Fruits and vegetables, canned and preserved	32	767, 806	612	1, 208	225	212, 678	965, 637	1, 417, 086
Furnishing goods, men's	2	7, 000	4	68	4	7, 400	17, 500	62, 000
Furniture (see also Mattresses and spring beds; Upholstering)	77	340, 350	323	3	20	149, 834	193, 660	480, 798
Furniture, chairs	8	28, 575	91	15	12	34, 300	25, 575	74, 450
Furs, dressed	4	35, 200	37	13	7	18, 785	47, 315	96, 495
Gas machines and meters	1	40, 000	11		1	5, 000	20, 000	37, 500
Glass	27	2, 728, 021	2, 762	46	770	1, 300, 038	1, 088, 346	2, 810, 170
Glass, cut, stained, and ornamented	6	45, 000	44		5	27, 090	41, 212	84, 893
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	1	400		8		800	1, 000	3, 600
Glue	4	14, 500	11			5, 410	8, 400	18, 810
Gold and silver leaf and foil	3	4, 000	6			1, 380	11, 580	16, 918
Gold and silver, reduced and refined (not from the ore)	4	60, 000	20		1	9, 350	368, 386	424, 500
Grease and tallow	8	39, 200	29		1	12, 418	160, 740	218, 187
Gunpowder (see also High explosives)	1	55, 000	30			11, 442	70, 216	91, 560
Hairwork	2	9, 750		5	1	1, 249	2, 500	8, 100
Hammocks	1	10, 000	19	1		7, 800	30, 000	50, 000
Handles, wooden	3	10, 775	8		1	3, 510	2, 690	11, 500
Hardware (see also Cutlery and edge tools; Tools)	35	507, 450	392	33	51	217, 090	540, 793	965, 986
Hardware, saddlery	37	870, 200	856	139	150	441, 972	779, 958	1, 609, 555
Hat and cap materials	5	31, 500	47	7	1	25, 964	31, 666	82, 490
Hats and caps, not including wool hats	79	1, 343, 900	4, 094	1, 271	202	2, 113, 581	2, 103, 082	6, 152, 447
High explosives (see also Gunpowder)	1	21, 000	35	1		17, 821	179, 312	274, 000
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	8	804, 570	320	604	146	239, 761	258, 043	861, 181
Housefurnishing goods	1	1, 900	2			1, 200	1, 000	3, 700
Ink	5	62, 700	43	1	4	25, 950	64, 385	142, 919
Instruments, professional and scientific	6	5, 050	13			4, 480	2, 750	16, 900
Iron and steel	40	9, 099, 050	4, 711		81	1, 808, 448	6, 556, 283	10, 341, 896
Iron bolts, nuts, washers, and rivets	4	160, 050	196		13	85, 263	334, 853	452, 862
Iron doors and shutters	1	10, 000	90		12	40, 000	75, 000	150, 000
Iron forgings	9	391, 941	349		33	150, 190	524, 352	775, 514
Iron pipe, wrought	2	50, 500	7			3, 350	1, 925	6, 700
Iron railing, wrought	9	23, 675	23		4	13, 489	53, 692	80, 874
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	1	6, 000	25			9, 000	18, 000	30, 000
Ivory and bone work	3	7, 100	29	6	22	13, 900	12, 800	37, 500
Jewelry	68	2, 555, 899	1, 781	264	189	1, 114, 946	1, 967, 054	4, 079, 677

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—NEW JERSEY, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Jewelry and instrument cases	1	$1,000	4	2	2	$1,900	$3,000	$8,000
Kaolin and ground earths	2	80,000	56	2		28,300	61,216	142,000
Kindling wood	28	54,700	92	2	15	43,958	93,315	181,698
Labels and tags	1	90,000	70		50	70,000	100,000	300,000
Lamps and reflectors	5	47,975	33	1	21	20,470	15,456	55,160
Lapidary work	6	5,400	25		4	9,900	8,200	29,506
Lard, refined	1	25,000	28			15,000	150,000	175,000
Lasts	1	20,000	8		1	4,900	2,950	15,000
Leather board (see also Paper)	1	10,000	6			1,350	3,000	5,000
Leather, curried	56	1,983,746	1,283	27	78	762,697	7,090,270	8,727,128
Leather, tanned	55	1,810,050	1,227	4	69	716,599	5,262,747	6,748,094
Lime	26	136,400	132			37,904	85,005	169,754
Liquors, distilled	19	102,045	14			2,900	27,550	41,890
Liquors, malt	49	3,260,800	1,121			493,741	2,564,748	4,532,733
Liquors, vinous (see also Liquors, distilled)	5	68,000	42	2		8,525	58,360	79,700
Lock- and gun-smithing	10	7,300	9		1	3,275	3,400	14,400
Looking-glass and picture frames	19	160,130	245	39	37	104,196	243,650	394,000
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	11	162,000	136		27	58,739	152,230	254,285
Lumber, sawed	284	1,657,395	760		8	179,693	989,979	1,627,640
Malt	1	10,000	4			800	13,500	16,875
Mantels, slate, marble, and marbleized	1	2,500	6			1,458	1,000	3,550
Marble and stone work	85	411,860	503	1	41	308,683	286,512	811,996
Masonry, brick and stone	69	224,930	704		12	282,135	397,005	853,046
Matches	1	6,000	4	15	5	1,840	1,470	3,600
Mattresses and spring beds (see also Furniture)	9	28,550	63	7	8	20,216	58,976	101,900
Millinery and lace goods (see also Artificial feathers and flowers)	1	6,000	6	28		4,000	5,580	11,580
Mineral and soda waters	19	76,200	89		6	35,709	93,670	178,847
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	10	1,577,870	521	906	343	526,770	829,038	1,906,680
Models and patterns	8	7,575	14			6,543	2,437	17,477
Mucilage and paste	1	400	1			50	1,500	2,700
Musical instruments and materials (not specified)	4	26,000	28	5		13,900	10,600	30,000
Musical instruments, organs and materials	5	354,022	409	2		160,900	215,168	467,000
Musical instruments, pianos and materials	2	10,200	6		1	4,500	6,000	13,000
Needles and pins	2	4,500	22	1	2	8,700	4,400	16,000
Oil, castor	1	250,000	30			15,000	200,000	300,000
Oil, essential	2	1,500	1			200	2,500	3,250
Oil, linseed	1	14,000	1			450	9,000	9,500
Oil, lubricating	1	3,000	3			1,135	2,035	6,047
Oilcloth, enameled	2	190,000	130		30	71,627	603,200	722,000
Oilcloth, floor	8	625,000	384		14	180,132	878,169	1,173,258
Painting and paperhanging	159	193,675	598	2	14	277,628	300,909	798,077
Paints (see also Varnish)	13	761,000	164	8	10	71,204	428,165	598,338
Paper (see also Leather board)	32	1,830,500	670	139	33	272,936	1,286,182	2,015,569
Paperhangings	3	270,000	161	13	10	56,698	270,688	454,469
Patent medicines and compounds (see also Drugs and chemicals)	12	308,500	113	50	5	62,076	133,550	639,125
Paving materials	1	3,000	6			3,000	6,000	30,000
Pencils, lead	1	100,000	47	24	99	35,000	35,000	100,000
Pens, steel	1	150,000	22	162	16	70,000	27,000	120,000
Photographic apparatus	1	3,000	6	2		3,000	500	5,000
Photographing	45	86,550	83	19	9	50,047	50,574	172,682
Photographing materials	1	7,000	8			1,800	14,500	21,000
Pickles, preserves, and sauces	3	16,000	17	8	3	6,953	44,460	62,412
Pipes, tobacco	2	3,400	17	2		3,600	1,100	7,800
Plumbing and gasfitting	125	404,175	482		28	245,492	448,268	912,352
Pocket-books	1	1,000		12		1,000	6,000	10,000
Printing and publishing	93	865,475	859	82	120	477,224	418,758	1,224,519
Printing materials	1	12,000	12			5,500	6,300	30,000
Pumps, not including steam pumps	5	5,500	11			3,300	3,650	11,075
Refrigerators	1	500	4			1,000	1,000	3,000
Roofing and roofing materials	19	39,260	69		1	28,200	82,141	149,150
Rubber and elastic goods	15	934,000	715	282	94	347,924	1,597,796	2,231,202
Rubber, vulcanized	3	226,200	335	150	10	154,700	391,200	767,200
Saddlery and harness	194	709,878	854	69	29	354,896	875,211	1,579,404
Sand and emery paper and cloth	1	500	3		1	2,000	1,800	4,000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	67	806,925	763	31	28	322,674	622,071	1,150,115
Saws	3	235,000	197	6	58	120,643	114,462	279,909
Screws	1	12,000	11			3,640	2,423	9,000
Sewing machines and attachments	8	1,152,755	2,836	75	400	1,519,947	1,484,902	4,640,852
Shipbuilding	93	943,070	930			548,807	649,194	1,384,629
Shirts	34	516,300	439	2,180	204	662,086	1,196,329	2,111,069
Shoddy (see also Mixed textiles)	1	35,000	10	5	15	25,000	80,734	137,500
Silk and silk goods (see also Mixed textiles)	106	6,952,325	4,696	5,360	2,493	4,177,745	9,678,536	17,122,230
Silversmithing	2	108,000	41	4		30,000	13,000	60,000
Silverware	1	20,000	6		2	3,000	2,500	9,000
Slaughtering and meat-packing, not including retail butchering establishments.	31	1,775,200	572		10	374,278	19,349,435	20,719,640
Smelting and refining (base scrap metal, not from the ore)	2	151,800	300		2	156,000	8,137,500	8,370,100
Soap and candles	15	1,197,700	246	8	176	187,383	1,116,321	1,743,380
Spectacles and eyeglasses	2	5,000	6	6	5	4,400	4,695	13,000
Sporting goods	2	16,000	24	11		15,000	7,100	45,600
Springs, steel, car, and carriage	3	66,393	85		1	44,050	125,250	191,100

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—NEW JERSEY, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Stationery goods	9	$60, 500	74	4	18	$29, 048	$21, 740	$78, 900
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	40, 000	72	....	....	24, 300	22, 000	60, 000
Stereotyping and electrotyping (see also Type founding)	1	50, 000	7	....	....	3, 000	4, 000	20, 000
Stone- and earthen-ware	49	2, 057, 200	2, 054	458	668	1, 101, 511	1, 030, 598	2, 598, 757
Straw goods	3	54, 800	33	192	....	30, 150	145, 800	251, 900
Sugar and molasses, refined	4	2, 110, 000	692	....	5	476, 216	20, 794, 961	22, 841, 258
Surgical appliances	2	4, 000	4	5	....	4, 624	3, 500	16, 100
Taxidermy	1	10, 000	5	100	20	9, 000	10, 000	25, 000
Thread, linen	1	500, 000	200	730	....	260, 000	750, 000	1, 200, 000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	165	656, 310	808	38	88	361, 274	796, 999	1, 404, 655
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	6	1, 293, 000	990	1, 994	181	923, 350	3, 492, 949	5, 063, 949
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	283	479, 595	761	71	70	332, 276	800, 706	1, 508, 810
Tools (see also Cutlery and edge tools; Hardware)	3	31, 550	46	....	....	23, 450	10, 950	38, 700
Toys and games	7	8, 500	50	22	12	11, 716	12, 737	34, 247
Trunks and valises	15	991, 800	1, 313	160	250	650, 822	1, 349, 855	2, 453, 923
Type founding (see also Stereotyping and electrotyping)	1	1, 000	....	....	....	....	400	1, 200
Umbrellas and canes	8	101, 800	198	....	41	64, 448	65, 513	180, 300
Upholstering (see also Furniture)	30	34, 500	48	8	8	23, 637	58, 731	105, 580
Upholstering materials	3	62, 500	45	76	15	39, 600	75, 000	126, 000
Varnish (see also Paints)	17	430, 000	84	....	3	56, 630	551, 007	840, 774
Vinegar	6	16, 225	13	....	1	3, 440	29, 750	42, 390
Watch and clock materials	3	14, 500	16	4	2	6, 300	7, 500	20, 651
Watch and clock repairing	23	29, 750	30	....	1	17, 701	18, 900	74, 060
Watch cases	2	153, 000	326	17	77	137, 342	517, 225	659, 817
Wheelbarrows	1	100, 000	48	....	....	17, 000	14, 000	36, 000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	364	386, 673	569	3	24	205, 127	260, 302	697, 470
Whips	1	70, 000	32	11	....	24, 000	25, 000	90, 000
Window blinds and shades	4	154, 300	70	3	20	36, 300	104, 000	226, 500
Wire	3	260, 000	430	6	100	273, 350	718, 000	1, 093, 500
Wirework	6	248, 800	185	32	8	87, 649	172, 880	308, 000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	34	114, 525	211	8	34	86, 094	102, 525	231, 420
Wooden ware	1	1, 500	3	....	3	2, 000	3, 500	6, 500
Woolen goods (see also Carpets, other than rag; Felt goods; Gloves and mittens; Mixed textiles; Worsted goods).	27	2, 530, 125	1, 827	997	539	996, 384	3, 162, 955	4, 984, 007
Worsted goods (see also Woolen goods)	2	45, 000	90	35	55	22, 200	70, 417	119, 000
Zinc	1	125, 000	29	....	....	45, 373	141, 548	200, 000

A—NEW MEXICO TERRITORY, BY TOTALS OF COUNTIES.

The Territory	144	$463, 275	553	....	4	$218, 731	$871, 352	$1, 284, 846
COUNTIES.								
Bernalillo	3	32, 500	26	....	....	3, 000	17, 000	23, 520
Colfax	8	8, 500	26	....	....	6, 194	9, 100	22, 330
Doña Aña	7	45, 300	21	....	....	7, 887	56, 575	80, 811
Grant	7	16, 175	24	....	....	5, 318	16, 230	26, 630
Lincoln	6	10, 950	10	....	....	1, 088	6, 185	10, 720
Mora	9	60, 700	18	....	....	4, 090	56, 000	66, 086
Rio Arriba	5	23, 000	36	....	....	5, 345	40, 525	52, 874
San Miguel	43	128, 750	251	....	....	133, 629	321, 330	529, 071
Santa Fé	21	61, 450	76	....	3	35, 695	125, 897	204, 490
Socorro	12	21, 700	21	....	....	3, 800	69, 600	81, 110
Taos	15	20, 250	23	....	1	4, 210	98, 210	114, 704
Valencia	8	34, 000	21	....	....	8, 475	54, 700	72, 500

B—NEW MEXICO TERRITORY, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	144	$463, 275	553	....	4	$218, 731	$871, 352	$1, 284, 846
Blacksmithing (see also Wheelwrighting)	11	4, 950	17	....	....	5, 944	6, 675	20, 550
Boots and shoes, including custom work and repairing	6	5, 300	8	....	....	3, 650	3, 500	11, 430
Brick and tile	1	800	8	....	....	600	500	1, 500
Carpentering	22	40, 250	132	....	4	90, 075	205, 250	336, 790
Carriages and wagons (see also Wheelwrighting)	1	20, 000	12	....	....	9, 500	30, 000	48, 000
Clothing, men's	1	500	2	....	....	2, 100	1, 000	3, 600
Flouring- and grist-mill products	51	249, 250	134	....	....	35, 416	435, 450	529, 171
Furniture	1	3, 500	4	....	....	3, 600	7, 000	18, 000
Jewelry	3	13, 000	16	....	....	11, 000	14, 000	35, 000
Liquors, distilled	1	1, 000	1	....	....	40	350	535
Liquors, malt	3	6, 000	2	....	....	410	1, 772	3, 290
Liquors, vinous (see also Liquors, distilled)	1	1, 300	3	....	....	800	1, 500	4, 000
Lumber, sawed	26	74, 675	172	....	....	24, 240	117, 055	173, 930
Masonry, brick and stone	2	700	4	....	....	2, 000	3, 300	7, 000
Saddlery and harness	5	7, 600	11	....	....	5, 900	6, 500	15, 800
Tinware, copperware, and sheet-iron ware	2	30, 000	12	....	....	10, 100	22, 000	40, 000
Tobacco, cigars and cigarettes	1	1, 000	1	....	....	550	500	2, 000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	6	3, 450	16	....	....	12, 806	15, 000	34, 250

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—NEW YORK, BY TOTALS OF COUNTIES.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	42, 739	$514, 246, 575	364, 549	137, 455	29, 529	$198, 634, 029	$679, 612, 545	$1, 080, 696, 596
Albany	1, 213	27, 873, 440	15, 230	6, 325	2, 446	7, 866, 733	20, 600, 969	36, 258, 031
Allegany	400	1, 586, 096	1, 197	62	39	333, 068	2, 169, 402	3, 190, 385
Broome	403	3, 978, 824	2, 834	696	127	1, 289, 588	4, 894, 316	7, 536, 513
Cattaraugus	533	2, 885, 309	2, 073	76	51	591, 507	3, 984, 591	5, 584, 808
Cayuga	485	5, 554, 537	4, 242	848	204	1, 861, 785	5, 288, 658	9, 560, 397
Chautauqua	594	4, 461, 760	3, 132	417	242	1, 285, 166	4, 294, 587	6, 616, 654
Chemung	421	3, 605, 096	2, 941	349	124	1, 156, 479	4, 238, 245	6, 392, 717
Chenango	445	1, 118, 820	1, 106	130	37	291, 179	1, 375, 718	2, 173, 603
Clinton	287	3, 246, 255	2, 403	163	97	724, 573	2, 829, 625	4, 149, 776
Columbia	385	8, 078, 830	2, 655	1, 157	488	1, 299, 850	4, 378, 222	7, 772, 623
Cortland	260	1, 501, 766	1, 152	315	55	406, 588	2, 379, 348	3, 425, 138
Delaware	444	1, 190, 757	1, 035	28	11	238, 655	1, 223, 838	1, 919, 496
Duchess	460	9, 572, 594	5, 077	1, 909	876	2, 607, 642	7, 577, 223	12, 204, 168
Erie	1, 831	29, 200, 731	16, 637	2, 132	1, 443	7, 985, 093	30, 723, 295	47, 522, 471
Essex	188	3, 955, 950	1, 526	76	39	470, 136	1, 846, 630	3, 008, 617
Franklin	276	1, 475, 415	1, 158	106	27	338, 414	1, 855, 789	2, 519, 205
Fulton	464	3, 621, 258	2, 701	3, 433	145	1, 509, 564	4, 320, 997	7, 152, 019
Genesee	309	932, 569	847	102	39	241, 374	907, 423	1, 534, 676
Greene	260	1, 679, 375	1, 366	405	483	467, 844	1, 399, 973	2, 306, 418
Hamilton	19	179, 410	144	....	....	33, 860	307, 742	476, 994
Herkimer	454	4, 355, 988	2, 620	678	246	1, 337, 953	3, 749, 409	6, 676, 355
Jefferson	696	3, 927, 230	2, 645	382	86	912, 813	4, 156, 253	6, 553, 014
Kings	5, 281	62, 719, 399	37, 878	7, 299	3, 621	22, 867, 176	130, 108, 417	179, 188, 685
Lewis	338	1, 797, 365	1, 397	55	20	340, 696	2, 185, 867	3, 193, 655
Livingston	314	1, 128, 080	953	9	7	222, 543	1, 037, 229	1, 625, 355
Madison	454	1, 977, 288	1, 325	305	58	425, 021	2, 205, 202	3, 354, 258
Monroe	1, 104	15, 347, 133	11, 228	4, 330	1, 449	5, 749, 047	18, 594, 915	29, 949, 126
Montgomery	324	6, 445, 190	2, 972	2, 339	737	1, 723, 780	6, 136, 249	10, 375, 026
New York	11, 339	181, 206, 356	146, 179	71, 795	9, 378	97, 030, 021	288, 441, 691	472, 926, 437
Niagara	285	3, 335, 649	2, 217	278	215	797, 046	3, 701, 460	5, 757, 707
Oneida	1, 100	12, 606, 989	7, 876	3, 886	931	3, 427, 566	11, 098, 698	17, 808, 378
Onondaga	1, 227	13, 213, 178	10, 406	3, 162	766	3, 995, 627	12, 222, 132	20, 428, 477
Ontario	403	2, 133, 603	1, 345	177	28	472, 592	2, 480, 648	3, 679, 924
Orange	496	6, 650, 648	5, 067	1, 079	646	2, 204, 083	5, 772, 067	10, 058, 463
Orleans	160	824, 900	625	28	22	172, 852	808, 179	1, 273, 237
Oswego	695	6, 203, 315	3, 893	937	277	1, 554, 829	8, 318, 024	12, 034, 845
Otsego	550	1, 589, 763	1, 197	392	72	353, 503	1, 498, 578	2, 372, 321
Putnam	46	323, 700	179	55	....	87, 981	569, 941	841, 054
Queens	355	7, 536, 650	3, 197	487	200	1, 692, 166	5, 315, 352	9, 104, 347
Rensselaer	863	18, 255, 148	13, 283	13, 013	1, 307	8, 184, 666	17, 448, 710	33, 679, 573
Richmond	100	2, 658, 570	1, 439	88	30	676, 305	2, 807, 237	4, 635, 237
Rockland	156	1, 600, 390	2, 165	364	229	854, 308	1, 523, 888	3, 236, 385
Saint Lawrence	827	3, 842, 875	2, 792	241	112	810, 862	4, 532, 187	6, 614, 981
Saratoga	392	5, 409, 137	3, 386	1, 388	312	1, 436, 731	4, 882, 062	8, 053, 673
Schenectady	171	1, 560, 650	2, 022	231	78	775, 915	1, 606, 896	2, 847, 802
Schoharie	244	588, 365	471	33	[illegible]	89, 978	661, 029	934, 844
Schuyler	174	478, 440	413	40	5	92, 423	526, 772	788, 211
Seneca	172	2, 407, 210	1, 245	254	65	584, 447	1, 570, 154	2, 927, 772
Steuben	610	3, 888, 905	2, 694	124	30	856, 091	3, 850, 743	5, 863, 128
Suffolk	379	1, 686, 907	1, 350	134	98	419, 139	1, 301, 617	2, 176, 613
Sullivan	270	804, 755	858	....	21	184, 032	1, 095, 854	1, 557, 436
Tioga	290	1, 758, 720	1, 209	63	8	325, 940	2, 098, 887	2, 931, 741
Tompkins	314	2, 033, 118	1, 450	126	46	506, 832	1, 688, 786	2, 897, 300
Ulster	558	3, 958, 408	3, 701	192	305	1, 385, 125	3, 504, 036	6, 533, 735
Warren	134	2, 112, 380	1, 065	1, 960	283	470, 837	1, 772, 737	2, 830, 141
Washington	355	2, 658, 188	1, 955	182	68	565, 335	2, 208, 225	3, 597, 512
Wayne	496	2, 091, 684	1, 557	205	85	423, 541	1, 796, 964	2, 842, 854
Westchester	502	5, 659, 424	7, 542	2, 286	674	3, 231, 364	7, 752, 838	14, 217, 985
Wyoming	299	1, 073, 370	666	85	35	207, 286	1, 287, 599	1, 906, 825
Yates	145	698, 715	631	44	4	186, 478	698, 422	1, 117, 475

B—NEW YORK, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	42, 739	$514, 246, 575	364, 549	137, 455	29, 529	$198, 634, 029	$679, 612, 545	$1, 080, 696, 596
Agricultural implements	265	9, 580, 009	6, 335	....	127	2, 513, 875	4, 580, 010	10, 707, 766
Artificial feathers and flowers (see also Millinery and lace goods)	150	1, 101, 650	455	3, 047	109	950, 938	2, 257, 623	4, 343, 924
Artificial limbs (see also Surgical appliances)	10	30, 500	22	....	....	15, 037	9, 556	57, 120
Awnings and tents	46	178, 000	182	101	11	106, 275	364, 794	569, 339
Axle-grease	3	40, 500	15	....	....	11, 490	68, 600	104, 000
Babbitt metal and solder	4	30, 100	17	....	....	8, 034	65, 193	83, 450
Bags, other than paper	[illegible]	755, 500	271	454	82	338, 850	3, 119, 600	3, 884, 300
Bags, paper	20	212, 100	158	144	7	98, 219	452, 890	691, 072
Baking and yeast powders (see also Drugs and chemicals)	28	434, 200	249	155	16	215, 585	1, 644, 714	2, 142, 730
Baskets, rattan and willow ware	72	162, 000	520	172	86	83, 805	124, 210	309, 982
Bells	3	110, 000	22	....	....	9, 729	95, 860	133, 800
Belting and hose, leather	22	674, 209	318	22	26	196, 674	1, 904, 513	2, 365, 139
Billiard tables and materials	15	370, 069	135	....	5	82, 216	368, 618	583, 518
Blacking	6	133, 500	102	15	6	62, 300	200, 300	488, 160
Blacksmithing (see also Wheelwrighting)	3, 769	3, 213, 002	4, 715	1	60	1, 751, 612	2, 034, 407	6, 253, 634

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—NEW YORK, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Bluing	8	$69, 700	40	19	....	$18, 775	$73, 850	$124, 700
Bone-, ivory-, and lamp-black	6	67, 000	26	....	2	9, 349	80, 293	107, 626
Bookbinding and blank-book making	156	2, 536, 000	2, 019	2, 178	205	1, 680, 629	2, 445, 294	5, 296, 691
Boot and shoe cut stock	3	8, 500	22	53	38	22, 450	54, 400	90, 880
Boot and shoe findings	15	88, 850	101	43	21	50, 312	94, 257	204, 120
Boot and shoe uppers	22	49, 934	53	40	3	37, 244	109, 346	198, 797
Boots and shoes, including custom work and repairing	2, 831	8, 283, 244	12, 957	3, 847	704	6, 591, 833	13, 800, 951	24, 991, 983
Boxes, cigar	54	441, 045	599	296	166	373, 278	603, 337	1, 339, 668
Boxes, fancy and paper	113	959, 010	886	2, 354	173	916, 049	1, 508, 391	3, 033, 777
Boxes, wooden, packing	156	1, 742, 225	1, 487	121	117	684, 519	2, 309, 185	3, 610, 472
Brass and copper, rolled	1	39, 600	85	....	3	52, 031	470, 610	583, 709
Brass castings (see also Bronze castings)	102	1, 219, 721	1, 309	62	204	683, 243	1, 301, 247	2, 458, 445
Brass ware	8	54, 800	127	25	15	56, 457	168, 643	260, 214
Bread and other bakery products	1, 719	5, 030, 681	4, 943	482	245	2, 612, 982	13, 022, 040	19, 937, 953
Brick and tile (see also Drain and sewer pipe)	321	3, 923, 405	6, 715	29	619	1, 613, 766	1, 196, 925	4, 108, 464
Bridges	4	314, 000	171	....	....	65, 500	319, 000	426, 000
Bronze castings (see also Brass castings)	1	250	....	....	....	....	300	1, 036
Brooms and brushes	215	1, 581, 271	1, 814	799	341	814, 349	2, 030, 919	3, 705, 127
Buttons	18	450, 000	255	1, 054	123	332, 799	366, 372	916, 262
Calcium lights	2	18, 000	17	....	....	9, 212	23, 631	46, 243
Carpentering	1, 487	4, 845, 550	10, 455	2	90	5, 563, 901	10, 317, 052	19, 410, 276
Carpets, other than rag (see also Woolen goods)	10	6, 422, 158	1, 887	3, 159	556	1, 952, 391	4, 453, 410	8, 419, 254
Carpets, rag	26	11, 475	27	4	5	9, 933	23, 003	44, 361
Carpets, wood	2	2, 500	4	....	4	2, 250	3, 500	7, 500
Carriage and wagon materials	62	451, 750	422	1	8	139, 063	314, 536	619, 631
Carriages and wagons (see also Wheelwrighting)	667	5, 487, 158	6, 218	37	173	2, 882, 672	4, 031, 422	8, 888, 479
Carriages and sleds, children's	19	287, 450	439	18	11	192, 228	358, 340	703, 469
Cars, railroad, street, and repairs	26	980, 522	1, 221	1	39	556, 590	1, 470, 232	2, 304, 680
Celluloid and celluloid goods	1	5, 000	....	1	....	300	1, 000	10, 000
Cement	10	193, 500	377	....	10	134, 701	164, 300	387, 958
Charcoal	3	6, 500	8	....	....	975	4, 700	7, 450
Cheese and butter (factory)	1, 652	3, 576, 214	2, 526	808	34	623, 391	8, 848, 708	12, 295, 353
Chocolate	4	55, 500	39	44	....	26, 203	157, 403	257, 153
Cigar molds	1	5, 000	6	....	9	5, 200	17, 000	26 000
Cleansing and polishing preparations	8	159, 000	74	1	4	42, 435	147, 419	267, 250
Clocks	4	625, 000	771	304	217	382, 920	508, 650	1, 037, 350
Cloth finishing	8	13, 600	42	....	2	17, 188	26, 656	91, 129
Clothing, men's	1, 583	30, 517, 107	36, 635	25, 822	651	18, 324, 466	52, 712, 947	81, 133, 611
Clothing, women's	277	5, 141, 290	1, 649	11, 892	64	4, 196, 913	12, 577, 958	20, 314, 307
Coffee and spices, roasted and ground	58	2, 065, 725	544	74	22	380, 259	6, 073, 482	7, 652, 672
Coffins, burial cases, and undertakers' goods	115	1, 360, 085	679	166	10	399, 309	953, 199	1, 942, 577
Collars and cuffs, paper	3	170, 000	52	123	....	38, 050	242, 458	408, 832
Combs	6	152, 300	158	154	4	106, 608	52, 825	228, 719
Confectionery	392	2, 279, 658	1, 566	829	176	835, 204	4, 304, 823	6, 686, 389
Cooperage	740	2, 752, 727	4, 479	35	360	1, 676, 719	3, 913, 531	6, 765, 719
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	40	471, 202	412	....	1	279, 392	645, 268	1, 021, 372
Cordage and twine	37	3, 032, 100	939	1, 017	505	632, 748	4, 110, 112	5, 207, 135
Cork cutting	20	176, 400	97	64	20	56, 430	186, 109	323, 001
Corsets	27	211, 100	118	1, 235	116	228, 551	443, 561	791, 639
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	57	12, 644, 138	3, 259	4, 564	2, 167	2, 218, 121	5, 627, 299	9, 723, 527
Cutlery and edge tools (see also Hardware; Tools)	87	1, 590, 742	1, 443	38	100	614, 403	799, 137	1, 680, 960
Dentistry, mechanical	156	169, 450	97	....	8	47, 044	78, 309	335, 220
Dentists' materials	6	85, 800	117	5	4	63, 304	60, 874	220, 858
Drain and sewer pipe (see also Brick and tile)	12	105, 200	65	....	3	25, 403	57, 908	124, 866
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	112	6, 779, 899	1, 652	392	46	993, 556	6, 978, 755	9, 991, 259
Dyeing and cleaning	66	131, 025	128	72	3	74, 448	210, 010	385, 171
Dyeing and finishing textiles	29	2, 343, 000	1, 359	300	270	842, 387	1, 075, 559	2, 776, 154
Dyestuffs and extracts	10	933, 200	303	10	0	164, 315	1, 399, 176	1, 831, 762
Electrical apparatus and supplies (see also Telegraph and telephone apparatus).	3	17, 500	11	1	....	8, 450	17, 150	38, 900
Electroplating	78	228, 600	511	52	52	264, 169	185. 927	696, 932
Emery wheels	1	10, 000	3	....	1	1, 920	15, 000	40, 000
Enameling	9	21, 700	17	9	....	10, 020	10, 099	42, 583
Engravers' materials	7	48, 200	56	3	....	32, 320	21, 964	70, 500
Engraving and die-sinking	103	152, 180	263	5	48	151, 808	99, 136	476, 386
Engraving, steel	26	535, 700	460	189	60	1, 158, 960	385, 514	1, 808, 850
Engraving, wood	76	33, 228	164	4	6	132, 817	17, 834	283, 747
Envelopes	2	5, 800	5	48	1	10, 416	23, 150	36, 271
Explosives and fireworks	10	117, 500	103	36	58	51, 599	101, 048	235, 447
Fancy articles	66	695, 100	736	374	99	436, 041	452, 384	1, 264, 944
Felt goods (see also Woolen goods)	4	157, 500	137	46	12	35, 289	155, 893	257, 450
Fertilizers	75	2, 328, 400	900	5	5	287, 859	2, 242, 511	3, 150, 312
Files (see also Saws)	37	234, 400	397	8	34	163, 553	103, 377	412, 554
Fire-arms	5	788, 000	489	....	24	391, 500	84, 000	823, 500
Flags and banners	4	32, 000	5	31	....	14, 800	25, 500	60, 000
Flavoring extracts	11	122, 350	30	6	2	17, 905	77, 048	120, 237
Flax, dressed	12	58, 750	90	....	....	12, 753	46, 050	67, 150
Flouring- and grist-mill products	1, 768	19, 545, 994	4, 284	10	10	1, 587, 899	43, 226, 194	49, 331, 984
Food preparations (see page 39)	31	452, 250	209	43	21	117, 616	629, 513	899, 722
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	883	34, 046, 914	30, 186	34	1, 041	14, 828, 342	20, 214, 369	44, 714, 915
Foundery supplies	2	22, 500	8	....	....	930	2, 240	4, 200
Fruits and vegetables, canned and preserved	88	1, 102, 421	1, 271	1, 510	573	346, 050	1, 619, 484	2, 379, 816
Fuel, artificial	1	100, 000	70	....	....	10, 000	55, 000	102, 000
Furnishing goods, men's	73	2, 349, 900	780	7, 045	221	1, 790, 514	3, 770, 374	7, 147, 443
Furniture (see also Mattresses and spring beds; Upholstering)	849	8, 220, 978	9, 367	254	454	4, 997, 041	6, 749, 672	15, 210, 879
Furniture, chairs	62	991, 935	1, 195	368	546	472, 974	614, 690	1, 404, 138

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—NEW YORK, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Furs, dressed	95	$2,622,890	1,133	1,882	50	$1,052,242	$3,715,761	$5,649,122
Galvanizing	8	273,000	229	....	12	122,620	351,800	850,770
Gas and lamp fixtures	18	2,231,000	1,500	40	127	867,878	1,027,565	2,728,628
Gas machines and meters	3	140,000	119	2	....	63,587	76,655	177,197
Glass	32	1,933,600	2,116	50	912	1,046,812	944,691	2,420,796
Glass, cut, stained, and ornamented	109	596,130	842	86	133	451,194	868,452	1,801,962
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	199	2,690,048	1,569	3,623	121	1,245,013	3,404,937	5,718,529
Glucose	3	1,750,000	775	5	17	485,000	2,000,000	3,075,000
Glue	9	867,000	297	9	20	129,139	624,123	884,280
Gold and silver leaf and foil	29	160,700	254	110	11	189,282	386,824	655,358
Gold and silver, reduced and refined (not from the ore)	10	193,600	85	....	....	50,452	3,030,919	3,120,452
Graphite	1	8,000	18	....	....	7,200	5,000	15,000
Grease and tallow	23	564,004	323	3	6	178,898	6,623,526	7,322,970
Gunpowder	6	299,660	122	10	....	73,500	327,319	567,843
Hairwork	88	228,300	95	366	12	150,622	313,273	679,629
Hand-knit goods	9	4,600	3	109	4	8,622	11,967	26,022
Handles, wooden	30	139,235	190	....	4	44,037	74,948	166,842
Hand-stamps	17	41,100	62	3	1	33,108	34,266	127,032
Hardware (see also Cutlery and edge tools; Tools)	141	1,842,226	2,062	55	315	1,038,028	1,514,042	3,396,633
Hardware, saddlery	9	351,000	687	44	98	230,080	381,028	720,128
Hat and cap materials	39	392,228	414	275	15	278,451	663,682	1,179,609
Hats and caps, not including wool hats	168	1,682,140	2,408	1,917	201	1,877,123	3,335,778	6,464,058
Hones and whetstones	4	7,900	14	....	1	2,648	4,435	12,500
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	75	5,334,876	2,389	4,470	999	2,036,076	5,072,058	9,899,540
Housefurnishing goods	10	23,906	33	2	13	16,808	26,739	57,040
Ink	12	388,800	77	22	11	51,342	348,000	505,010
Instruments, professional and scientific	67	571,350	465	16	23	266,113	188,186	716,922
Iron and steel	89	21,543,221	10,697	....	747	4,099,451	13,395,229	22,219,219
Iron bolts, nuts, washers, and rivets	26	432,619	416	15	49	185,694	572,326	929,111
Iron forgings	12	852,500	703	....	28	273,770	809,912	1,314,274
Iron nails and spikes, cut and wrought	8	250,000	204	22	29	94,795	183,000	3[illegible]6,000
Iron pipe, wrought	9	379,500	236	....	30	105,997	640,699	924,745
Iron railing, wrought	49	200,697	281	....	[illegible]	182,770	214,913	529,067
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	9	106,000	104	....	1	48,653	184,647	293,131
Ivory and bone work	18	182,414	232	59	28	116,389	217,845	401,674
Japanning	12	13,750	26	1	17	16,235	6,801	39,715
Jewelry	260	2,663,938	2,052	220	118	1,417,710	2,765,347	5,340,806
Jewelry and instrument cases	2	6,900	26	....	....	18,980	7,450	29,830
Jute and jute goods	3	390,000	197	282	....	132,621	415,788	650,560
Kaolin and ground earths	3	73,000	87	....	....	26,410	12,100	87,000
Kindling wood	109	738,500	755	10	154	359,377	1,071,730	1,818,721
Labels and tags	2	16,000	3	9	1	2,685	9,900	24,550
Lamps and reflectors	25	487,000	447	3	24	254,163	363,885	857,467
Lapidary work	26	99,250	90	11	16	80,226	128,682	313,230
Lard, refined	11	786,366	492	....	10	254,883	14,317,826	14,758,718
Lasts	11	87,382	100	2	....	52,869	37,347	146,582
Lead, bar, pipe, sheet, and shot	10	901,575	113	3	3	60,558	1,250,492	1,701,717
Leather, curried	185	1,720,356	884	....	16	366,426	5,210,852	6,192,002
Leather, dressed skins	71	1,831,040	1,071	23	41	450,130	2,061,438	3,095,302
Leather goods	46	483,100	783	129	37	426,280	952,073	1,764,778
Leather, patent and enameled	1	2,100	5	2	....	3,800	10,136	16,000
Leather, tanned	386	11,710,415	4,991	34	65	1,819,742	18,014,683	23,652,366
Lime	79	794,332	763	....	62	178,116	345,433	707,571
Linen goods	3	76,800	56	92	25	32,097	39,941	88,000
Liquors, distilled	19	453,025	155	....	....	70,820	673,472	1,012,550
Liquors, malt	325	27,580,502	8,064	8	21	3,912,798	19,823,853	35,392,677
Liquors, vinous (see also Liquors, distilled)	12	459,000	93	....	....	33,650	254,056	375,150
Lithographing (see also Printing and publishing)	58	1,628,550	1,193	61	144	828,615	842,379	2,270,854
Lock- and gun-smithing	122	125,325	157	2	27	90,582	105,352	324,798
Looking-glass and picture frames	146	1,026,481	1,354	18	142	670,780	1,550,915	2,828,757
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	222	4,556,865	3,113	....	185	1,356,491	5,271,184	8,073,766
Lumber, sawed	2,822	13,230,934	11,056	....	389	2,162,972	9,119,263	14,356,910
Malt	111	8,196,810	1,252	....	....	513,229	7,781,359	9,874,098
Mantels, slate, marble, and marbleized	5	221,500	108	....	....	50,680	65,864	147,565
Marble and stone work	560	4,892,056	5,759	10	108	3,496,242	4,055,445	10,189,267
Masonry, brick and stone	280	966,695	2,873	....	33	1,520,550	2,265,235	4,649,356
Matches	8	321,950	104	234	52	84,860	270,632	551,270
Mats and matting	7	193,650	183	12	70	116,029	203,427	385,340
Mattresses and spring beds (see also Furniture)	65	449,198	366	88	19	205,252	873,987	1,426,602
Millinery and lace goods (see also Artificial feathers and flowers)	110	1,460,680	722	2,827	138	1,068,173	3,685,280	5,797,531
Millstones	4	26,700	12	....	....	4,500	6,875	15,000
Mineral and soda waters	99	864,948	664	2	57	351,014	590,273	1,368,542
Mirrors	1	20,000	20	....	3	12,000	132,000	150,000
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods)	134	7,902,150	3,369	5,722	1,326	3,049,305	6,935,558	13,376,380
Models and patterns	54	131,121	202	1	3	119,125	47,196	272,665
Musical instruments and materials (not specified)	16	44,150	73	2	6	37,278	76,433	153,204
Musical instruments, organs and materials	52	460,350	433	8	20	234,648	205,661	604,891
Musical instruments, pianos and materials	82	6,627,845	3,892	24	50	3,213,481	3,579,131	8,084,154
Needles and pins	4	104,100	26	60	8	31,712	39,300	91,000
Nets and seines	2	8,000	9	11	....	1,700	4,600	8,800

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—NEW YORK, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Oil, essential	54	$30, 775	126	1	1	$7, 000	$73, 014	$117, 785
Oil, lard	3	170, 000	100		2	37, 415	920, 600	1, 026, 800
Oil, linseed	9	1, 406, 000	359	6	6	196, 277	4, 961, 782	5, 679, 607
Oil, lubricating	12	231, 800	92		1	60, 485	386, 571	534, 595
Oil, neat's-foot	2	4, 800	6			1, 200	3, 500	6, 500
Oil, resin	3	82, 523	23			14, 590	189, 622	238, 471
Oilcloth, enameled	2	125, 000	85	2	11	45, 000	261, 000	340, 000
Oilcloth, floor	8	1, 125, 000	560		16	222, 689	906, 853	1, 426, 848
Oleomargarine	5	645, 500	270			126, 636	4, 418, 695	5, 338, 753
Painting and paperhanging	852	1, 567, 235	4, 000	33	82	2, 180, 099	2, 257, 425	5, 897, 276
Paints (see also Varnish)	73	4, 842, 600	1, 540	103	40	831, 863	6, 994, 561	9, 455, 900
Paper (see also Collars and cuffs, papers; Envelopes; Wood pulp)	168	6, 859, 565	2, 929	751	134	1, 217, 580	5, 579, 525	8, 524, 279
Paperhangings	16	2, 462, 000	1, 240	136	521	654, 853	2, 970, 282	5, 095, 955
Paper patterns	4	105, 100	13	84		40, 538	44, 000	512, 550
Patent medicines and compounds (see also Drugs and chemicals)	108	3, 512, 430	584	339	180	485, 558	1, 932, 936	4, 339, 178
Paving materials	5	58, 600	95			21, 097	17, 868	53, 856
Pencils, lead	1	236, 097	64	116	40	65, 118	59, 844	172, 427
Pens, gold	12	314, 050	169	14	19	145, 907	174, 356	461, 761
Pens, steel	1	22, 500	5	45		10, 000	3, 450	24, 000
Perfumery and cosmetics	22	462, 450	171	216	5	121, 484	724, 100	1, 280, 200
Photographic apparatus	2	4, 000	5		2	3, 402	2, 630	10, 025
Photographing	290	930, 875	935	278	46	553, 709	534, 458	1, 840, 191
Pickles, preserves, and sauces	40	387, 050	178	71	37	64, 597	351, 080	676, 916
Pipes, tobacco	16	101, 400	177	23	20	97, 208	110, 718	297, 188
Plated and britannia ware (see also Silverware)	2	290, 000	115	53		55, 000	120, 000	290, 000
Plumbing and gasfitting	725	1, 823, 398	3, 188	1	178	1, 807, 153	3, 300, 282	6, 642, 401
Pocket-books	35	283, 950	491	77	54	285, 577	532, 983	1, 033, 834
Printing and publishing (see also Lithographing)	712	20, 027, 989	11, 651	1, 678	1, 088	8, 059, 487	9, 518, 171	27, 885, 376
Printing materials	8	91, 500	67	1	5	38, 658	100, 205	196, 000
Pumps, not including steam pumps	72	250, 550	206		2	88, 313	158, 558	365, 153
Racking-hose	1	500	2			1, 200	1, 350	5, 512
Refrigerators	28	346, 528	473	14	36	215, 528	396, 463	801, 172
Regalia and society banners and emblems	14	185, 200	66	52	3	45, 271	103, 701	209, 263
Roofing and roofing materials	147	411, 991	852		22	459, 098	783, 101	1, 695, 672
Rubber and elastic goods	24	1, 589, 037	972	469	89	697, 340	1, 769, 673	2, 914, 119
Saddlery and harness	1, 123	1, 725, 782	2, 192	62	65	905, 371	1, 734, 498	3, 792, 955
Safes, doors, and vaults, fire-proof	9	561, 400	450		20	233, 276	399, 210	807, 516
Salt	69	2, 286, 081	962	11	39	274, 087	507, 020	1, 107, 760
Salt, ground	[illegible]	229, 200	130	38		31, 897	218, 943	266, 906
Sand and emery paper and cloth	1	40, 000	10		5	7, 850	27, 648	84, 000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	244	2, 639, 775	2, 890		133	1, 170, 394	2, 628, 837	4, 879, 894
Saws	18	435, 800	382	10	26	157, 250	319, 059	606, 851
Scales and balances	19	369, 800	320		8	155, 735	165, 957	456, 147
Sewing-machine cases	2	7, 000	17		3	5, 600	6, 910	14, 350
Sewing machines and attachments	26	919, 725	944	56	43	483, 039	386, 111	1, 168, 758
Shingles, split	3	1, 750	5			825	1, 625	3, 200
Shipbuilding	457	3, 944, 100	4, 661			2, 907, 129	4, 055, 637	7, 985, 044
Shirts	195	3, 732, 694	1, 133	12, 453	205	2, 730, 571	6, 410, 261	11, 014, 820
Shoddy (see also Mixed textiles)	7	32, 700	43	32	3	33, 610	321, 220	407, 590
Show-cases	17	51, 800	101		1	58, 873	80, 850	181, 580
Silk and silk goods (see also Mixed textiles)	151	4, 696, 775	2, 405	5, 459	1, 769	2, 590, 025	5, 331, 804	10, 170, 140
Silversmithing	1	8, 000	4	[illegible]		1, 700	4, 000	7, 000
Silverware (see also Plated and britannia ware)	23	1, 186, 600	713	31	101	574, 314	775, 154	1, 663, 286
Slaughtering and meat-packing, not including retail butchering establishments.	128	4, 543, 625	1, 688		22	1, 020, 790	40, 149, 850	43, 096, 138
Soap and candles	97	4, 462, 775	937	131	129	494, 903	4, 889, 625	6, 574, 939
Soda-water apparatus	2	165, 000	72	12	1	68, 900	215, 400	466, 263
Spectacles and eyeglasses	30	264, 750	362	30	56	191, 918	152, 769	500, 583
Sporting goods	36	733, 750	259	298	49	201, 102	263, 619	682, 043
Springs, steel, car, and carriage	9	360, 000	178		5	64, 821	424, 958	548, 890
Stamped ware (see also Tinware, copperware, and sheet-iron ware)	16	1, 070, 340	1, 068	141	128	489, 259	1, 147, 721	1, 945, 009
Starch	60	2, 260, 750	1, 270	174	25	480, 574	2, 045, 148	3, 328, 102
Stationery goods	85	2, 208, 725	1, 160	915	120	839, 931	2, 596, 013	4, 281, 877
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	23	832, 000	549		6	336, 393	951, 871	1, 488, 678
Stencils and brands	7	17, 600	3	2		1, 704	3, 787	13, 930
Stereotyping and electrotyping (see also Type founding)	9	111, 350	133	25	8	62, 624	52, 710	153, 965
Stone- and earthen-ware	53	703, 500	649	142	36	319, 336	241, 385	788, 694
Straw goods	[illegible]	183, 000	49	290	23	72, 734	145, 858	264, 692
Sugar and molasses, refined	17	13, 726, 000	2, 626		13	1, 218, 212	67, 273, 614	71, 237, 051
Surgical appliances (see also Artificial limbs)	20	77, 767	47	20	7	27, 357	63, 379	182, 216
Taxidermy	4	3, 200	4		1	2, 200	600	6, 600
Telegraph and telephone apparatus (see also Electrical apparatus and supplies).	25	333, 558	413	31	10	278, 801	321, 066	798, 939
Tinware, copperware, and sheet-iron ware (see also Coppersmithing; Stamped ware).	1, 190	4, 756, 079	4, 707	280	309	2, 151, 397	5, 217, 864	9, 858, 768
Tinfoil	2	580, 000	75	50	13	90, 694	167, 867	360, 349
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	45	3, 236, 830	1, 343	1, 519	232	1, 103, 435	5, 337, 075	8, 907, 737
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	1, 683	8, 274, 917	13, 098	5, 039	995	7, 671, 831	11, 942, 043	24, 767, 504
Tools (see also Cutlery and edge tools; Hardware)	5	270, 650	256		15	114, 870	99, 520	320, 200
Toys and games	31	418, 225	388	405	125	207, 247	259, 552	641, 359
Trunks and valises	51	433, 950	458	52	39	255, 730	598, 830	1, 080, 910
Type founding (see also Stereotyping and electrotyping)	22	798, 500	426	111	56	336, 056	232, 950	822, 257
Umbrellas and canes	75	1, 021, 450	551	796	19	528, 505	2, 450, 455	3, 509, 367

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—NEW YORK, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Upholstering (see also Furniture)	226	$1, 380, 072	876	392	88	$542, 931	$2, 025, 055	$3, 240, 138
Upholstering materials	10	57, 200	71	7	4	16, 474	35, 699	70, 655
Varnish (see also Paints)	17	1, 395, 800	137		6	91, 638	1, 028, 705	1, 867, 155
Vault lights and ventilators	10	128, 450	89			50, 285	75, 140	210, 216
Vinegar	107	699, 181	406	15	15	85, 280	552, 026	840, 968
Washing-machines and clothes-wringers	4	69, 600	34	3	10	21, 100	31, 150	84, 460
Watch and clock materials	1	1, 000	8			1, 485	763	4, 048
Watch and clock repairing	261	378, 923	415	12	17	231, 032	304, 222	773, 067
Watch cases	4	156, 565	261	22	12	249, 816	717, 177	1, 109, 046
Whalebone and rattan	8	141, 950	92	21	8	55, 888	330, 406	457, 360
Wheelbarrows	11	117, 300	99		10	33, 390	52, 553	112, 742
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	1, 672	1, 832, 722	2, 386	2	34	806, 302	1, 080, 983	3, 025, 788
Whips	8	192, 500	96	68	10	71, 223	113, 632	270, 483
Windmills	1	60, 000	15			7, 000	20, 000	40, 000
Window blinds and shades	28	611, 800	348	25	20	201, 933	760, 772	1, 279, 625
Wire	4	325, 000	383		11	176, 666	435, 038	735, 418
Wirework	73	968, 303	912	76	248	553, 441	924, 923	1, 958, 398
Wood preserving	1	20, 000	12			7, 717	42, 700	61, 110
Wood pulp	12	265, 500	153		2	43, 800	48, 100	229, 200
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	182	982, 170	1, 323	29	95	671, 906	1, 000, 380	2, 163, 511
Wooden ware	68	380, 700	595	7	18	159, 800	248, 729	552, 301
Woolen goods (see also Carpets, other than rag; Felt goods; Gloves and mittens; Mixed textiles; Wool hats; Worsted goods).	159	8, 266, 878	3, 311	2, 128	691	1, 774, 143	6, 212, 835	9, 874, 973
Wool hats (see also Woolen goods)	10	1, 723, 005	1, 593	724	477	1, 041, 405	2, 308, 221	4, 205, 080
Worsted goods (see also Woolen goods)	6	1, 679, 157	477	874	356	385, 952	1, 348, 376	2, 321, 990
Zinc	3	26, 500	14			11, 502	10, 520	38, 385

A—NORTH CAROLINA, BY TOTALS OF COUNTIES.

The State	3, 802	$13, 045, 639	12, 818	2, 939	2, 352	$2, 740, 768	$13, 090, 937	$20, 095, 037
COUNTIES.								
Alamance	58	724, 766	197	384	112	93, 622	422, 489	709, 196
Alexander	32	69, 072	29	15	5	5, 371	62, 139	81, 715
Alleghany	6	7, 000	7			750	8, 930	11, 243
Anson	51	82, 160	131		6	17, 750	126, 095	169, 353
Ashe	57	49, 810	65	2		9, 801	82, 576	109, 231
Beaufort	28	99, 550	146		2	22, 697	63, 862	110, 811
Bertie	28	54, 565	91			10, 609	60, 085	91, 830
Bladen	27	74, 445	109		1	21, 285	85, 435	159, 280
Brunswick	21	36, 500	51			12, 160	23, 590	74, 420
Buncombe	58	156, 035	119	14	12	24, 615	127, 897	198, 886
Burke	35	61, 485	80		33	14, 232	84, 214	112, 376
Cabarrus	74	155, 579	186	52	40	44, 009	213, 561	313, 624
Caldwell	49	98, 025	94	31	7	16, 072	89, 055	126, 190
Camden	[illegible]	15, 000					25, 380	27, 965
Carteret	29	24, 550	28		4	2, 340	25, 570	31, 146
Caswell	41	96, 675	84	10	9	16, 588	125, 186	170, 419
Catawba	77	168, 865	193	61	64	34, 510	193, 251	282, 604
Chatham	93	576, 885	147	18	15	22, 853	227, 993	286, 709
Cherokee	21	29, 420	46			4, 705	23, 722	37, 971
Chowan	8	22, 300	21		5	3, 950	13, 611	22, 206
Clay	4	4, 500	4			625	15, 297	16, 732
Cleaveland	52	133, 200	127	45	23	25, 700	172, 575	262, 128
Columbus	29	48, 815	194	5		27, 950	103, 467	225, 210
Craven	40	186, 000	225	16	46	66, 864	200, 110	322, 519
Cumberland	81	460, 750	494	170	90	120, 348	353, 701	612, 461
Currituck (a)								
Dare	1	500	5			2, 500	3, 000	6, 000
Davidson	92	161, 230	204	23	18	42, 937	336, 878	452, 668
Davie	60	80, 552	98	24	22	14, 937	108, 188	150, 965
Duplin	48	70, 150	101	1		11, 868	99, 003	149, 618
Edgecombe	41	162, 525	162		16	26, 296	99, 166	162, 050
Forsyth	96	708, 850	650	396	388	199, 509	734, 840	1, 104, 749
Franklin	46	111, 825	113	9	17	18, 895	90, 689	134, 112
Gaston	87	635, 965	192	146	115	72, 245	579, 014	844, 308
Gates	3	3, 800	[illegible]			732	18, 092	19, 850
Graham (a)								
Granville	97	147, 800	241	21	31	35, 240	246, 761	354, 172
Greene	20	43, 450	80		1	8, 595	35, 716	61, 900
Guilford	98	438, 800	296	45	33	72, 305	350, 383	498, 526
Halifax	22	58, 725	83		4	12, 270	71, 660	99, 020
Harnett	23	42, 950	38		4	4, 765	32, 075	52, 202
Haywood	20	30, 160	24			3, 540	43, 759	52, 868
Henderson	30	18, 925	42	1		4, 689	29, 685	48, 074
Hertford	12	39, 400	88			14, 432	63, 353	97, 550
Hyde	6	12, 300	22			3, 490	10, 940	19, 020
Iredell	78	157, 920	103	26	8	17, 698	200, 004	256, 429
Jackson	11	14, 900	19			1, 918	25, 597	31, 677
Johnston	48	109, 550	129		3	20, 044	105, 011	156, 264
Jones	9	12, 200	17			768	26, 535	31, 040
Lenoir	15	57, 120	70		3	12, 518	82, 597	117, 445

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—NORTH CAROLINA, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Lincoln	61	$286, 355	134	46	12	$36, 783	$240, 589	$339, 726
McDowell	22	41, 300	50	3	1	8, 208	40, 204	58, 036
Macon	11	15, 240	11			1, 675	26, 458	32, 990
Madison	7	17, 500	13			1, 692	19, 045	24, 392
Martin	14	53, 100	61		6	8, 921	107, 387	137, 113
Mecklenburg	75	218, 925	267	10	19	66, 608	202, 791	349, 846
Mitchell	21	169, 200	56	1		6, 393	43, 785	67, 850
Montgomery	51	95, 025	102		3	11, 323	95, 295	129, 724
Moore	123	225, 110	669	3		115, 459	278, 463	522, 362
Nash	31	263, 875	125	45	44	25, 933	119, 950	178, 038
New Hanover	60	987, 975	782	88	75	277, 400	1, 087, 419	1, 799, 602
Northampton	28	55, 050	66		1	7, 552	55, 566	76, 870
Onslow	23	17, 075	62		2	4, 990	33, 660	45, 089
Orange	96	823, 000	635	219	277	129, 560	725, 972	1, 236, 984
Pamlico	11	16, 775	38			5, 379	21, 300	32, 701
Pasquotank	16	67, 600	88		1	23, 795	75, 920	124, 310
Pender	6	6, 750	13			1, 200	18, 265	24, 200
Perquimans	18	43, 850	42		6	10, 492	36, 192	56, 361
Person	42	138, 400	120	19	63	16, 367	116, 821	160, 895
Pitt	28	52, 400	84		2	9, 844	61, 831	85, 781
Polk	4	5, 800	16			1, 471	9, 025	12, 950
Randolph	98	487, 665	301	376	151	111, 009	617, 053	894, 462
Richmond	31	208, 000	138	61	31	36, 594	143, 707	232, 854
Robeson	118	175, 175	690	119	62	90, 748	280, 965	526, 941
Rockingham	67	404, 905	368	188	187	81, 099	325, 103	503, 596
Rowan	71	148, 165	177	42	38	32, 077	214, 384	293, 949
Rutherford	35	56, 850	69			13, 204	70, 729	95, 093
Sampson	48	85, 925	132			21, 178	176, 577	238, 515
Stanley	25	60, 200	47		5	4, 080	84, 741	95, 620
Stokes	69	95, 102	126	50	52	16, 506	165, 875	213, 804
Surry	65	218, 050	144	118	76	33, 084	183, 419	262, 705
Swain (a)								
Transylvania	10	10, 000	10			2, 170	22, 469	28, 539
Tyrrell	5	13, 130	15			751	3, 742	5, 617
Union	45	57, 680	127		10	18, 182	101, 674	143, 045
Wake	137	364, 198	763	36	62	174, 894	352, 960	712, 735
Warren	37	97, 400	84			10, 026	135, 825	162, 566
Washington	10	23, 600	33			5, 499	41, 093	56, 906
Watauga	25	23, 550	21			2, 807	28, 545	38, 346
Wayne	61	177, 010	280		12	60, 456	201, 168	335, 323
Wilkes	32	35, 500	29			3, 462	48, 922	58, 926
Wilson	30	77, 100	119		7	22, 450	70, 429	120, 039
Yadkin	50	51, 640	39		11	5, 674	55, 727	77, 262
Yancey	19	18, 940	18		1	2, 176	27, 155	35, 642

a Returned as having no manufactures.

B—NORTH CAROLINA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	3, 802	$13, 045, 639	12, 818	2, 939	2, 352	$2, 740, 768	$13, 090, 937	$20, 095, 037
Agricultural implements	34	132, 800	199		3	48, 550	62, 380	178, 449
Blacksmithing (see also Wheelwrighting)	186	61, 070	242		12	45, 139	65, 963	192, 507
Bookbinding and blank-book making	1	1, 500	4	4		2, 000	1, 000	4, 500
Boots and shoes, including custom work and repairing	95	71, 915	227	6	21	51, 262	114, 377	237, 849
Boxes, wooden, packing	2	1, 200	4			400	800	1, 700
Bread and other bakery products	1	1, 000	3			600	1, 500	2, 500
Brick and tile	66	54, 390	433	3	178	49, 928	34, 657	150, 874
Carpentering	27	70, 660	293	1	8	75, 010	101, 720	221, 970
Carriage and wagon materials	4	46, 100	95			27, 800	19, 700	57, 800
Carriages and wagons (see also Wheelwrighting)	47	202, 650	376		4	107, 731	139, 300	334, 900
Cheese and butter (factory)	2	900					152	250
Clothing, men's	3	1, 560	3	6		1, 016	3, 500	7, 500
Coffins, burial cases, and undertakers' goods	6	7, 500	7		1	1, 764	3, 970	9, 600
Confectionery	5	13, 750	34	7	2	4, 502	17, 608	29, 345
Cotton goods	49	2, 855, 800	764	1, 727	741	439, 659	1, 463, 645	2, 554, 482
Cooperage	55	22, 620	177			32, 736	32, 450	85, 655
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	3	12, 650	18			6, 000	9, 200	22, 400
Cutlery and edge tools	1	1, 000	9			2, 000	5, 000	10, 000
Fertilizers	1	350, 000	100		25	40, 000	150, 000	300, 000
Flouring- and grist-mill products	1, 313	3, 218, 053	1, 844			237, 777	5, 722, 603	6, 462, 806
Foundery and machine-shop products	29	189, 200	260		4	77, 878	105, 340	238, 550
Fruits and vegetables, canned and preserved	2	650	3	1	1	275	500	1, 700
Furniture (see also Mattresses and spring beds; Upholstering)	39	46, 960	82	2	1	21, 431	21, 365	73, 221
Furniture, chairs	3	2, 300	4	2		1, 600	500	4, 400
Hats and caps	1	500	2			200	200	800
Iron and steel	20	759, 400	63			7, 907	11, 792	41, 085
Leather, curried	97	66, 731	85		4	13, 590	132, 817	196, 302
Leather, tanned	133	183, 659	219		1	37, 846	222, 068	367, 920
Liquors, distilled	17	176, 049	110			20, 045	167, 223	255, 838
Liquors, vinous (see also Liquors, distilled)	1	5, 000	3			400	150	4, 000

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—NORTH CAROLINA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Lock- and gun-smithing	3	$690	2	....	....	$900	$250	$2, 700
Looking-glass and picture frames	1	2, 000	4	....	....	1, 000	5, 000	10, 000
Lumber, planed (see also Sash, doors, and blinds)	4	25, 000	26	....	2	6, 575	9, 400	21, 200
Lumber, sawed	776	1, 743, 217	2, 938	....	91	447, 431	1, 577, 139	2, 672, 796
Marble and stone work	8	7, 000	52	....	1	9, 668	9, 798	27, 010
Masonry, brick and stone	1	150	4	....	....	350	300	1, 500
Mattresses and spring beds (see also Furniture)	2	1, 600	8	7	....	800	927	2, 500
Musical instruments, organs and materials	1	1, 000	5	....	....	3, 000	5, 000	10, 000
Painting and paperhanging	5	2, 340	12	1	1	4, 456	4, 200	11, 950
Paints	1	4, 000	1	....	....	500	1, 760	3, 600
Paper	4	129, 500	47	29	4	20, 860	88, 200	145, 000
Patent medicines and compounds	1	1, 000	5	....	....	600	1, 000	3, 000
Plumbing and gasfitting	3	2, 500	10	....	....	6, 660	17, 900	28, 270
Printing and publishing	31	95, 600	158	10	34	63, 120	55, 392	179, 132
Rice cleaning and polishing	1	5, 000	3	....	1	700	8, 610	10, 667
Saddlery and harness	37	54, 235	85	....	10	22, 457	53, 517	108, 583
Sash, doors, and blinds (see also Lumber, planed)	12	71, 600	184	....	9	55, 593	66, 024	179, 120
Sewing machines and attachments	1	4, 000	3	....	....	350	700	1, 700
Shipbuilding	11	15, 400	38	....	....	19, 256	32, 075	57, 219
Silversmithing	1	50	....	....	....	....	25	500
Stone- and earthen-ware	2	1, 600	2	....	....	100	600	1, 650
Tar and turpentine, not including farm products	184	473, 915	1, 610	130	58	255, 849	916, 228	1, 758, 488
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	23	32, 000	64	....	3	19, 520	39, 450	77, 706
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	118	1, 512, 900	1, 544	949	1, 090	362, 859	1, 252, 830	2, 215, 154
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	8	13, 500	37	3	2	12, 628	21, 725	46, 200
Upholstering (see also Furniture)	3	1, 400	3	1	....	850	1, 825	4, 800
Watch and clock repairing	3	2, 500	4	....	....	2, 300	1, 175	5, 800
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	107	65, 675	161	....	5	34, 145	47, 700	136, 729
Wooden ware	1	15, 000	25	....	20	10, 000	5, 000	20, 000
Woolen goods	49	203, 100	120	50	15	23, 195	255, 707	303, 160

A—OHIO, BY TOTALS OF COUNTIES.

The State	20, 699	$188, 939, 614	152, 217	18, 563	12, 829	$62, 103, 800	$215, 334, 258	$348, 298, 390
COUNTIES.								
Adams	104	178, 675	199	....	13	44, 035	236, 695	366, 500
Allen	194	929, 675	1, 046	43	37	318, 887	809, 197	1, 523, 007
Ashland	146	467, 340	359	7	4	112, 696	917, 862	1, 218, 849
Ashtabula	363	1, 174, 305	1, 167	66	41	293, 097	1, 463, 573	2, 276, 335
Athens	92	544, 292	477	2	3	197, 797	408, 358	715, 334
Auglaize	228	797, 351	654	30	19	213, 517	920, 586	1, 479, 393
Belmont	238	2, 356, 125	2, 017	106	417	1, 061, 006	2, 658, 936	4, 661, 649
Brown	193	531, 170	541	10	27	131, 115	665, 993	994, 341
Butler	368	4, 785, 225	2, 281	574	276	1, 050, 267	4, 705, 100	7, 157, 877
Carroll	47	118, 075	69	....	1	15, 258	182, 682	233, 961
Champaign	148	630, 635	763	14	12	219, 480	833, 727	1, 369, 747
Clarke	218	7, 348, 153	3, 847	50	200	1, 654, 300	4, 682, 692	8, 647, 269
Clermont	179	405, 530	494	68	25	138, 374	528, 577	876, 947
Clinton	147	263, 781	317	3	16	69, 016	385, 057	588, 603
Columbiana	401	3, 219, 397	3, 321	236	339	1, 343, 291	3, 042, 005	5, 459, 490
Coshocton	216	444, 975	414	15	2	115, 827	663, 406	968, 563
Crawford	150	700, 611	539	64	8	190, 207	785, 299	1, 265, 114
Cuyahoga	1, 270	20, 699, 299	18, 880	2, 366	1, 450	8, 826, 542	33, 076, 644	50, 910, 564
Darke	173	354, 835	584	2	35	147, 709	660, 950	1, 055, 526
Defiance	144	1, 025, 300	966	17	66	324, 109	797, 780	1, 444, 343
Delaware	163	593, 600	506	59	35	166, 810	667, 336	1, 034, 229
Erie	144	2, 312, 050	1, 757	11	101	610, 928	1, 545, 649	2, 757, 086
Fairfield	150	671, 860	629	96	12	210, 125	782, 953	1, 242, 845
Fayette	74	124. 625	229	5	13	51, 071	200, 469	329, 212
Franklin	433	5, 874, 115	5, 547	301	289	2, 103, 333	6, 164, 482	10, 609, 644
Fulton	151	340, 860	397	14	10	98, 404	502, 043	752, 365
Gallia	101	544, 364	378	1	37	99, 234	730, 370	1, 022, 054
Geauga	141	298, 900	266	23	2	61, 758	458, 326	662, 547
Greene	197	946, 910	628	46	19	202, 133	1, 638, 971	2, 187, 809
Guernsey	85	224, 360	216	4	3	48, 849	362, 551	503, 366
Hamilton	3, 494	52, 689, 910	40, 204	10, 586	5, 263	20, 017, 718	64, 330, 300	108, 338, 757
Hancock	163	554, 445	523	21	48	153, 757	586, 153	1, 088, 706
Hardin	140	683, 885	540	19	41	164, 464	620, 810	995, 462
Harrison	130	225, 850	242	13	10	71, 166	534, 125	730, 968
Henry	113	441, 195	420	14	66	104, 949	503, 101	811, 892
Highland	143	404, 392	370	7	13	91, 335	688, 743	955, 678
Hocking	54	2, 040, 415	1, 095	2	12	182, 351	506, 561	768, 798
Holmes	130	287, 255	221	7	3	53, 556	432, 920	585, 938
Huron	169	634, 558	630	16	50	219, 893	1, 456, 071	1, 955, 714
Jackson	65	1, 982, 975	1, 631	6	91	573, 534	836, 350	1, 244, 877
Jefferson	229	2, 079, 016	1, 574	105	161	702, 134	2, 013, 213	2, 945, 230
Knox	175	861, 150	803	28	18	252, 873	795, 747	1, 423, 259
Lake	94	379, 150	408	6	13	113, 501	436, 619	722, 301
Lawrence	81	4, 236, 050	3, 511	1	250	1, 113, 617	1, 728, 122	2, 871, 246
Licking	205	480, 599	557	29	17	157, 288	483, 185	878, 753

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—OHIO, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Logan	163	$441, 510	397	42	21	$139, 193	$861, 334	$1, 222, 415
Lorain	224	908, 425	915	43	68	279, 159	1, 141, 494	1, 881, 837
Lucas	510	6, 045, 280	5, 339	1, 045	695	2, 343, 987	6, 924, 629	11, 402, 919
Madison	87	111, 553	171	7	2	42, 120	128, 098	227, 399
Mahoning	320	4, 871, 691	3, 779	33	145	1, 702, 668	7, 310, 399	9, 847, 238
Marion	113	381, 060	365	1	11	110, 191	459, 794	716, 440
Medina	191	485, 000	511	46	23	123, 480	586, 579	891, 533
Meigs	149	1, 122, 010	967	20	33	213, 624	724, 041	1, 186, 861
Mercer	90	213, 237	318	3	24	51, 806	280, 207	430, 296
Miami	190	1, 363, 666	1, 068	65	42	372, 717	1, 877, 043	2, 839, 868
Monroe	162	316, 125	236	4	7	36, 813	367, 485	496, 600
Montgomery	656	6, 902, 989	5, 674	536	482	2, 480, 374	7, 229, 531	13, 226, 760
Morgan	101	339, 943	335	41	36	104, 711	555, 910	798, 303
Morrow	133	248, 610	305	16	8	75, 391	351, 023	553, 656
Muskingum	377	2, 943, 057	2, 615	238	182	1, 006, 543	3, 594, 359	5, 560, 465
Noble	105	149, 185	141	....	11	20, 921	281, 357	371, 884
Ottawa	78	783, 640	479	10	73	135, 778	721, 824	1, 109, 115
Paulding	51	317, 200	339	....	25	67, 735	231, 890	341, 061
Perry	120	1, 095, 620	909	2	28	270, 185	730, 006	1, 085, 227
Pickaway	148	594, 475	519	27	26	132, 356	702, 499	1, 023, 511
Pike	46	634, 264	130	3	6	25, 646	188, 940	294, 492
Portage	225	808, 175	821	50	53	277, 977	949, 086	1, 537, 489
Preble	185	357, 865	427	36	21	100, 107	589, 812	880, 019
Putnam	110	350, 050	413	4	35	86, 251	404, 993	620, 882
Richland	297	2, 794, 321	1, 414	69	62	529, 978	2, 286, 071	3, 850, 656
Ross	196	810, 529	644	16	11	222, 075	923, 733	1, 491, 728
Sandusky	189	1, 068, 985	1, 179	44	62	408, 529	1, 676, 094	2, 583, 316
Scioto	230	2, 408, 005	2, 314	460	157	817, 772	1, 897, 319	2, 961, 973
Seneca	240	1, 066, 857	1, 045	51	16	298, 003	1, 020, 618	1, 720, 094
Shelby	104	497, 504	588	....	35	137, 167	675, 178	1, 029, 079
Stark	462	5, 621, 960	3, 590	72	56	1, 311, 035	4, 265, 733	7, 986, 627
Summit	365	6, 317, 621	3, 508	139	258	1, 622, 609	6, 541, 515	10, 484, 576
Trumbull	299	2, 294, 760	2, 298	43	151	844, 793	3, 245, 892	4, 822, 084
Tuscarawas	302	1, 545, 984	984	39	27	244, 953	1, 824, 290	2, 461, 791
Union	82	220, 160	291	7	9	56, 673	261, 787	397, 517
Van Wert	92	599, 463	690	6	52	179, 911	639, 298	1, 054, 417
Vinton	51	793, 660	100	1	3	20, 692	186, 029	240, 105
Warren	160	684, 744	571	92	60	132, 738	601, 201	971, 381
Washington	181	811, 573	869	108	72	250, 025	1, 121, 608	1, 678, 583
Wayne	254	1, 002, 170	856	17	31	274, 644	1, 491, 907	2, 232, 883
Williams	173	583, 635	556	7	6	136, 149	626, 831	961, 067
Wood	282	693, 375	785	15	126	185, 683	868, 315	1, 337, 406
Wyandot	163	452, 450	545	12	12	139, 327	558, 217	854, 689

B—OHIO, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	20, 699	$188, 939, 614	152, 217	18, 563	12, 829	$62, 103, 800	$215, 334, 258	$348, 298, 390
Agricultural implements	156	16, 111, 576	7, 281	13	242	2, 981, 065	7, 243, 326	15, 479, 825
Artificial limbs (see also Surgical appliances)	4	3, 850	11	....	1	4, 904	3, 655	14, 225
Awnings and tents	15	23, 250	44	55	4	29, 004	73, 910	134, 662
Axle-grease	3	102, 700	9	....	....	3, 269	38, 665	57, 148
Bagging, flax, hemp, and jute	4	167, 500	128	96	48	49, 000	152, 600	237, 600
Bags, other than paper	2	25, 000	13	9	6	9, 000	65, 000	99, 000
Bags, paper	8	157, 000	67	167	28	60, 445	573, 872	739, 808
Baking and yeast powders (see also Drugs and chemicals)	10	51, 150	42	....	4	16, 010	131, 197	241, 125
Baskets, rattan and willow ware	25	75, 775	119	6	27	43, 975	65, 110	139, 560
Bells	1	17, 000	20	....	....	6, 000	9, 000	21, 000
Belting and hose, leather	7	64, 700	35	....	1	18, 329	96, 107	136, 554
Belting and hose, rubber	1	65, 000	102	....	18	21, 721	200, 000	235, 000
Billiard tables and materials	4	83, 300	46	....	....	30, 550	135, 080	249, 080
Blacking	3	5, 400	2	....	....	600	1, 613	3, 722
Blacksmithing (see also Wheelwrighting)	2, 175	1, 344, 232	2, 527	1	23	736, 553	974, 710	3, 038, 310
Bookbinding and blank-book making	51	361, 510	314	267	46	238, 305	333, 107	851, 206
Boots and shoes, including custom work and repairing	1, 729	2, 285, 927	4, 535	731	308	1, 826, 524	3, 684, 621	7, 055, 003
Boot and shoe findings	5	28, 000	9	2	....	4, 366	63, 200	91, 000
Boot and shoe uppers	6	24, 400	29	24	1	17, 488	42, 350	72, 820
Boxes, cigar	20	39, 150	71	66	41	47, 260	102, 130	197, 620
Boxes, fancy and paper	13	44, 711	44	53	14	37, 081	47, 743	105, 087
Boxes, wooden, packing	35	138, 758	257	24	23	76, 434	129, 785	265, 262
Brass castings	28	289, 777	356	....	35	164, 919	430, 162	806, 736
Bread and other bakery products	497	1, 060, 131	1, 225	155	121	526, 678	2, 440, 001	3, 805, 506
Brick and tile (see also Drain and sewer pipe; Terra-cotta ware)	825	2, 723, 528	5, 527	17	583	1, 114, 133	1, 185, 794	3, 481, 291
Bridges	10	700, 500	955	....	14	364, 233	859, 748	1, 660, 563
Brooms and brushes	84	232, 087	514	165	232	161, 729	277, 021	583, 640
Calcium lights	1	500	1	....	....	700	1, 200	3, 000
Carpentering	623	1, 053, 180	3, 014	42	57	1, 124, 499	2, 543, 753	4, 815, 589
Carpets, rag	75	12, 947	56	8	6	18, 841	33, 486	92, 202

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—OHIO, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Carpets, wood	1	$14, 000	14			$5, 500	$12, 300	$25, 000
Carriage and wagon materials	63	2, 239, 265	1, 997	4	72	730, 565	1, 039, 737	2, 652, 823
Carriages and sleds, children's	5	46, 000	105	13	32	33, 165	63, 717	143, 942
Carriages and wagons (see also Wheelwrighting)	325	4, 234, 481	6, 387	92	601	2, 610, 268	5, 416, 656	10, 043, 404
Cars, railroad, street, and repairs	10	1, 264, 000	1, 512		27	675, 806	2, 133, 288	3, 429, 996
Cement	2	17, 000	22	3	4	9, 040	8, 500	21, 250
Cheese and butter (factory)	452	948, 702	701	104	14	162, 985	1, 985, 050	2, 756, 793
Cigar molds	1	64, 000	55			25, 000	36, 000	78, 000
Cleansing and polishing preparations	1	25			1	30	200	500
Cloth finishing	2	600	2	2	1	850	500	2, 800
Clothing, men's	647	8, 651, 094	6, 026	7, 659	733	4, 136, 382	12, 043, 020	20, 008, 398
Clothing, women's	25	249, 902	52	1, 153	49	275, 875	756, 902	1, 280, 654
Coffee and spices, roasted and ground	27	416, 000	208	41	11	135, 292	1, 118, 327	1, 517, 114
Coffins, burial cases, and undertakers' goods	37	1, 043, 650	738	141	107	376, 843	667, 880	1, 489, 926
Coke	15	144, 012	150		3	51, 977	233, 831	334, 546
Combs	1	900	1			365	200	1, 365
Confectionery	64	377, 875	339	118	40	156, 449	882, 802	1, 248, 288
Cooperage	412	1, 371, 100	2, 768	2	341	969, 610	1, 852, 907	3, 486, 032
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	5	34, 000	50		2	25, 054	57, 740	102, 536
Cordage and twine	10	35, 100	53	7	25	23, 105	38, 950	76, 410
Corsets	4	12, 900	3	45	1	7, 395	10, 800	25, 000
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	6	857, 000	165	320	71	130, 897	432, 592	920, 658
Cutlery and edge tools (see also Hardware; Tools)	28	916, 900	538	8	23	246, 487	321, 759	790, 000
Dentistry, mechanical	66	66, 850	35	2	1	26, 556	40, 159	179, 295
Dentists' materials	1	2, 000	1			750	3, 500	5, 000
Drain and sewer pipe (see also Brick and tile; Terra-cotta ware)	5	89, 500	57			22, 230	13, 700	93, 000
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	46	839, 500	366	6	10	119, 219	618, 145	1, 082, 420
Dyeing and cleaning	20	59, 850	36	20	3	25, 022	13, 658	71, 507
Dyeing and finishing textiles	7	58, 300	27	13	3	20, 401	78, 400	144, 295
Electric lights	1	200, 000	150			80 000	100, 000	300, 000
Electrical apparatus and supplies (see also Telegraph and telephone apparatus).	6	83, 900	32	8	6	15, 310	80, 900	174, 180
Electroplating	12	38, 610	107	2	5	37, 037	26, 865	102, 090
Enameled goods	2	80, 000	174			24, 640	115, 235	154, 622
Engraving and die-sinking	15	12, 150	27	8	10	17, 774	7, 494	41, 721
Engraving, steel	3	1, 300	3			1, 600	1, 100	5, 600
Engraving, wood	6	3, 300	15		1	7, 150	1, 625	19, 500
Envelopes	1	35, 000	9	8	1	8, 000	37, 000	65, 000
Explosives and fireworks	4	160, 350	71	28	23	42, 100	463, 341	608, 368
Fancy articles	6	28, 500	40	49	109	39, 410	61, 248	138, 605
Fertilizers	14	593, 900	214		1	67, 530	325, 120	531, 540
Files (see also Saws)	11	33, 850	87		18	40, 630	26, 675	94, 700
Flags and banners	1	2, 000	2	1		1, 000	500	2, 000
Flavoring extracts	4	10, 800	10	1	2	3, 980	9, 300	17, 800
Flax, dressed	15	86, 350	106	1	26	21, 750	35, 907	76, 834
Flouring- and grist-mill products	1, 380	12, 328, 847	3, 874		1	1, 221, 494	34, 157, 024	38, 950, 264
Food preparations (see page 39)	17	75, 050	143	39	55	27, 439	133, 331	190, 508
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	419	12, 770, 649	11, 857	[illegible]	378	5, 105, 596	8, 407, 972	18, 242, 325
Foundery supplies	3	35, 500	26		1	9, 960	78, 300	115, 650
Fruits and vegetables, canned and preserved	20	302, 880	283	631	174	102, 935	651, 662	885, 105
Furnishing goods, men's	5	21, 400	13	31	6	9, 950	68, 050	91, 400
Furniture (see also Mattresses and spring beds; Upholstering)	412	4, 417, 076	4, 929	176	566	2, 080, 243	2, 694, 602	6, 865, 027
Furniture, chairs	37	497, 026	782	219	155	321, 918	274, 472	821, 702
Furs, dressed	2	52, 000	12	35		21, 000	87, 000	123, 000
Gas and lamp fixtures	2	12, 800	7			2, 550	4, 400	9, 200
Gas machines and meters	6	121, 000	76		1	41, 998	77, 100	139, 670
Glass	20	1, 194, 850	1, 170	81	437	644, 520	459, 333	1, 549, 320
Glass, cut, stained, and ornamented	3	5, 650	14			8, 700	3, 525	23, 600
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	3	1, 100	4	1		1, 400	3, 500	7, 000
Glue	8	206, 600	57		26	22, 934	40, 667	157, 700
Gold and silver leaf and foil	2	3, 800	9	7		4, 700	12, 000	21, 100
Grease and tallow	8	46, 550	35		1	18, 666	188, 200	232, 100
Grindstones	5	37, 000	45			9, 050	7, 380	31, 900
Gunpowder	3	550, 000	113			55, 000	280, 000	401, 073
Hairwork	33	51, 465	18	60	1	18, 543	32, 120	82, 245
Hand-knit goods	2	700		6		760	2, 500	6, 000
Hand-stamps	6	8, 400	15	1		4, 200	9, 800	27, 000
Handles, wooden	45	427, 550	479	8	13	156, 681	243, 606	531, 167
Hardware (see also Cutlery and edge tools; Tools)	39	1, 357, 109	1, 105	11	93	407, 894	744, 963	1, 592, 827
Hardware, saddlery	3	178, 000	338	12	30	93, 120	275, 000	440, 000
Hats and caps, not including wool hats	16	28, 500	45	141	4	35, 425	53, 376	119, 610
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	23	187, 000	53	574	118	94, 858	241, 583	418, 825
Housefurnishing goods	2	10, 500	21		1	3, 300	5, 900	13, 000
Ink	5	46, 500	16	7	8	11, 645	65, 700	108, 800
Instruments, professional and scientific	10	36, 700	40	2	2	18, 957	13, 298	53, 049
Iron and steel	134	25, 141, 294	18, 885		1, 186	8, 265, 070	23, 997, 915	34, 918, 360
Iron bolts, nuts, washers, and rivets	8	522, 500	571	25	5	260, 423	727, 926	1, 310, 711
Iron forgings	4	310, 000	263			106, 500	363, 000	590, 000
Iron nails and spikes, cut and wrought	1	75, 000	30	8	2	16, 970	30, 000	49, 000
Iron pipe, wrought	1	10, 000	30		5	18, 000	114, 550	150, 000
Iron railing, wrought	18	201, 050	128		22	51, 980	130, 419	223, 786
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	18	195, 350	291		1	102, 087	305, 115	549, 567
Jewelry	23	168, 250	225	25	49	149, 836	158, 735	470, 500
Jewelry and instrument cases	1	500	2			500	500	1, 340
Kaolin and ground earths	9	76, 500	37			14, 196	24, 112	49, 046
Kindling wood	2	2, 100	12			2, 880	3, 500	7, 720

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—OHIO, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Labels and tags	3	$28,000	19	10		$8,400	$12,170	$27,750
Lamps and reflectors	7	309,500	257	27	30	100,247	261,400	432,000
Lapidary work	1	300					200	600
Lasts	2	42,000	41	8	1	15,100	11,100	35,300
Lead, bar, pipe, sheet, and shot	3	61,000	21			9,700	119,000	208,000
Leather, curried	251	1,089,075	563	5	4	234,209	3,141,024	3,886,627
Leather, dressed skins	3	21,000	24			9,250	77,000	98,000
Leather, tanned	302	2,022,990	912	1	14	373,595	3,247,592	4,357,273
Lightning rods	3	40,000	13			6,950	96,000	144,500
Lime	53	352,456	386		19	121,251	171,633	431,328
Lithographing (see also Printing and publishing)	13	423,100	422	36	44	255,663	407,617	856,744
Liquors, distilled	37	4,813,185	976	5	11	406,197	4,533,049	6,692,736
Liquors, malt	163	8,178,545	2,692	2	12	1,184,825	5,110,587	9,125,014
Liquors, vinous (see also Liquors, distilled)	21	747,500	133	23	9	54,990	583,700	773,110
Lock- and gun-smithing	27	34,345	26		4	10,184	10,085	47,017
Looking-glass and picture frames	39	613,700	590	3	69	239,403	408,573	788,919
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	148	1,728,551	1,532	1	29	605,926	1,773,590	2,961,567
Lumber, sawed	2,352	7,944,412	8,769		548	1,708,300	8,896,106	13,864,460
Malt	29	1,402,931	247	7	2	125,287	1,391,584	1,756,551
Mantels, slate, marble, and marbleized	6	241,000	210		17	96,722	137,740	311,330
Marble and stone work	246	1,127,930	1,564	6	70	633,312	904,069	2,240,160
Masonry, brick and stone	102	220,270	850		14	325,121	479,113	1,022,469
Matches	1	300,000	102	46	80	68,686	600,000	935,529
Mattresses and spring beds (see also Furniture)	22	98,890	84	19	15	34,943	128,285	223,860
Millinery and lace goods	22	81,450	25	259	11	77,486	162,852	320,091
Millstones	2	18,000	21		3	7,651	18,808	38,000
Mineral and soda waters	34	132,200	151	2	19	47,387	79,412	210,792
Mirrors	1	800	2			1,200	5,000	10,000
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	5	20,200	20	45	10	14,650	28,320	80,970
Models and patterns	21	19,450	42	8	4	19,893	9,615	51,396
Musical instruments and materials (not specified)	7	12,300	17			6,875	4,925	19,625
Musical instruments, organs and materials	6	86,000	105		26	53,300	58,200	132,315
Musical instruments, pianos and materials	1	15,000	20			6,000	3,000	15,000
Oil, castor	1	3,500	4		1	350	800	2,000
Oil, cottonseed and cake	1	150,000	45		10	7,450	400,000	435,000
Oil, illuminating, not including petroleum refining	1	5,000	2			900	50,000	55,000
Oil, lard	9	472,500	166		2	42,772	1,035,636	1,141,835
Oil, linseed	21	1,123,550	299			143,454	1,903,103	2,381,934
Oil, lubricating	16	786,925	164		4	78,692	1,031,112	1,431,039
Oleomargarine	1	300,000	20			8,000	108,000	250,000
Painting and paperhanging	261	221,411	935	10	10	334,129	357,869	996,572
Paints (see also Varnish)	15	447,000	232	12	15	123,164	835,734	1,263,980
Paperhangings	1	3,500	1			500	2,000	3,000
Paper (see also Envelopes; Wood pulp)	60	4,804,274	1,684	527	97	839,231	3,024,068	5,108,194
Patent medicines and compounds (see also Drugs and chemicals)	61	570,600	157	18	14	78,005	406,804	668,141
Paving materials	4	55,000	50			4,000	9,000	15,000
Pens, gold	1	55,000	55	5		25,000	15,000	65,000
Perfumery and cosmetics	2	10,300	8	2		3,120	5,400	10,800
Photographing	101	147,500	178	38	11	92,407	92,371	332,081
Pickles, preserves, and sauces	4	38,000	62	12		17,200	95,400	135,000
Pipes, tobacco	1	25,000	40			12,000	18,000	50,000
Plumbing and gasfitting	104	324,868	459	6	29	191,947	457,901	850,515
Pocket-books	1	1,200	4			2,130	1,500	6,000
Printing and publishing (see also Lithographing)	237	4,688,535	3,461	543	976	2,067,593	2,382,305	6,579,565
Printing materials	1	3,200	1			468	7,500	13,000
Pumps, not including steam pumps	66	313,875	300		3	114,326	184,650	384,561
Refrigerators	6	84,100	81		2	26,803	30,484	89,540
Regalia and society banners and emblems	6	118,200	37	136	27	70,550	150,031	289,414
Roofing and roofing materials	46	333,300	336	2	3	133,276	592,944	900,141
Rubber and elastic goods	4	107,600	59	18	2	30,867	233,232	305,494
Rules, ivory and wood	1	2,000	8			3,000	5,000	10,800
Saddlery and harness	743	1,271,869	1,877	25	65	671,124	1,487,019	3,170,413
Safes, doors, and vaults, fire-proof	5	964,000	1,125		12	587,428	580,000	1,635,000
Salt	25	832,600	449	2	2	105,261	202,543	363,791
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	102	2,147,537	2,146	1	164	883,910	2,429,480	4,043,844
Saws	11	272,750	190		14	75,118	129,573	281,807
Scales and balances	4	22,200	22		2	9,350	6,300	30,000
Screws	2	550,000	140			72,124	202,441	307,170
Sewing-machine cases	5	36,000	275		22	108,600	126,000	255,600
Sewing machines and attachments	12	358,100	640	9	143	389,805	774,281	1,370,025
Shingles, split	1	600	2			250	475	725
Shipbuilding	54	423,050	773			414,360	985,960	1,552,210
Shirts	35	220,300	84	516	7	139 224	335,637	575,422
Shoddy (see also Mixed textiles)	1	250,000	30	216		40,000	575,000	700,000
Show-cases	6	38,200	118		21	60,316	83,019	171,637
Silk and silk goods (see also Mixed textiles)	6	24,700	21	73	41	12,550	19,495	53,110
Silversmithing	3	725	4			1,900	500	3,850
Slaughtering and meat-packing, not including retail butchering establishments.	93	5,487,682	1,950		74	633,044	17,173,446	19,231,297
Smelting and refining (base scrap metal, not from the ore)	1	10,000	5			1,500	26,000	30,000
Soap and candles	27	422,650	229	39	16	78,245	852,483	1,028,778

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—OHIO, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Spectacles and eyeglasses	3	$1, 125	2			$460	$500	$2, 500
Springs, steel, car, and carriage	5	240, 000	285			128, 784	269, 325	477, 905
Starch	5	1, 400, 000	505	60	40	179, 030	1, 099, 292	1, 754, 710
Stationery goods	3	27, 400	21	4	7	5, 700	14, 400	26, 000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	4	5, 500	19		2	7, 800	5, 000	21, 000
Stencils and brands	10	17, 650	32		8	19, 849	7, 550	42, 020
Stereotyping and electrotyping (see also Type founding)	7	16, 050	28		3	17, 745	9, 860	38, 348
Stone- and earthen-ware	179	1, 675, 055	2, 042	226	391	894, 322	628, 273	2, 106, 474
Surgical appliances (see also Artificial limbs)	8	37, 600	22	26		16, 117	23, 635	77, 197
Taxidermy	1	250					100	1, 000
Telegraph and telephone apparatus (see also Electrical apparatus and supplies).	3	3, 400	13			4, 503	7, 100	16, 000
Terra-cotta ware (see also Brick and tile; Drain and sewer pipe)	1	50, 000	70		30	30, 000	16, 000	80, 000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	704	1, 456, 313	1, 826	10	87	699, 108	1, 626, 346	3, 230, 208
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	26	1, 332, 345	734	456	367	393, 083	3, 198, 926	4, 378, 302
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	652	1, 341, 070	3, 589	552	571	1, 495, 859	2, 004, 439	5, 018, 638
Tools (see also Cutlery and edge tools; Hardware)	10	297, 250	273	3	8	115, 804	87, 500	328, 550
Toys and games	1	700	1			468	1, 000	1, 800
Trunks and valises	26	180, 500	357	25	28	110, 513	221, 535	456, 481
Type founding (see also Stereotyping and electrotyping)	2	329, 990	189	57	21	125, 360	63, 700	226, 889
Umbrellas and canes	14	26, 550	18	14	7	12, 875	39, 770	73, 550
Upholstering (see also Furniture)	38	211, 125	183	26	55	76, 480	278, 338	438, 940
Upholstering materials	7	39, 200	31		1	8, 500	24, 375	45, 500
Varnish (see also Paints)	12	635, 000	90			54, 770	779, 247	1, 042, 835
Veneering	1	211, 000	50		16	23, 900	125, 332	229, 205
Vinegar	21	153, 775	79		1	26, 238	115, 482	235, 288
Washing-machines and clothes-wringers	8	18, 279	26			9, 702	29, 969	60, 600
Watch and clock repairing	85	152, 195	140	12	13	65, 484	47, 127	216, 916
Watches	1	2, 000	2			2, 500	10, 000	18, 000
Wheelbarrows	4	12, 700	39		7	10, 800	15, 200	34, 660
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	946	1, 178, 790	1, 818	1	24	552, 308	637, 463	1, 831, 955
Whips	1	10, 000	6		2	7, 000	20, 000	30, 000
Windmills	1	400	1			275	500	1, 000
Window blinds and shades	16	39, 600	45	12	1	17, 169	83, 400	141, 099
Wire	3	527, 471	1, 298		257	60, 230	1, 251, 000	1, 895, 000
Wirework	22	235, 725	295	3	62	83, 035	339, 380	561, 600
Wood pulp	1	2, 000	5			1, 500	1, 000	5, 000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	51	148, 120	250	23	19	100, 357	138, 185	355, 177
Wooden ware	28	353, 364	434	16	129	179, 890	379, 623	714, 432
Woolen goods (see also Gloves and mittens; Mixed textiles; Worsted goods).	122	1, 316, 340	722	413	189	256, 214	1, 084, 323	1, 678, 189
Worsted goods (see also Woolen goods)	1	67, 000	51	32	25	23, 400	69, 606	101, 250

A—OREGON, BY TOTALS OF COUNTIES.

	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	1, 080	$6, 312, 056	3, 280	96	97	$1, 667, 046	$6, 954, 436	$10, 931, 232
COUNTIES.								
Baker	26	83, 150	33			15, 450	67, 917	119, 883
Benton	52	174, 100	69			25, 983	124, 340	209, 462
Clackamas	59	787, 475	482	20	11	156, 927	816, 625	1, 251, 691
Clatsop	28	131, 900	73			38, 780	166, 151	266, 987
Columbia	[illegible]	72, 800	28			11, 540	90, 230	135, 755
Coos	30	211, 000	77	1	1	30, 696	183, 997	277, 766
Curry (*a*)								
Douglas	67	277, 125	100			32, 945	232, 928	384, 820
Grant	19	53, 800	30			9, 222	61, 680	97, 701
Jackson	37	219, 800	91	8	1	53, 280	181, 877	296, 721
Josephine	13	25, 150	10			2, 475	20, 575	34, 413
Lake	29	57, 850	32			9, 384	43, 210	80, 640
Lane	49	227, 650	68	2	10	29, 112	240, 590	336, 570
Linn	118	485, 526	217	8	10	98, 297	617, 061	976, 721
Marion	111	608, 330	290	[illegible]	4	147, 945	1, 095, 920	1, 424, 979
Multnomah	162	1, 958, 025	1, 050	48	50	700, 878	1, 567, 246	2, 867, 271
Polk	49	138, 650	96		2	30, 295	193, 470	288, 231
Tillamook	3	15, 900	4			1, 790	5, 100	10, 300
Umatilla	26	180, 500	60			32, 841	281, 253	374, 465
Union	48	172, 925	80	1		31, 654	151, 574	251, 973
Wasco	45	150, 850	217		2	154, 314	404, 227	657, 396
Washington	30	104, 900	84	2	5	25, 073	162, 445	223, 845
Yam Hill	71	174, 650	89		1	28, 165	246, 020	363, 642

a Returned as having no manufactures.

B—OREGON, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	1, 080	$6, 312, 056	3, 280	96	97	$1, 667, 046	$6, 954, 436	$10, 931, 232
Agricultural implements	4	35, 000	17		1	9, 100	7, 073	24, 450
Awnings and tents	1	10, 000	7			5, 000	30, 000	38, 000
Baskets, rattan and willow ware	1	500	1			560	100	1, 200
Blacksmithing (see also Wheelwrighting)	146	120, 225	157		2	63, 190	102, 118	311, 450
Boot and shoe uppers	2	10, 500	17		2	10, 250	6, 500	20, 000

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—OREGON, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Boots and shoes, including custom work and repairing	86	$75,405	88			$49,717	$111,991	$238,887
Boxes, wooden, packing	1	10,000	12			7,000	12,000	22,000
Brass castings	1	3,000	4			3,750	5,000	11,000
Bread and other bakery products	14	59,150	47	3	7	30,300	98,500	165,000
Brick and tile	23	55,496	184	1	2	43,814	19,197	104,240
Brooms and brushes	2	5,250	11			6,000	10,700	21,800
Carpentering	16	27,500	123			88,498	222,903	341,339
Carriages and wagons (see also Wheelwrighting)	9	48,800	49			30,100	46,650	105,000
Cheese and butter (factory)	24	192,650	32	6	1	6,170	20,233	43,216
Clothing, men's	22	45,230	45	13		29,151	57,900	115,404
Coffee and spices, roasted and ground	2	17,000	1	3		1,000	24,000	31,000
Coffins, burial cases, and undertakers' goods	5	18,425	3			1,200	7,450	12,950
Confectionery	4	26,700	13	1	1	10,050	33,500	50,700
Cooperage	12	42,100	62		1	17,352	32,200	92,712
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	1	4,000	1			100	500	900
Cutlery and edge tools	1	300	1			300	185	900
Dentistry, mechanical	3	3,200					1,000	4,800
Drugs and chemicals	2	30,800	5			2,800	8,000	18,000
Explosives and fireworks	1	500	1			100	500	2,000
Flouring- and grist-mill products	106	1,286,200	307			139,882	2,978,714	3,475,531
Foundery and machine-shop products	16	260,500	173		8	139,022	121,911	352,300
Fruits and vegetables, canned and preserved	2	19,150	25	3	10	3,000	8,150	12,688
Furniture (see also Mattresses and spring beds; Upholstering)	33	206,050	105	4	10	65,910	91,325	227,303
Furniture, chairs	3	11,000	14			4,100	3,705	11,500
Furs, dressed	1	5,000	4	6		2,640	3,100	7,000
Gloves and mittens (see also Woolen goods)	2	10,300	4	12		7,800	12,600	26,800
Hairwork	1	2,000	4			4,500	2,000	7,000
Iron and steel	1	100,000	247		3	46,822	33,073	78,393
Jewelry	2	11,000	1			900	3,000	10,000
Leather, curried	11	19,135	12			5,638	61,815	89,577
Leather, tanned	16	36,465	16		3	9,212	38,694	65,767
Lithographing (see also Printing and publishing)	1	17,500	10	1	2	7,500	25,000	55,000
Liquors, malt	23	287,500	57			24,961	92,409	167,681
Lock- and gun-smithing	6	5,750	4			2,450	2,100	11,300
Looking-glass and picture frames	3	8,600	5			2,950	11,700	18,200
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	11	62,000	63			37,040	43,500	120,500
Lumber, sawed	228	1,577,875	566		13	242,154	1,331,342	2,030,463
Marble and stone work	11	13,175	27			14,575	20,150	52,650
Matches	1	13,000	2	2		1,300	2,000	4,230
Mattresses and spring beds (see also Furniture)	2	2,750					250	1,100
Oil, linseed	2	37,000	14			4,550	31,817	42,967
Painting and paperhanging	3	1,100	4			2,550	2,750	10,700
Paper	1	12,000	18			8,888	20,360	43,100
Printing and publishing (see also Lithographing)	15	65,600	72	8	7	65,067	37,015	133,900
Pumps, not including steam pumps	2	4,200	6			3,600	2,900	10,000
Saddlery and harness	46	190,050	111		2	63,767	222,350	385,350
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	20	230,400	94			71,031	143,980	253,692
Shipbuilding	14	63,300	85			77,150	124,400	206,500
Slaughtering and meat-packing, not including retail butchering establishments.	9	56,800	37			17,120	205,517	264,712
Soap and candles	1	50	2			500	1,000	2,000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	46	233,150	94		1	64,006	151,475	311,650
Tobacco, cigars and cigarettes	3	2,925	7		1	4,060	2,850	11,000
Upholstering (see also Furniture)	3	12,600	12		2	10,000	16,100	38,300
Watch and clock repairing	7	3,700	2			1,278	1,425	7,750
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	32	28,400	25		1	8,008	16,923	51,950
Wirework	1	2,000	2			1,100	300	4,000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	2	5,300	2			425	1,050	2,700
Woolen goods (see also Gloves and mittens)	10	566,800	166	33	17	86,088	227,486	549,030

A—PENNSYLVANIA, BY TOTALS OF COUNTIES.

The State	31,232	$474,510,993	284,359	73,046	29,667	$134,055,904	$465,020,563	$744,818,445
COUNTIES.								
Adams	276	486,770	394	44	19	59,329	621,937	876,130
Allegheny	1,895	70,641,426	42,815	2,361	3,995	22,371,951	61,739,293	105,272,739
Armstrong	200	1,918,656	975	60	76	436,951	1,348,564	2,328,557
Beaver	180	2,872,565	2,321	162	398	962,750	2,325,797	4,054,638
Bedford	254	1,369,993	587	3	20	155,868	1,213,992	1,747,617
Berks	1,044	12,522,140	8,307	890	811	3,077,919	13,026,331	20,143,164
Blair	254	3,017,563	2,068	28	96	677,371	2,752,243	4,233,552
Bradford	406	1,910,434	1,585	26	63	527,421	2,506,503	3,700,801
Bucks	591	3,039,014	2,334	926	349	904,915	4,033,627	6,208,209
Butler	262	744,580	521	24	11	148,794	695,930	1,080,290
Cambria	272	9,964,245	4,242	139	260	1,860,860	9,056,377	16,150,865
Cameron	24	594,500	191		10	60,331	693,880	1,017,701
Carbon	89	980,865	665	2	25	188,502	861,758	1,400,870
Centre	345	3,165,470	1,655	9	106	563,569	2,337,684	3,591,327
Chester	737	6,411,853	4,141	389	331	1,749,350	6,674,978	10,404,331

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—PENNSYLVANIA, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Clarion	228	$1,168,807	632	1	18	$143,616	$628,484	$992,582
Clearfield	261	2,778,227	1,230	11	39	366,147	1,661,850	2,584,339
Clinton	186	1,405,183	856	5	40	239,897	1,164,089	1,850,788
Columbia	221	1,219,505	842	37	18	260,024	1,147,040	1,746,084
Crawford	474	2,852,041	2,222	26	71	742,834	2,797,941	4,373,854
Cumberland	308	2,266,409	1,658	189	45	535,068	1,727,681	2,850,640
Dauphin	614	9,817,959	5,777	294	260	2,044,189	10,443,042	15,594,115
Delaware	416	14,256,720	6,569	2,885	1,788	3,839,838	11,262,964	19,601,493
Elk	92	2,362,310	1,102	....	....	252,384	1,517,559	2,414,791
Erie	559	6,424,413	4,584	257	397	1,869,466	6,646,427	10,463,906
Fayette	274	4,157,207	2,926	21	77	1,221,785	2,857,608	5,004,560
Forest	25	1,162,150	322	3	2	91,672	416,897	613,631
Franklin	403	2,003,679	1,489	48	46	391,161	1,872,975	2,825,138
Fulton	68	239,868	104	....	....	17,170	223,107	296,887
Greene	127	428,105	324	7	13	70,855	453,127	626,272
Huntingdon	245	3,267,613	917	17	30	230,245	1,871,761	2,496,918
Indiana	279	890,409	655	16	53	169,741	825,474	1,252,325
Jefferson	189	1,282,650	557	4	19	113,412	679,684	1,003,145
Juniata	93	224,170	153	1	3	25,578	243,023	325,142
Lackawanna	352	5,616,017	3,653	472	203	1,558,374	8,105,156	10,684,179
Lancaster	1,437	10,481,798	6,848	1,334	658	2,250,226	9,573,262	14,809,330
Lawrence	167	2,192,765	1,586	37	88	717,914	2,801,664	4,101,758
Lebanon	275	2,617,950	1,837	24	44	551,010	2,857,277	4,179,082
Lehigh	473	12,850,472	4,790	576	377	1,690,776	9,352,199	14,097,475
Luzerne	400	3,706,963	1,963	239	79	687,458	2,733,317	4,397,075
Lycoming	612	6,968,462	4,110	149	251	1,221,510	5,880,083	9,184,295
McKean	241	1,470,575	1,567	12	10	585,241	1,729,466	2,991,407
Mercer	349	3,796,641	2,854	30	200	1,170,945	5,377,565	7,952,874
Mifflin	169	1,378,080	886	16	36	298,472	1,527,681	2,298,170
Monroe	131	1,604,625	707	57	61	252,836	1,662,199	2,331,884
Montgomery	840	13,789,461	7,459	3,073	1,107	3,596,208	13,189,707	20,656,993
Montour	113	2,387,902	1,575	1	151	573,196	2,493,840	3,349,376
Northampton	531	9,955,966	5,264	318	302	1,922,027	9,272,417	13,001,276
Northumberland	226	2,023,575	1,600	16	96	540,791	2,341,762	3,399,197
Perry	204	1,358,835	850	7	35	274,250	1,571,452	2,205,048
Philadelphia	8,567	187,148,857	113,075	56,818	15,634	64,265,966	199,155,477	324,342,935
Pike	46	311,900	239	....	7	75,862	267,884	454,990
Potter	94	206,107	343	4	....	48,016	320,006	440,022
Schuylkill	480	4,854,058	3,028	251	123	1,016,641	4,169,130	6,047,336
Snyder	115	355,068	187	1	10	38,623	465,280	629,007
Somerset	348	839,071	628	15	47	113,483	719,314	1,089,719
Sullivan	60	858,420	342	....	1	95,010	744,342	1,004,443
Susquehanna	332	2,026,983	1,161	33	10	309,163	2,484,482	3,569,796
Tioga	285	1,818,085	1,308	11	14	321,257	2,294,697	3,165,656
Union	130	678,984	385	32	10	93,117	519,996	866,437
Venango	136	782,856	830	17	17	268,795	841,166	1,421,920
Warren	267	2,785,055	1,829	27	43	510,221	2,894,313	4,197,281
Washington	314	985,364	699	13	16	257,163	1,227,144	1,810,581
Wayne	282	2,830,037	1,576	64	97	506,864	2,127,343	3,458,441
Westmoreland	382	3,714,462	2,277	60	166	885,162	2,810,875	4,978,538
Wyoming	124	730,725	362	1	4	94,444	1,278,277	1,794,958
York	859	3,537,375	2,821	453	281	893,920	3,922,183	5,879,565

B—PENNSYLVANIA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	31,232	$474,510,993	284,359	73,046	29,667	$134,055,904	$465,020,563	$744,818,445
Agricultural implements	220	3,452,923	2,540	....	77	898,608	1,788,420	3,686,212
Artificial feathers and flowers (see also Millinery and lace goods)	6	81,500	34	264	84	65,330	91,070	229,500
Artificial limbs (see also Surgical appliances)	6	16,300	18	....	....	7,724	6,875	20,548
Awnings and tents	18	45,250	84	51	11	26,714	89,239	166,084
Axle-grease	2	6,400	7	....	....	3,500	1,750	6,500
Bags, other than paper	7	202,000	54	117	....	43,215	482,820	560,500
Bags, paper	15	358,600	123	277	6	107,376	618,027	852,478
Baking and yeast powders (see also Drugs and chemicals)	6	27,000	15	13	2	11,324	53,747	105,600
Baskets, rattan and willow ware	31	34,680	51	1	27	16,409	31,751	63,031
Bellows	2	8,500	13	....	....	6,200	13,000	25,400
Bells	2	40,400	15	....	....	10,500	15,600	31,500
Belting and hose, leather	9	280,500	76	....	6	42,465	367,571	476,545
Billiard tables and materials	3	25,000	16	....	....	10,300	26,300	49,700
Blacking	5	225,000	51	97	5	48,648	221,061	485,706
Blacksmithing (see also Wheelwrighting)	3,246	2,236,418	3,501	....	49	1,014,454	1,542,876	4,324,460
Bluing	4	50,200	17	19	1	12,500	25,428	75,300
Bone-, ivory-, and lamp-black	5	428,350	79	2	16	30,700	214,075	286,750
Bookbinding and blank-book making	74	890,775	867	829	148	585,786	727,166	1,703,206
Boot and shoe findings	20	121,950	94	107	6	62,088	140,072	253,668
Boot and shoe uppers	10	26,650	24	30	3	23,830	53,513	90,975
Boots and shoes, including custom work and repairing	2,157	5,399,228	7,930	2,604	352	3,757,957	7,016,204	13,246,250
Boxes, cigar	61	134,522	135	93	45	63,743	172,916	332,124
Boxes, fancy and paper	47	438,450	227	1,228	56	281,445	401,378	894,505
Boxes, wooden, packing	61	486,270	502	28	75	220,550	605,455	977,725
Brass and copper, rolled	2	600,000	94	....	5	80,000	432,000	640,000

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—PENNSYLVANIA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Brass castings (see also Bronze castings)	63	$1, 578, 901	1, 009	19	89	$456, 748	$1, 344, 931	$2, 294, 684
Bread and other bakery products	1, 265	3, 919, 053	2, 923	384	197	1, 315, 677	5, 263, 591	8, 448, 474
Brick and tile (see also Drain and sewer pipe; Terra-cotta ware)	521	5, 028, 524	7, 135	6	1, 285	2, 077, 168	1, 332, 758	4, 813, 153
Bridges	7	720, 400	859	....	13	425, 290	1, 071, 936	1, 757, 932
Bronze castings (see also Brass castings)	5	126, 250	50	....	1	27, 072	423, 170	545, 876
Brooms and brushes	122	626, 215	725	88	252	292, 556	678, 753	1, 293, 881
Buttons	18	159, 000	324	166	133	167, 613	146, 585	387, 554
Cardboard	1	250, 000	63	106	37	50, 000	300, 000	450, 000
Card cutting and designing	5	8, 993	15	12	6	8, 665	10, 920	33, 320
Carpentering	773	2, 314, 519	4, 664	....	13	2, 072, 580	4, 621, 380	8, 125, 571
Carpets, other than rag (see also Woolen goods)	172	7, 210, 483	5, 731	2, 384	774	3, 035, 971	8, 992, 385	14, 304, 660
Carpets, rag	143	142, 542	322	22	36	102, 054	243, 444	449, 825
Carpets, wood	1	25, 000	80	....	7	13, 000	4, 000	54, 670
Carriage and wagon materials	47	485, 616	458	....	12	159, 453	325, 916	634, 777
Carriages and sleds, children's	10	76, 800	101	4	4	46, 051	111, 055	196, 872
Carriages and wagons (see also Wheelwrighting)	391	3, 627, 023	3, 875	5	54	1, 584, 035	2, 059, 819	4, 760, 723
Cars, railroad, street, and repairs	43	2, 946, 912	3, 850	2	48	1, 352, 299	6, 032, 114	8, 082, 272
Cement	2	135, 000	104	....	27	50, 850	76, 200	147, 200
Charcoal	5	3, 900	14	....	2	2, 200	1, 600	9, 900
Cheese and butter (factory)	146	395, 020	253	43	8	51, 943	655, 368	915, 468
Cleansing and polishing preparations	4	176, 300	31	3	7	16, 100	37, 175	110, 000
Cloth finishing	5	107, 000	64	11	17	32, 702	36, 236	92, 000
Clothing, horse	2	407, 000	68	482	....	133, 800	443, 200	680, 000
Clothing, men's	876	10, 816, 742	8, 791	13, 328	91	5, 127, 682	15, 332, 253	23, 821, 887
Clothing, women's	75	941, 950	351	2, 878	99	618, 603	1, 776, 610	2, 977, 810
Coal-tar	1	100, 000	85	....	5	32, 000	85, 200	146, 800
Coffee and spices, roasted and ground	32	885, 000	171	121	5	118, 383	2, 240, 980	2, 652, 830
Coffins, burial cases, and undertakers' goods	105	681, 425	547	38	5	229, 036	425, 267	903, 074
Coke	104	4, 262, 525	2, 379	3	62	983, 431	2, 241, 154	4, 190, 136
Collars and cuffs, paper	1	191, 233	26	65	....	42, 000	96, 000	158, 000
Combs	5	71, 500	99	6	3	46, 350	56, 480	122, 651
Confectionery	283	1, 718, 690	1, 036	531	204	512, 141	2, 358, 774	3, 564, 934
Cooperage	249	1, 385, 335	1, 845	2	174	671, 464	2, 126, 784	3, 256, 552
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	11	148, 950	95	2	1	51, 654	148, 849	255, 423
Cordage and twine	23	1, 289, 250	395	240	247	274, 282	1, 437, 026	2, 039, 721
Cork cutting	11	479, 550	141	146	65	97, 764	473, 260	708, 500
Corsets	10	62, 800	29	171	2	44, 018	129, 061	205, 505
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	189	15, 490, 735	5, 990	8, 232	3, 341	4, 683, 617	12, 500, 217	21, 640, 397
Crucibles	7	440, 250	92	....	....	57, 560	434, 271	577, 189
Cutlery and edge tools (see also Hardware; Tools)	61	2, 585, 610	2, 024	46	106	882, 612	1, 148, 138	2, 614, 239
Dentistry, mechanical	53	58, 200	30	2	3	16, 345	32, 230	114, 919
Dentists' materials	4	715, 000	255	60	11	156, 175	159, 000	564, 000
Drain and sewer pipe (see also Brick and tile; Terra-cotta ware)	1	20, 000	16	....	....	10, 000	12, 000	30, 000
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	75	11, 680, 812	2, 362	340	76	1, 300, 238	8, 245, 297	13, 092, 863
Dyeing and cleaning	24	56, 350	71	17	3	26, 674	31, 440	89, 570
Dyeing and finishing textiles	60	3, 884, 846	1, 926	248	424	1, 041, 309	2, 398, 396	6, 259, 852
Dyestuffs and extracts	6	432, 000	107	....	....	50, 185	269, 090	452, 979
Electrical apparatus and supplies (see also Telegraph and telephone apparatus).	3	15, 000	16	....	1	7, 472	7, 149	20, 770
Electroplating	24	102, 463	120	5	11	52, 427	43, 175	145, 094
Emery wheels	2	230, 000	35	....	....	21, 928	16, 973	80, 485
Engravers' materials	3	5, 300	7	....	1	6, 920	3, 700	11, 764
Engraving and die-sinking	16	41, 715	53	1	5	29, 224	18, 921	77, 746
Engraving, steel	6	50, 050	42	10	18	30, 930	25, 195	92, 233
Engraving, wood	20	17, 725	72	3	2	46, 088	12, 965	95, 559
Explosives and fireworks	6	25, 000	16	51	31	20, 686	7, 900	50, 982
Fancy articles	19	154, 700	129	39	14	76, 305	130, 012	255, 406
Felt goods (see also Woolen goods)	1	150, 000	167	75	20	80, 000	250, 000	450, 000
Fertilizers	45	831, 515	373	....	3	137, 955	981, 987	1, 433, 245
Files (see also Saws)	26	488, 500	508	19	80	223, 593	216, 545	580, 443
Fire-arms	8	160, 200	178	1	3	76, 350	51, 400	177, 900
Flavoring extracts	2	22, 800	30	....	2	8, 524	28, 080	41, 000
Flax, dressed	2	24, 000	10	7	22	8, 379	10, 446	34, 054
Flouring- and grist-mill products	2, 873	20, 238, 601	4, 422	1	11	1, 105, 939	36, 291, 933	41, 522, 662
Food preparations (see page 39)	10	376, 500	100	83	10	61, 127	226, 722	371, 003
Foundery and machine-shop products (see also Iron works, architectural and ornamental; Steam fitings and heating apparatus).	748	28, 982, 140	22, 907	79	898	10, 293, 821	17, 636, 353	35, 029, 673
Foundery supplies	2	40, 000	9	....	1	5, 280	34, 500	54, 000
Fruits and vegetables, canned and preserved	14	267, 925	91	171	39	67, 202	469, 326	606, 000
Furnishing goods, men's	22	124, 740	61	336	36	88, 260	318, 736	501, 007
Furniture (see also Mattresses and spring beds; Upholstering)	718	5, 445, 940	4, 928	92	179	2, 090, 088	3, 725, 989	7, 588, 229
Furniture, chairs	45	111, 700	273	14	47	143, 037	186, 071	437, 010
Furs, dressed	16	238, 000	50	153	5	59, 233	292, 800	496, 700
Galvanizing	7	370, 000	241	....	5	112, 132	720, 295	976, 875
Gas and lamp fixtures	5	251, 500	283	43	11	133, 759	93, 085	355, 228
Gas machines and meters	11	471, 500	361	7	15	154, 103	227, 498	475, 804
Glass	78	7, 639, 706	6, 999	294	2, 491	3, 897, 306	3, 350, 660	8, 720, 584
Glass, cut, stained, and ornamented	16	65, 600	115	13	10	58, 845	52, 283	160, 902
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	2	51, 000	15	28	2	14, 587	70, 000	95, 000
Glue	13	1, 810, 400	498	90	51	184, 950	1, 376, 821	1, 903, 470
Gold and silver leaf and foil	8	237, 000	157	157	10	135, 300	344, 150	525, 344
Gold and silver, reduced and refined (not from the ore)	2	20, 500	13	....	4	9, 130	200, 800	251, 560
Graphite	1	50, 000	38	....	2	12, 500	5, 500	30, 000
Grease and tallow	27	322, 075	110	....	1	56, 223	1, 416, 614	1, 671, 265
Grindstones	1	10, 161	2	....	....	1, 500	7, 236	10, 855
Gunpowder (see also High explosives)	11	858, 900	157	8	3	73, 871	420, 834	693, 854
Hairwork	25	95, 525	25	68	6	23, 987	46, 710	98, 137

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—PENNSYLVANIA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Hand-knit goods	11	$98, 400	31	575	320	$90, 048	$127, 437	$246, 200
Hand-stamps	2	6, 000	7	2	2	2, 300	2, 200	13, 500
Handles, wooden	19	108, 455	150			43, 065	54, 863	147, 142
Hardware (see also Cutlery and edge tools; Tools)	68	1, 980, 729	2, 184	41	359	893, 032	1, 761, 884	3, 725, 526
Hardware, saddlery	2	36, 100	28	20	2	28, 040	52, 635	114, 488
Hat and cap materials	6	39, 600	21	2	5	11, 430	79, 600	132, 100
Hats and caps, not including wool hats	70	820, 553	1, 255	561	52	711, 159	1, 082, 079	2, 342, 324
High explosives (see also Gunpowder)	11	76, 025	78			39, 837	190, 783	309, 230
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	106	3, 743, 790	2, 337	5, 570	1, 365	2, 175, 913	4, 924, 138	8, 935, 147
Housefurnishing goods	4	79, 000	109	38	18	36, 042	107, 203	154, 600
Ink	12	398, 800	81	8	11	62, 608	169, 375	362, 550
Instruments, professional and scientific	26	347, 086	224	7	14	137, 798	87, 307	349, 126
Iron and steel	366	107, 304, 782	54, 637	12	3, 303	25, 095, 850	92, 267, 030	145, 576, 268
Iron bolts, nuts, washers, and rivets	17	1, 444, 500	1, 306	60	278	521, 625	1, 571, 436	2, 636, 366
Iron forgings	19	558, 500	594		38	264, 743	667, 125	1, 110, 166
Iron nails and spikes, cut and wrought	9	192, 450	83	14	7	37, 849	206, 410	291, 927
Iron pipe, wrought	12	3, 864, 565	3, 151	1	183	996, 567	6, 141, 797	8, 418, 975
Iron railing, wrought	20	130, 150	130		1	44, 633	107, 333	202, 352
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	5	16, 450	37			20, 000	32, 370	66, 825
Ivory and bone work	11	209, 750	253	29	64	112, 888	152, 599	358, 019
Japanning	5	13, 100	33	8	4	8, 765	8, 298	26, 625
Jewelry	33	485, 256	394	24	32	220, 902	437, 416	846, 736
Jewelry and instrument cases	3	25, 000	37	13		11, 300	13, 600	35, 000
Kaolin and ground earths	8	163, 000	113		3	38, 113	28, 833	101, 006
Kindling wood	30	106, 750	130		26	48, 612	110, 498	216, 620
Lamps and reflectors	13	136, 550	95	12	6	51, 908	57, 967	151, 756
Lard, refined	2	350, 000	65	6		29, 631	1, 135, 000	1, 221, 000
Lasts	6	37, 400	29	8	16	18, 295	10, 890	44, 234
Lead, bar, pipe, sheet, and shot	4	665, 000	89		2	49, 076	820, 500	1, 008, 000
Leather, curried	455	2, 570, 969	827	4	15	334, 950	6, 639, 432	7, 852, 177
Leather, dressed skins	57	2, 619, 347	2, 121	103	89	1, 183, 898	4, 971, 982	6, 859, 044
Leather goods	1	15, 000	25			5, 350	9, 000	36, 000
Leather, tanned	642	15, 608, 635	5, 541	12	39	1, 967, 946	19, 716, 236	27, 042, 068
Lightning rods	3	255, 000	58			25, 475	358, 500	481, 000
Lime	120	471, 610	579		10	141, 887	174, 979	466, 532
Liquors, distilled	70	2, 198, 753	334			138, 745	1, 216, 120	1, 856, 484
Liquors, malt	291	12, 073, 068	2, 439		13	1, 200, 289	5, 765, 837	10, 124, 348
Liquors, vinous (see also Liquors, distilled)	1	5, 000	4			1, 200	3, 500	7, 000
Lithographing (see also Printing and publishing)	24	659, 550	483	65	59	269, 011	259. 627	765, 003
Lock- and gun-smithing	55	91, 950	87		8	32, 257	40, 735	119, 458
Looking-glass and picture frames	74	799, 793	696	19	75	330, 660	610, 641	1, 276, 471
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	200	3, 250, 225	2, 142	6	61	758, 281	2, 749, 840	4, 602, 753
Lumber, sawed	2, 827	21, 418, 588	14, 443	8	463	2, 918, 459	13, 955, 430	22, 457, 359
Malt	26	2, 522, 000	309	1		108, 892	1, 794, 761	2, 333, 348
Mantels, slate, marble, and marbleized	15	145, 800	171		4	77, 792	127, 513	263, 106
Marble and stone work	321	2, 476, 752	2, 185	1	11	970, 026	1, 467, 475	3, 135, 651
Masonry, brick and stone	109	306, 325	734		8	329, 237	419, 630	966, 050
Matches	5	237, 800	39	66	11	29, 931	166, 592	311, 500
Mattresses and spring beds (see also Furniture)	27	123, 850	119	46	15	51, 263	252, 990	362, 599
Millinery and lace goods (see also Artificial feathers and flowers)	40	593, 300	85	1, 139	54	205, 942	1, 063, 779	1, 518, 578
Millstones	4	19, 500	18			9, 650	33, 800	51, 200
Mineral and soda waters	33	192, 800	206		22	83, 044	181, 095	340, 433
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	126	11, 536, 818	5, 361	6, 971	1, 936	4, 223, 662	12, 202, 028	20, 882, 764
Models and patterns	31	70, 225	109	10	4	59, 271	31, 811	139, 224
Mucilage and paste	2	1, 200	4		1	1, 600	4, 500	8, 000
Musical instruments and materials (not specified)	9	149, 200	129	3	9	91, 016	88, 555	219, 067
Musical instruments, organs and materials	15	68, 950	72		7	23, 894	24, 020	65, 794
Musical instruments, pianos and materials	5	169, 500	153		1	87, 044	81, 145	217, 924
Nets and seines	4	13, 400	21	17	6	5, 000	10, 750	25, 700
Oil, essential	1	150					240	640
Oil, illuminating, not including petroleum refining	1	20, 000	30			12, 000	51, 000	89, 000
Oil, lard	6	76, 000	18		1	9, 575	144, 464	179, 831
Oil, linseed	9	409, 200	59	5		29, 846	596, 500	697, 205
Oil, lubricating	9	85, 500	82	2		41, 593	508, 411	642, 370
Oilcloth, floor	2	938, 550	374	2	10	169, 084	646, 785	1, 219, 571
Oleomargarine	1	100, 000	45	16	3	26, 000	192, 946	298, 386
Painting and paperhanging	507	940, 997	2, 620	5	39	1, 040, 820	1, 045, 007	2, 781, 153
Paints (see also Varnish)	46	3, 128, 192	791	26	7	394, 437	2, 657, 857	3, 674, 043
Paper (see also Cardboard; Collars and cuffs, paper; Wood pulp)	78	4, 099, 000	1, 481	555	47	752, 151	3, 185, 168	5, 355, 912
Paperhangings	4	820, 000	263	1	137	161, 120	384, 252	708, 979
Patent medicines and compounds (see also Drugs and chemicals)	53	2. 076, 100	259	189	7	194, 524	734, 262	2, 006, 058
Paving materials	2	55, 000	24			5. 880	12, 400	38, 500
Pens, steel	1	10, 000	7	23		8, 500	8, 500	20, 000
Perfumery and cosmetics	8	132, 867	34	53	3	32, 515	148, 488	229, 305
Photographing	106	384, 200	285	127	11	175, 127	138, 577	541, 964
Photographing materials	3	41, 000	11	27	2	13, 510	50, 400	81, 000
Pickles, preserves, and sauces	7	84, 248	55	15	1	25, 173	167, 096	268, 812
Pipes, tobacco	5	70, 600	219	13	42	89, 565	66, 800	209, 500
Plated and britannia ware (see also Silverware)	11	246, 500	183	59	12	82, 474	113, 342	238, 305
Plumbing and gasfitting	323	1, 059, 855	1, 267		36	539, 338	1, 043, 219	2, 070. 110

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—PENNSYLVANIA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products
			Males above 16 years.	Females above 15 years.	Children and youths.			
Pocket-books	5	$250, 000	271	209	48	$120, 000	$219, 500	$412, 000
Printing and publishing (see also Lithographing)	371	8, 962, 320	5, 897	625	1, 180	3, 274, 969	4, 157, 045	10, 229, 893
Printing materials	5	45, 200	38	....	5	22, 470	18, 298	52, 366
Pumps, not including steam pumps	29	131, 900	75	....	1	27, 858	99, 088	171, 191
Refrigerators	7	76, 442	41	....	1	21, 495	69, 380	110, 463
Regalia and society banners and emblems	12	93, 890	46	133	6	36, 073	82, 585	151, 834
Registers, car-fare	1	300, 000	7	....	....	4, 876	870	6, 600
Roofing and roofing materials	116	451, 055	513	3	[illegible]	219, 958	394, 442	798, 999
Rubber and elastic goods	3	54, 000	25	22	11	11, 500	31, 500	51, 000
Saddlery and harness	781	1, 301, 402	1, 542	54	35	540, 772	1, 265, 482	2, 505, 850
Safes, doors, and vaults, fire-proof	7	176, 000	159	....	1	93, 850	106, 015	259, 505
Salt	16	234, 500	131	....	6	52, 047	74, 047	177, 415
Sand and emery paper and cloth	2	35, 000	16	15	3	9, 500	70, 000	95, 000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	109	1, 989, 198	1, 601	1	45	627, 674	1, 480, 004	2, 513, 607
Saws	7	1, 518, 000	1, 115	6	134	620, 140	634, 897	1, 654, 200
Scales and balances	10	153, 000	180	....	9	94, 081	73, 490	238, 099
Sewing-machine cases	1	68, 500	47	....	....	18, 189	31, 180	57, 907
Sewing machines and attachments	7	1, 175, 800	440	8	51	226, 000	225, 190	625, 550
Shingles, split	1	1, 200	3	....	....	200	600	1, 000
Shipbuilding	125	5, 797, 731	3, 298	....	....	2, 279, 629	3, 610, 367	6, 689, 470
Shirts	61	785, 094	242	2, 597	85	614, 924	1, 182, 154	2, 095, 761
Shoddy (see also Mixed textiles)	11	186, 000	90	40	13	47, 441	510, 977	655, 895
Show-cases	12	58, 950	70	....	7	40, 134	97, 392	178, 815
Silk and silk goods (see also Mixed textiles)	49	1, 379, 900	1, 000	1, 870	319	678, 120	1, 830, 985	3, 491, 840
Silverware (see also Plated and britannia ware)	6	102, 000	68	3	4	44, 131	75, 283	169, 384
Slaughtering and meat-packing, not including retail butchering establishments.	35	2, 938, 625	531	....	21	242, 077	8, 854, 778	9, 908, 545
Soap and candles	78	1, 873, 971	490	62	35	331, 677	1, 809, 904	2, 715, 771
Soda-water apparatus	2	150, 000	45	....	....	25, 000	67, 000	114, 000
Spectacles and eyeglasses	3	202, 000	167	53	7	86, 600	53, 000	196, 000
Sporting goods	8	35, 000	40	11	6	21, 786	21, 600	61, 600
Springs, steel, car, and carriage	12	600, 100	361	....	28	180, 613	768, 059	1, 138, 895
Stamped ware (see also Tinware, copperware, and sheet-iron ware)	2	15, 000	12	....	3	5, 384	7, 500	17, 494
Starch	1	45, 000	8	....	....	2, 500	6, 750	11, 000
Stationery goods	26	203, 500	324	34	61	111, 310	338, 920	556, 473
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	14	251, 300	259	....	11	112, 980	255, 833	506, 962
Stencils and brands	14	75, 700	57	2	7	27, 589	39, 157	103, 923
Stereotyping and electrotyping (see also Type founding)	5	226, 000	172	17	2	104, 982	51, 050	223, 500
Stone- and earthen-ware	97	670, 545	634	85	93	254, 082	202, 011	655, 169
Straw goods	7	48, 200	48	195	7	48, 000	106, 204	225, 718
Sugar and molasses, refined	11	6, 072, 000	1, 073	....	5	474, 017	21, 943, 943	24, 294, 929
Surgical appliances (see also Artificial limbs)	6	120, 500	63	44	4	48, 314	69, 821	149, 273
Taxidermy	1	1, 000	....	....	....	....	300	500
Telegraph and telephone apparatus (see also Electrical apparatus and supplies).	4	57, 000	41	....	3	12, 773	24, 444	45, 840
Terra-cotta ware (see also Brick and tile; Drain and sewer pipe)	5	81, 000	60	....	....	18, 150	19, 350	63, 000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing; Stamped ware).	1, 010	3, 223, 836	3, 093	128	185	1, 325, 010	2, 735, 514	5, 442, 555
Tinfoil	2	106, 000	26	20	2	9, 979	31, 075	56, 500
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	11	398, 676	136	122	16	71, 084	572, 456	910, 204
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	1, 377	2, 934, 819	5, 064	1, 329	564	1, 885, 530	3, 144, 977	6, 906, 603
Tools (see also Cutlery and edge tools; Hardware)	22	1, 657, 182	752	....	....	339, 656	291, 452	883, 973
Toys and games	14	172, 100	270	102	175	107, 328	96, 425	306, 086
Trunks and valises	24	114, 900	148	....	3	66, 835	175, 172	306, 742
Type founding (see also Stereotyping and electrotyping)	4	810, 000	279	2	25	146, 694	89, 400	417, 132
Umbrellas and canes	33	1, 379, 050	621	999	166	481, 347	1, 788, 464	2, 822, 244
Upholstering (see also Furniture)	107	266, 900	294	103	20	163, 366	397, 258	784, 020
Upholstering materials	5	123, 000	31	56	....	33, 600	103, 500	176, 000
Varnish (see also Paints)	11	241, 800	69	....	7	34, 865	201, 275	372, 310
Vinegar	12	57, 185	28	1	3	19, 780	86, 244	128, 500
Washing-machines and clothes-wringers	8	137, 600	62	....	45	33, 550	134, 237	220, 600
Watch and clock repairing	62	148, 240	89	1	8	46, 997	31, 655	128, 135
Watch cases	11	553, 175	433	54	12	243, 722	534, 480	1, 013, 180
Watches	1	293, 000	108	73	....	57, 957	18, 286	98, 710
Wheelbarrows	1	7, 000	6	....	....	2, 500	5, 800	8, 790
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	1, 353	1, 344, 055	1, 940	[illegible]	20	530, 881	773, 823	2, 087, 659
Whips	10	84, 700	78	12	12	25, 550	49, 400	121, 000
Window blinds and shades	24	96, 150	106	17	16	40, 433	133, 997	231, 416
Wire	5	560, 500	106	13	....	58, 108	269, 338	378, 658
Wirework	35	246, 650	302	1	55	119, 090	500, 241	763, 832
Wood pulp	2	510, 000	205	....	....	97, 000	206, 006	463, 195
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	55	324, 650	449	18	63	173, 524	199, 797	496, 100
Wooden ware	22	358, 500	268	....	65	126, 750	178, 448	387, 302
Wool hats (see also Woolen goods)	23	797, 500	726	290	133	317, 987	1, 034, 652	1, 717, 826
Woolen goods (see also Carpets, other than rag; Felt goods; Gloves and mittens; Mixed textiles; Wool hats; Worsted goods).	324	18, 780, 604	8, 391	6, 809	2, 489	5, 254, 328	21, 185, 804	32, 341, 201
Worsted goods (see also Woolen goods)	28	4, 959, 639	1, 673	2, 378	949	1, 473, 958	7, 277, 489	10, 072, 473
Zinc	2	1, 065, 000	184	....	8	81, 020	238, 859	377, 280

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—RHODE ISLAND, BY TOTALS OF COUNTIES.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	2, 205	$75, 575, 943	37, 060	18, 270	7, 548	$21, 355, 619	$58, 103, 443	$104, 163, 621
Bristol	90	2, 520, 950	1, 574	857	258	761, 016	2, 637, 164	4, 110, 262
Kent	126	6, 205, 628	2, 955	1, 715	1, 104	1, 514, 728	3, 977, 934	8, 481, 418
Newport	111	712, 050	834	200	66	539, 763	1, 062, 716	1, 851, 428
Providence	1, 688	61, 299, 603	29, 267	13, 905	5, 618	17, 229, 126	46, 236, 937	82, 083, 318
Washington	195	4, 837, 712	2, 430	1, 593	502	1, 310, 986	4, 188, 692	7, 637, 195

B—RHODE ISLAND, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	2, 205	$75, 575, 943	37, 060	18, 270	7, 548	$21, 355, 619	$58, 103, 443	$104, 163, 621
Agricultural implements	4	18, 500	16			5, 219	6, 710	15, 068
Belting and hose, leather	4	74, 000	27		1	12, 250	83, 925	130, 150
Blacksmithing (see also Wheelwrighting)	164	170, 550	271		2	125, 610	132, 410	405, 727
Bookbinding and blank-book making	8	52, 900	45	27	1	29, 040	29, 100	88, 000
Boot and shoe findings	2	20, 000	22	11	12	7, 324	37, 250	54, 500
Boots and shoes, including custom work and repairing	115	57, 425	88	10	1	39, 164	80, 311	187, 559
Boots and shoes, rubber	2	325, 000	508	130	51	225, 025	1, 031, 339	1, 455, 420
Boxes, cigar	1	1, 500	2	1		1, 800	3, 000	6, 000
Boxes, fancy and paper	6	44, 100	33	128	2	60, 290	57, 151	136, 365
Boxes, wooden, packing	6	69, 800	76		1	30, 034	89, 396	151, 000
Brass castings	10	105, 900	63			33, 080	119, 930	182, 163
Bread and other bakery products	51	270, 100	301	28	3	158, 389	561, 138	869, 188
Brick and tile (see also Drain and sewer pipe)	1	100, 000	195			32, 000	24, 000	75, 000
Bridges	2	50, 000	28			12, 800	15, 993	58, 294
Brooms and brushes	10	23, 000	30	28	2	15, 008	31, 585	58, 700
Buttons	1	350					275	1, 150
Cardboard	2	100, 000	33	8	15	26, 378	172, 644	271, 441
Carpentering	146	428, 123	1, 239		3	615, 459	1, 332, 443	2, 336, 517
Carpets, rag	1	1, 400	1			250	800	1, 200
Carriages and wagons (see also Wheelwrighting)	51	181, 505	192		1	95, 021	130, 260	301, 259
Charcoal	2	55	2			250	750	1, 600
Clothing, men's	58	899, 277	455	586	37	423, 717	1, 138, 144	1, 980, 330
Clothing, women's	7	21, 400	6	59		18, 555	94, 825	137, 880
Coffee and spices, roasted and ground	5	42, 000	19			10, 676	121, 536	156, 194
Coffins, burial cases, and undertakers' goods	12	48, 000	48	4	1	24, 208	56, 423	113, 293
Collars and cuffs, paper	1	15, 000	4	16		7, 000	96, 000	126, 000
Confectionery	12	30, 100	33	12	4	20, 209	60, 288	114, 450
Cooperage	3	20, 732	27		2	14, 884	27, 150	60, 500
Cordage and twine	2	25, 000	24			7, 950	48, 000	70, 000
Corsets	2	8, 000	6	39	10	13, 500	15, 200	39, 850
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	133	29, 260, 734	8, 471	9, 567	4, 038	5, 623, 933	13, 300, 119	24, 609, 461
Cotton-ties	1	8, 000	35			10, 990	65, 220	101, 613
Cutlery and edge tools (see also Hardware; Tools)	4	25, 550	45			15, 889	16, 660	45, 360
Dentistry, mechanical	25	27, 825	17	3		13, 268	12, 942	67, 050
Drain and sewer pipe (see also Brick and tile)	1	5, 000	3			1, 400	1, 600	8, 000
Drugs and chemicals (see also Patent medicines and compounds)	13	472, 500	239	70		142, 099	584, 436	847, 378
Dyeing and cleaning	4	16, 000	18	8		9, 708	6, 738	25, 866
Dyeing and finishing textiles	16	5, 912, 500	2, 146	430	400	1, 093, 727	2, 315, 062	6, 874, 254
Dyestuffs and extracts	4	144, 000	40			19, 195	162, 500	221, 765
Electroplating	10	65, 600	58	1	2	36, 162	136, 372	208, 164
Enameling	9	123, 000	93	45	9	44, 816	59, 263	136, 175
Engraving and die-sinking	24	17, 900	52	5	10	34, 941	6, 423	76, 764
Engraving, wood	6	1, 750	2			2, 146	2, 660	13, 130
Fancy articles	4	21, 500	25	6	2	11, 367	35, 084	70, 382
Files (see also Saws)	9	540, 600	484	11	25	206, 220	226, 525	659, 178
Fire-arms	1	360, 000	553		23	264, 248	550, 785	991, 111
Flouring- and grist-mill products	48	579, 600	105			46, 870	981, 861	1, 137, 990
Foundery and machine-shop products	94	4, 823, 867	4, 411	109	75	2, 072, 143	2, 687, 484	6, 281, 707
Foundery supplies	1	5, 000	3			1, 215	1, 720	6, 660
Furniture (see also Mattresses and spring beds; Upholstering)	27	283, 950	388	16	5	208, 509	501, 401	840, 437
Furniture, chairs	1	2, 500					3, 174	9, 464
Furs, dressed	1	100		8		900	1, 500	3, 000
Gas and lamp fixtures	3	91, 000	46	9	6	26, 500	34, 600	86, 600
Glass, cut, stained, and ornamented	2	11, 000	9	18		7, 936	7, 600	23, 140
Gold and silver, reduced and refined (not from the ore)	6	138, 000	25			18, 627	1, 366, 471	1, 421, 100
Grease and tallow	2	13, 000	12			5, 950	76, 100	88, 100
Hairwork	8	24, 050	1	19	2	6, 700	26, 930	44, 945
Hand-stamps	1	600	4			4, 000	250	5, 500
Hardware (see also Cutlery and edge tools; Tools)	7	164, 800	217		9	101, 059	93, 484	254, 243
Hats and caps, not including wool hats	1	1, 500	3	7		4, 000	8, 000	16, 000
Hooks and eyes	2	250, 188	40	31	8	26, 728	85, 086	118, 278
Hosiery and knit goods (see also Cotton goods)	1	6, 000	6	24	9	8, 400	14, 838	36, 000
Housefurnishing goods	1	550					500	1, 000
Iron and steel	3	630, 000	200		75	130, 969	375, 347	488, 040
Iron bolts, nuts, washers, and rivets	1	130, 000	83		4	33, 562	86, 761	165, 880

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—RHODE ISLAND, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Iron forgings	1	$4,000	6			$2,600	$4,765	$8,500
Iron nails and spikes, cut and wrought	1	105,000	6		4	5,000	60,000	134,000
Iron pipe, wrought	3	125,000	150			82,412	172,375	275,222
Ivory and bone work	4	36,000	60	6	2	35,230	17,375	72,667
Jewelry	148	2,836,620	2,568	714	188	1,688,616	2,590,611	5,650,133
Lapidary work	7	22,000	39	2	2	16,682	11,200	42,333
Lead, bar, pipe, sheet, and shot	2	65,000	83		5	52,092	110,350	200,563
Leather, curried	3	71,400	29			15,476	186,250	227,125
Leather, dressed skins	1	2,500	2			628	700	2,100
Leather goods	3	45,600	38		3	19,420	63,950	96,815
Leather, tanned	4	368,600	113			55,694	509,370	638,000
Lime	1	1,500	4			1,250	400	2,400
Liquors, malt	4	165,000	90			39,410	236,944	398,743
Lithographing (see also Printing and publishing)	2	80,000	37	5	1	31,760	34,929	109,642
Lock- and gun-smithing	5	4,950	5			3,702	2,762	10,515
Looking-glass and picture frames	11	40,200	26	2	2	13,601	42,260	77,745
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	9	163,000	88			38,274	76,727	150,244
Lumber, sawed	49	144,250	139		13	33,143	120,888	240,579
Marble and stone work	39	346,000	354	1	5	155,011	110,299	374,900
Masonry, brick and stone	47	80,175	346	1		138,924	202,385	413,044
Mattresses and spring beds (see also Furniture)	4	29,700	21	6		9,356	80,260	113,656
Mineral and soda waters	6	25,400	22		[illegible]	8,399	18,140	48,375
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	16	1,591,000	817	663	163	488,068	1,520,099	2,718,822
Models and patterns	6	16,500	26		1	16,089	16,280	42,432
Musical instruments, organs and materials	1	5,000	4			3,000	1,000	7,000
Oil, cottonseed and cake	1	125,000	32	3		14,899	415,820	458,085
Oil, neat's-foot	1	4,000	1			468	3,375	5,550
Painting and paperhanging	113	138,365	419		7	205,507	190,703	545,615
Paints	2	58,000	7		1	4,167	50,000	69,800
Patent medicines and compounds (see also Drugs and chemicals)	24	474,500	107	23	6	72,609	330,864	772,942
Paving materials	2	252,000	55			19,500	47,000	98,000
Photographing	29	53,250	47	32	1	34,200	30,070	112,163
Pickles, preserves, and sauces	2	13,300	4	10	1	2,213	7,000	13,650
Plated and britannia ware (see also Silverware)	2	1,025,000	310	15		189,200	611,300	972,000
Plumbing and gasfitting	34	102,750	137		1	74,265	143,846	291,916
Printing and publishing (see also Lithographing)	32	361,850	398	18	68	280,900	218,120	674,025
Pumps, not including steam pumps	4	11,500	7			3,413	8,062	15,900
Roofing and roofing materials	2	5,000	7			2,820	11,000	16,500
Rubber and elastic goods	2	710,000	687	320		313,715	1,617,000	2,217,000
Saddlery and harness	51	81,900	119	17	3	57,784	89,771	201,927
Safes, doors, and vaults, fire-proof	2	132,000	14			8,480	10,100	29,090
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	11	156,500	130		10	59,057	184,080	296,449
Saws	2	26,500	4			2,669	5,137	10,850
Screws	1	3,250,000	467	356	241	239,157	504,684	1,367,672
Sewing machines and attachments	2	61,000	17			11,560	37,000	112,960
Shipbuilding	22	227,700	318			194,662	266,858	517,041
Shirts	1	2,500		20	1	3,900	4,532	11,215
Shoddy (see also Mixed textiles)	6	49,600	51	26	6	18,590	137,054	195,045
Silk and silk goods (see also Mixed textiles)	1	7,500	1	7		1,600	7,500	10,000
Silverware (see also Plated and britannia waro)	2	83,000	42			18,448	66,280	111,000
Slaughtering and meat-packing, not including retail butchering establishments.	9	598,000	178		7	97,362	3,449,816	3,876,740
Soap and candles	8	39,136	15			5,398	83,325	100,850
Sporting goods	2	2,300	3	1		1,200	1,700	5,350
Starch	1	30,000	4			2,000	60,000	75,000
Stationery goods	4	24,300	21	6		16,898	23,910	56,425
Stencils and brands	3	9,000	7		2	2,665	8,730	18,580
Stone- and earthen-ware	1	3,500	9			3,300	2,300	15,000
Straw goods	3	2,300	5	11		5,553	547	10,160
Taxidermy	1	1,500					100	800
Tinware, copperware, and sheet-iron ware	75	224,150	282	3	3	153,674	261,473	561,515
Tobacco, cigars and cigarettes	49	51,675	113	70	2	53,974	90,247	191,752
Tools (see also Cutlery and edge tools; Hardware)	2	11,200	5			3,000	2,025	7,750
Toys and games	1	3,000	1	2	2	1,400	1,700	4,500
Trunks and valises	4	23,200	14		4	7,321	14,937	36,246
Umbrellas and canes	3	1,700	2	1		660	1,050	5,850
Upholstering (see also Furniture)	6	6,400	8	3		5,405	27,578	44,210
Upholstering materials	2	28,000	77	6	32	25,781	36,000	69,500
Vinegar	1	1,800	2			800	500	1,500
Washing-machines and clothes-wringers	1	75,000	62		3	17,685	124,024	220,986
Watch and clock materials	3	13,500	55	18	8	24,045	18,750	62,750
Watch and clock repairing	5	13,700	7			4,095	1,100	6,375
Watch cases	1	100,000	28		2	26,019	49,560	123,900
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	51	58,175	77		2	35,520	37,142	102,975
Windmills	1	2,000	1			375	1,000	1,800
Window blinds and shades	1	2,000	2	1		700	1,650	3,625
Wire	1	15,000	10	40		15,000	45,000	73,000
Wirework	2	1,800	7			2,384	3,260	7,955
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	10	68,500	112		25	52,651	55,230	139,900
Woolen goods (see also Mixed textiles; Worsted goods)	50	8,448,700	4,312	2,648	1,161	2,480,907	9,138,429	15,410,450
Worsted goods (see also Woolen goods)	11	4,567,416	1,559	1,759	706	1,222,350	3,941,383	6,177,754

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—SOUTH CAROLINA, BY TOTALS OF COUNTIES.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
The State	2,078	$11,205,894	13,687	1,023	1,118	$2,836,289	$9,885,538	$16,738,008
Abbeville	81	132,555	152	......	4	24,288	302,104	388,963
Aiken	68	1,993,170	592	437	301	260,146	1,144,673	1,812,551
Anderson	106	196,570	204	26	16	44,154	261,714	378,303
Barnwell	92	116,250	241	......	2	22,347	145,747	214,673
Beaufort	23	550,250	951	1	1	201,862	343,496	666,411
Charleston	259	4,631,450	4,548	181	374	1,145,772	2,538,273	5,158,112
Chester	53	62,835	92	......	2	17,792	154,157	203,126
Chesterfield	34	68,100	441	1	6	63,072	67,900	192,436
Clarendon	33	72,000	345	......	2	50,552	64,581	168,948
Colleton	34	149,890	673	37	11	104,521	133,395	304,380
Darlington	53	88,200	255	......	......	41,569	192,167	290,965
Edgefield	79	121,860	173	......	4	23,899	259,969	338,165
Fairfield	30	51,100	124	......	......	19,608	75,322	116,791
Georgetown	21	230,875	282	20	20	60,227	265,495	431,891
Greenville	130	812,365	525	196	208	169,433	897,249	1,413,556
Hampton	24	95,350	263	......	5	41,433	137,645	250,377
Horry	30	67,895	158	1	1	35,474	94,508	227,275
Kershaw	33	99,800	517	......	......	33,603	143,395	210,830
Lancaster	24	57,590	43	......	......	5,256	143,789	177,401
Laurens	52	74,685	93	......	......	10,300	167,713	199,623
Lexington	83	140,945	156	10	19	21,285	152,813	228,032
Marion	75	142,440	450	1	1	44,080	174,615	301,097
Marlborough	33	59,550	85	......	1	10,650	124,206	156,131
Newberry	52	73,925	145	......	4	21,067	172,012	233,187
Oconee	51	89,400	129	6	8	17,000	112,057	176,803
Orangeburgh	43	75,450	275	......	8	28,614	83,871	143,603
Pickens	55	37,230	60	......	1	6,190	98,658	123,355
Richland	81	165,765	388	4	28	102,625	201,739	413,391
Spartanburgh	107	307,775	278	97	79	71,414	409,554	610,125
Sumter	73	113,469	505	3	8	61,915	190,496	342,910
Union	41	95,820	96	1	......	13,525	153,571	197,813
Williamsburgh	53	93,860	313	1	1	39,640	150,433	254,654
York	72	137,475	135	......	3	22,981	328,221	412,130

B—SOUTH CAROLINA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	2,078	$11,205,894	13,687	1,023	1,118	$2,836,289	$9,885,538	$16,738,008
Agricultural implements	7	18,150	33	10	45	7,050	5,250	17,475
Axle-grease	2	7,000	4	......	......	1,768	4,600	8,400
Bagging, flax, hemp, and jute	1	100,000	35	66	8	23,473	96,736	148,000
Bags, other than paper	1	7,500	1	10	5	1,100	35,000	40,000
Baskets, rattan and willow ware	2	500	1	......	1	626	750	1,951
Blacksmithing (see also Wheelwrighting)	175	70,745	290	......	6	50,146	66,289	192,371
Bookbinding and blank-book making	1	1,000	2	......	......	1,000	500	2,500
Boots and shoes, including custom work and repairing	43	24,495	75	......	2	20,112	31,609	74,752
Bread and other bakery products	20	69,900	89	1	16	35,946	158,382	226,045
Brick and tile	29	31,100	269	2	96	35,903	17,208	80,819
Carpentering	32	40,125	520	......	15	115,913	158,198	326,590
Carriages and wagons (see also Wheelwrighting)	10	86,200	131	......	......	40,570	59,966	141,852
Cars, railroad, street, and repairs	2	1,300	9	......	......	3,912	3,940	9,813
Clothing, men's	8	40,300	37	5	4	12,200	25,900	49,200
Coffins, burial cases, and undertakers' goods	1	1,200	2	......	......	350	1,500	2,500
Confectionery	5	3,000	7	......	3	2,830	15,250	23,240
Cooperage	12	7,325	26	1	......	5,489	5,400	15,725
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	1	3,000	2	......	1	1,000	3,000	5,000
Cotton compressing	4	580,000	230	......	......	62,900	65,000	198,000
Cotton goods	14	2,776,100	661	772	585	380,844	1,808,300	2,895,769
Cotton-ties	1	2,000	15	......	15	4,095	4,000	10,000
Dentistry, mechanical	7	2,800	......	......	......	......	3,785	9,800
Fertilizers	28	3,493,300	2,679	10	70	576,580	1,297,204	2,091,053
Flouring- and grist mill products	720	1,339,269	1,048	1	3	139,352	3,265,485	3,779,470
Foundery and machine-shop products	18	179,850	283	......	31	90,449	137,359	289,502
Furnishing goods, men's	1	8,000	2	33	......	5,000	4,500	15,000
Furniture (see also Mattresses and spring beds; Upholstering)	7	3,625	5	......	2	1,395	2,805	9,350
Leather, curried	22	8,400	21	......	......	2,452	32,602	43,520
Leather, tanned	28	42,675	61	......	......	9,120	47,225	73,597
Lime	2	5,000	28	......	......	5,205	2,660	9,500
Liquors, distilled	10	6,700	10	......	......	785	6,246	9,705
Liquors, malt	1	75,000	6	......	......	2,917	13,446	22,240
Lock- and gun-smithing	8	2,430	6	......	3	2,858	2,150	11,968
Lumber, planed (see also Sash, doors, and blinds)	12	109,500	220	......	34	52,770	142,700	258,250
Lumber, sawed	420	1,056,265	1,431	......	37	221,963	1,257,361	2,031,507
Marble and stone work	14	26,650	44	......	4	18,870	27,950	59,734
Mattresses and spring beds (see also Furniture)	1	500	2	......	......	100	300	900
Mineral and soda waters	4	5,000	14	......	......	4,209	8,200	21,150
Painting and paperhanging	10	6,810	51	......	......	11,794	14,754	34,365
Patent medicines and compounds	1	200	3	......	......	300	600	1,800

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—SOUTH CAROLINA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Photographing	7	$8,400	8	1		$2,950	$2,980	$14,200
Plumbing and gasfitting	7	4,400	12		8	9,436	19,700	34,876
Printing and publishing	14	132,700	194	35	13	115,947	89,450	209,520
Rice cleaning and polishing	2	68,000	94	20	20	18,000	13,500	50,000
Saddlery and harness	25	27,700	49		6	18,192	56,286	97,922
Sash, doors, and blinds (see also Lumber, planed)	1	2,000	6			1,872	1,040	4,000
Shingles, split	1	250	1			75	250	550
Shipbuilding	16	46,300	94			55,990	55,250	144,000
Soap and candles	1	300	1			418	1,500	2,000
Stencils and brands	1	1,000	3			1,000	200	1,800
Stone- and earthen-ware	3	6,500	18			2,200	8,500	16,200
Tar and turpentine, not including farm products	192	565,290	4,512	52	55	555,460	666,179	1,896,206
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	20	37,850	70		3	18,597	43,396	81,858
Tobacco, cigars and cigarettes	9	11,600	40		1	14,391	12,572	38,462
Upholstering (see also Furniture)	4	13,400	11	4		6,000	30,420	49,000
Watch and clock repairing	12	6,750	13		3	11,221	3,430	22,100
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	67	72,640	195		23	50,021	47,290	141,226
Woolen goods	11	7,900	13			1,173	19,455	24,075

A—TENNESSEE, BY TOTALS OF COUNTIES.

	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	4,326	$20,092,845	19,575	1,196	1,674	$5,254,775	$23,834,262	$37,074,886
COUNTIES.								
Anderson	14	18,150	27		2	3,222	26,910	37,561
Bedford	112	297,892	236	31	31	51,183	441,383	606,737
Benton	15	29,100	38			5,669	36,715	51,987
Bledsoe	10	7,521	12			1,029	12,296	17,869
Blount	42	124,760	103	36	15	22,206	167,388	236,565
Bradley	35	84,175	99		3	19,540	208,070	266,316
Campbell	14	7,335	15			1,490	14,490	20,225
Cannon	25	52,500	42			6,560	95,870	138,165
Carroll	41	137,200	80			13,951	108,130	153,793
Carter	69	121,015	394	12	5	34,221	197,135	306,893
Cheatham	35	150,236	96		9	19,216	87,328	139,007
Claiborne	32	50,375	28			4,060	63,947	88,625
Clay	4	18,300	22			4,265	18,105	27,567
Cocke	25	86,037	70			11,491	70,293	95,909
Coffee	18	135,100	109	16	21	27,804	169,059	249,500
Crockett	36	60,435	91			14,480	96,880	141,153
Cumberland	6	7,200	8		1	465	1,870	4,470
Davidson	352	4,110,345	4,133	538	474	1,388,601	5,841,841	9,385,211
Decatur	5	106,000	73		1	10,930	16,042	30,947
De Kalb	59	62,735	95	2		11,863	122,760	175,277
Dickson	16	184,600	173	6	16	45,070	66,544	134,388
Dyer	23	51,100	83		9	13,250	148,075	198,980
Fayette	30	49,065	61		3	8,982	51,216	83,714
Fentress	3	5,000	12			1,625	14,575	19,630
Franklin	51	111,400	126	3	10	20,109	159,229	219,974
Gibson	71	190,415	268	3	11	63,289	336,148	500,072
Giles	140	207,156	243	12	37	44,874	283,400	426,640
Grainger	31	35,875	38			3,607	44,172	60,544
Greene	123	277,470	161	9	7	25,985	223,518	335,541
Grundy	16	157,700	147			49,443	98,437	194,350
Hamblen	57	86,388	92			18,864	165,538	218,700
Hamilton	58	2,045,000	1,958	7	168	568,508	2,056,438	3,230,006
Hancock	18	12,005	21			3,520	31,841	43,475
Hardeman	48	72,120	70		2	12,600	99,988	141,597
Hardin	31	65,400	68		1	8,335	65,070	97,904
Hawkins	91	93,745	123	7		18,371	203,463	271,385
Haywood	25	68,400	109		4	30,294	207,697	316,766
Henderson	29	41,735	39		3	3,934	75,394	100,873
Henry	61	326,525	208	57	18	51,941	427,504	692,220
Hickman	30	147,335	63	36	20	18,025	133,135	185,525
Houston	11	51,595	89		2	18,225	56,321	95,958
Humphreys	35	86,728	122	4	9	15,810	105,086	162,195
Jackson	23	32,980	39		1	5,080	33,562	49,147
James	11	17,950	16			2,500	30,074	40,164
Jefferson	25	45,440	43		1	5,975	144,742	186,465
Johnson	27	88,550	183	2	6	23,132	39,002	77,328
Knox	136	957,440	786	9	179	320,121	1,066,061	1,629,045
Lake	4	20,000	52			7,720	27,250	42,500
Lauderdale	33	45,450	92			9,889	66,471	93,293
Lawrence	27	211,136	216	81	42	61,734	132,792	197,851
Lewis	2	3,300	9		2	975	2,100	4,200
Lincoln	97	212,000	231	16	31	44,127	334,803	464,950
Loudon	55	177,665	116	17	17	33,270	185,091	298,255
McMinn	58	165,175	95	24	7	24,745	168,042	242,149
McNairy	15	28,700	43		1	4,638	52,059	65,900

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—TENNESSEE, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Macon	36	$57, 165	69	....	1	$8, 807	$83, 976	$131, 546
Madison	73	246, 700	272	2	12	70, 762	333, 947	567, 160
Marion	25	400, 165	309	....	11	101, 715	303, 764	513, 968
Marshall	30	67, 700	77	....	....	10, 171	112, 326	144, 906
Maury	134	277, 896	296	....	5	59, 116	387, 012	571, 549
Meigs	42	44, 280	50	....	1	7, 332	85, 132	116, 289
Monroe	59	70, 050	82	4	1	12, 224	73, 543	107, 564
Montgomery	64	376, 250	458	49	110	136, 410	544, 808	812, 841
Moore	40	78, 430	61	....	1	12, 141	83, 029	134, 835
Morgan	6	5, 400	7	....	1	1, 100	7, 350	12, 100
Obion	49	280, 600	369	4	57	125, 350	380, 387	644, 542
Overton	13	18, 100	25	....	2	2, 695	20, 870	33, 526
Perry	21	66, 030	60	....	1	11, 031	161, 334	221, 173
Polk	5	10, 850	8	....	....	1, 460	21, 450	25, 811
Putnam	20	25, 425	38	....	1	5, 050	33, 097	50, 550
Rhea	1	10, 000	3	....	....	1, 000	24, 000	27, 500
Roane	48	787, 268	461	....	31	88, 452	221, 456	348, 426
Robertson	87	344, 885	227	2	....	48, 577	388, 210	558, 580
Rutherford	98	181, 755	285	2	16	73, 488	419, 149	614, 292
Scott	2	6, 500	4	....	....	900	11, 740	14, 089
Sequatchie	6	7, 900	4	....	....	490	14, 550	19, 150
Sevier	34	50, 540	57	....	....	5, 262	38, 945	55, 364
Shelby	186	2, 452, 425	2, 278	69	69	876, 566	2, 640, 910	4, 759, 091
Smith	59	86, 140	96	....	....	11, 153	155, 955	207, 753
Stewart	22	597, 465	310	....	51	31, 288	85, 767	111, 642
Sullivan	125	244, 177	298	36	31	57, 862	296, 513	466, 680
Sumner	67	198, 646	194	41	30	48, 348	212, 856	342, 387
Tipton	25	38, 325	67	....	2	11, 331	71, 500	104, 989
Trousdale	17	23, 378	12	....	....	1, 592	24, 005	33, 065
Unicoi	1	1, 000	....	....	....	....	....	....
Union	20	30, 120	26	....	2	4, 157	71, 825	91, 145
Van Buren	5	5, 900	7	....	....	960	8, 108	12, 122
Warren	56	200, 803	142	49	27	38, 620	209, 752	308, 204
Washington	93	162, 598	153	2	2	28, 389	263, 930	376, 167
Wayne	30	129, 220	48	....	....	6, 350	48, 274	67, 398
Weakley	39	89, 050	194	....	10	23, 197	140, 743	205, 079
White	35	49, 585	69	....	4	11, 634	80, 579	118, 768
Williamson	79	124, 575	185	8	1	24, 035	302, 071	413, 785
Wilson	114	206, 595	308	....	25	54, 936	341, 149	525, 389

B—TENNESSEE, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	4, 326	$20, 092, 845	19, 575	1, 196	1, 674	$5, 254, 775	$23, 834, 262	$37, 074, 886
Agricultural implements	33	161, 030	172	1	5	43, 277	59, 280	182, 116
Bags, paper	1	50, 000	10	12	3	6, 480	71, 300	88, 005
Baskets, rattan and willow ware	1	500	....	1	....	250	325	1, 800
Blacksmithing (see also Wheelwrighting)	722	226, 067	756	2	16	134, 970	219, 686	698, 469
Bookbinding and blank-book making	5	56, 080	26	21	5	13, 850	47, 125	92, 200
Boots and shoes, including custom work and repairing	197	113, 826	308	2	5	88, 835	150, 845	369, 952
Boxes, wooden, packing	3	23, 500	32	....	14	12, 995	24, 481	46, 000
Bread and other bakery products	18	120, 100	116	6	9	45, 390	214, 374	335, 917
Brick and tile	90	343, 354	1, 224	7	322	247, 227	139, 558	523, 113
Brooms and brushes	11	12, 165	42	2	7	9, 475	29, 435	54, 925
Buttons	1	1, 000	1	1	2	600	2, 000	5, 000
Carpentering	104	131, 898	459	....	....	168, 227	325, 356	642, 770
Carriage and wagon materials	3	52, 500	44	....	10	15, 000	33, 000	77, 000
Carriages and wagons (see also Wheelwrighting)	51	715, 050	942	2	11	219, 998	580, 300	1, 253, 721
Cars, railroad, street, and repairs	3	175, 000	190	....	....	69, 500	161, 500	251, 000
Cheese and butter (factory)	2	1, 800	4	....	1	300	1, 188	1, 980
Clothing, men's	14	49, 200	111	242	10	87, 600	123, 300	277, 275
Clothing, women's	1	30, 000	18	....	....	7, 000	24, 000	40, 000
Coffee and spices, roasted and ground	2	19, 000	6	....	....	2, 625	132, 450	142, 475
Coffins, burial cases, and undertakers' goods	27	40, 485	36	....	....	10, 640	31, 600	75, 900
Coke	4	200, 021	114	....	....	38, 820	132, 229	212, 493
Confectionery	10	89, 500	87	76	12	35, 450	266, 500	361, 225
Cooperage	52	36, 350	172	....	....	44, 284	55, 240	153, 275
Corsets	2	3, 500	5	3	3	3, 336	4, 500	11, 000
Cotton compressing	3	530, 000	173	....	....	102, 825	152, 670	311, 750
Cotton goods (see also Mixed textiles)	19	1, 184, 600	296	543	259	170, 507	586, 609	934, 014
Cotton-ties	1	50, 000	25	....	15	13, 684	66, 378	101, 538
Dentistry, mechanical	2	2, 500	1	....	....	240	1, 000	4, 000
Electroplating	1	100	....	....	....	....	275	875
Fertilizers	2	6, 500	3	....	....	1, 050	7, 150	11, 000
Flouring- and grist-mill products	990	3, 595, 585	1, 847	....	2	376, 399	9, 070, 421	10, 784, 804
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	50	551, 950	738	2	26	269, 272	610, 824	1, 191, 531
Furnishing goods, men's	1	5, 000	12	....	....	2, 500	10, 000	20, 000
Furniture (see also Mattresses and spring beds; Upholstering)	85	511, 250	643	7	149	231, 772	427, 637	954, 100
Furniture, chairs	7	10, 900	16	1	4	3, 350	4, 650	13, 750

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—TENNESSEE, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Grease and tallow	1	$10,000	3	....	....	$2,570	$49,586	$67,105
Gunpowder	1	100,000	12	....	....	6,000	25,000	40,000
Handles, wooden	1	3,500	6	....	2	600	1,500	3,750
Instruments, professional and scientific	1	1,200	2	....	....	624	225	2,500
Iron and steel	43	3,681,776	2,758	10	309	659,773	1,376,059	2,274,203
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	1	2,000	3	....	....	1,040	1,000	2,750
Kaolin and ground earths	1	44,027	20	....	....	6,000	4,914	10,695
Leather, curried	113	154,185	118	....	2	27,700	452,774	546,427
Leather, tanned	147	470,075	333	....	12	86,988	1,041,605	1,504,660
Lime	3	13,500	49	....	....	10,000	8,350	25,800
Liquors, distilled	63	373,573	136	....	....	43,344	353,776	540,729
Liquors, malt	3	66,500	30	....	....	9,602	43,637	73,869
Lock- and gun-smithing	12	8,750	12	....	2	5,275	6,650	21,425
Looking-glass and picture frames	5	15,000	28	....	4	10,164	18,375	38,675
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	15	117,700	169	....	24	63,275	150,570	270,405
Lumber, sawed	755	2,004,503	3,577	....	141	549,222	2,142,885	3,744,905
Marble and stone work	30	82,280	171	....	2	61,065	81,937	237,596
Masonry, brick and stone	8	31,440	180	....	....	56,410	134,715	221,625
Mattresses and spring beds (see also Furniture)	2	4,000	9	1	....	3,770	5,550	16,000
Mineral and soda waters	5	43,000	48	....	1	12,602	52,675	123,775
Mixed textiles (see also Cotton goods; Woolen goods)	1	35,000	15	8	5	7,500	52,780	79,000
Musical instruments and materials (not specified)	2	5,500	3	....	....	2,000	175	3,500
Oil, cottonseed and cake	9	935,000	644	4	18	163,340	812,000	1,235,000
Painting and paperhanging	12	27,600	76	....	....	28,268	34,375	93,468
Paints	1	1,200	3	....	....	1,170	1,200	2,730
Paper	1	20,500	5	5	10	3,250	12,600	17,975
Patent medicines and compounds	8	86,500	38	7	6	18,801	50,250	120,300
Photographing	2	3,200	4	....	....	3,500	4,260	15,660
Plumbing and gasfitting	12	37,400	110	....	7	40,225	94,758	174,950
Printing and publishing	30	625,550	368	41	53	248,356	213,026	653,645
Pumps, not including steam pumps	2	155,000	102	....	3	19,983	120,000	184,500
Saddlery and harness	86	180,166	382	1	31	123,912	308,295	595,135
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	8	183,500	102	1	3	80,100	132,930	268,930
Scales and balances	1	500	3	....	....	1,960	1,500	3,500
Sewing machines and attachments	2	1,000	3	....	....	1,100	600	2,700
Shingles, split	1	1,000	4	....	....	600	400	1,500
Shipbuilding	1	500	5	....	1	600	4,100	5,000
Show-cases	2	1,650	2	....	1	1,350	3,930	7,480
Silversmithing	5	2,750	2	....	....	1,100	1,125	5,250
Slaughtering and meat-packing, not including retail butchering establishments.	6	105,000	227	....	....	47,600	1,019,692	1,376,476
Soap and candles	5	36,200	16	....	....	4,645	28,200	43,400
Stencils and brands	2	3,500	1	....	....	350	700	3,450
Stone- and earthen-ware	8	16,900	24	2	3	5,294	2,115	12,260
Tinware, copperware, and sheet-iron ware	70	365,750	374	10	7	134,367	346,290	710,813
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	7	105,300	36	12	12	10,250	38,820	66,000
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	7	14,600	31	4	4	6,210	10,180	25,210
Tobacco stemming	5	113,000	60	45	53	22,000	146,000	194,000
Trunks and valises	4	30,500	41	....	12	17,650	25,700	68,700
Upholstering (see also Furniture)	5	55,250	23	3	....	11,625	7,758	35,000
Watch and clock repairing	10	13,300	14	....	....	12,365	12,795	37,580
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	173	84,545	180	....	2	32,589	51,275	171,333
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	1	150	....	....	....	....	100	500
Wooden ware	3	99,430	134	....	32	41,900	154,300	247,350
Woolen goods (see also Mixed textiles)	106	418,664	249	111	42	67,063	423,054	620,724

A—TEXAS, BY TOTALS OF COUNTIES.

The State	2,996	$9,245,561	11,645	116	398	$3,343,087	$12,956,269	$20,719,928
COUNTIES.								
Anderson	24	47,500	147	....	1	27,977	50,954	138,105
Angelina	3	6,475	12	....	....	927	3,250	6,250
Aransas	2	200,700	126	....	....	47,150	254,600	454,915
Archer (a)	....	....	....	....	....	....	....	....
Armstrong (a)	....	....	....	....	....	....	....	....
Atascosa (a)	....	....	....	....	....	....	....	....
Austin	55	71,910	161	....	....	29,341	86,262	151,673
Bandera	2	5,060	4	....	....	1,200	7,300	10,640
Bastrop	59	79,175	161	....	....	17,847	86,249	129,634
Baylor	1	300	....	....	....	....	300	800
Bee	6	4,800	3	....	....	755	2,350	5,700
Bell	45	139,042	93	2	....	19,942	248,761	321,966
Bexar	72	310,300	301	13	48	137,811	328,526	643,112
Blanco	9	15,250	12	....	....	1,517	16,670	25,196
Borden (a)	....	....	....	....	....	....	....	....
Bosque	11	29,300	49	....	....	6,730	140,277	161,784
Bowie	25	186,725	185	2	8	47,911	228,027	417,840
Brazoria	1	250	2	....	....	50	450	550
Brazos	5	52,500	41	2	1	13,759	52,286	73,733
Briscoe (a)	....	....	....	....	....	....	....	....

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—TEXAS, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Brown	7	$25, 049	18	...	1	$2, 865	$109, 050	$141, 670
Burleson	6	8, 200	14	...	...	1, 810	9, 960	12, 490
Burnet	19	35, 737	38	...	4	5, 791	77, 186	97, 427
Caldwell	28	52, 350	48	...	1	7, 386	106, 752	131, 789
Calhoun	1	300	2	...	...	1, 200	1, 400	3, 000
Callahan	1	300	2	...	...	300	3, 710	4, 411
Cameron	2	16, 250	10	...	...	5, 000	2, 660	15, 050
Camp	14	25, 150	25	...	...	3, 625	24, 608	37, 134
Cass	64	146, 720	289	...	6	63, 125	201, 836	345, 916
Chambers	4	2, 850	10	...	...	1, 510	3, 520	6, 550
Cherokee	32	39, 650	79	...	...	9, 902	72, 810	97, 956
Childress (*a*)	...	...	...	...	...	...	...	...
Clay	5	24, 500	23	...	...	5, 720	29, 050	39, 230
Coleman	3	4, 200	6	2	...	3, 300	1, 700	6, 910
Collin	37	130, 050	109	...	1	26, 834	218, 354	291, 931
Collingsworth (*a*)	...	...	...	...	...	...	...	...
Colorado	28	37, 825	55	...	3	14, 100	50, 100	84, 260
Comal	48	168, 500	68	8	1	34, 815	149, 017	231, 331
Comanche	18	37, 195	29	...	...	8, 580	109, 830	144, 792
Concho (*a*)	...	...	...	...	...	...	...	...
Cooke	25	47, 525	105	...	10	26, 984	135, 044	183, 205
Coryell	12	35, 000	34	...	...	6, 700	83, 400	100, 649
Cottle (*a*)	...	...	...	...	...	...	...	...
Crockett (*a*)	...	...	...	...	...	...	...	...
Crosby (*a*)	...	...	...	...	...	...	...	...
Dallas	126	450, 125	527	12	23	221, 680	916, 288	1, 459, 362
Dawson (*a*)	...	...	...	...	...	...	...	...
Deaf Smith (*a*)	...	...	...	...	...	...	...	...
Delta	9	11, 625	13	...	...	1, 477	12, 270	16, 610
Denton	22	65, 420	64	...	...	11, 645	74, 576	104, 344
De Witt	28	48, 450	53	1	4	8, 513	63, 778	97, 286
Dickens (*a*)	...	...	...	...	...	...	...	...
Dimmit	1	200	1	...	...	150	1, 500	3, 000
Donley (*a*)	...	...	...	...	...	...	...	...
Duval (*a*)	...	...	...	...	...	...	...	...
Eastland	9	11, 200	20	...	...	2, 416	28, 161	35, 343
Edwards (*a*)	...	...	...	...	...	...	...	...
Ellis	30	44, 250	103	...	...	23, 688	148, 511	201, 238
El Paso	4	25, 500	19	...	...	5, 200	81, 630	105, 363
Enciñal (*a*)	...	...	...	...	...	...	...	...
Erath	14	31, 900	49	...	...	6, 955	53, 813	72, 158
Falls	12	16, 750	29	...	...	5, 565	11, 425	22, 300
Fannin	40	126, 800	144	...	11	30, 709	148, 644	223, 229
Fayette	74	113, 448	150	...	...	23, 882	120, 048	181, 844
Fisher (*a*)	...	...	...	...	...	...	...	...
Floyd (*a*)	...	...	...	...	...	...	...	...
Fort Bend	18	26, 850	61	...	...	7, 942	23, 109	43, 200
Franklin	15	28, 450	62	...	...	10, 365	29, 990	56, 550
Freestone	21	33, 850	57	...	...	6, 638	53, 240	76, 878
Frio (*a*)	...	...	...	...	...	...	...	...
Gaines (*a*)	...	...	...	...	...	...	...	...
Galveston	172	871, 750	634	15	36	500, 255	1, 283, 846	2, 377, 065
Garza (*a*)	...	...	...	...	...	...	...	...
Gillespie	22	37, 500	26	...	...	4, 594	51, 171	67, 248
Goliad	6	7, 200	10	...	...	3, 134	5, 225	12, 547
Gonzales	31	64, 800	66	...	3	9, 790	55, 406	77, 063
Gray (*a*)	...	...	...	...	...	...	...	...
Grayson	77	345, 900	330	5	8	105, 899	393, 399	612, 024
Gregg	15	117, 900	186	...	1	34, 901	99, 183	174, 788
Grimes	33	127, 450	185	1	...	32, 533	116, 625	191, 361
Guadalupe	16	29, 350	19	...	...	3, 023	39, 341	51, 244
Hall (*a*)	...	...	...	...	...	...	...	...
Hamilton	13	32, 850	41	...	...	4, 140	28, 545	38, 207
Hansford (*a*)	...	...	...	...	...	...	...	...
Hardeman (*a*)	...	...	...	...	...	...	...	...
Hardin (*a*)	...	...	...	...	...	...	...	...
Harris	85	683, 625	688	7	47	296, 369	687, 204	1, 303, 293
Harrison	39	93, 275	264	5	9	71, 388	149, 419	281, 111
Hartley (*a*)	...	...	...	...	...	...	...	...
Haskell (*a*)	...	...	...	...	...	...	...	...
Hayes	10	51, 300	28	...	...	6, 235	33, 645	47, 931
Hemphill (*a*)	...	...	...	...	...	...	...	...
Henderson	14	15, 775	53	...	...	4, 650	22, 950	32, 344
Hidalgo (*a*)	...	...	...	...	...	...	...	...
Hill	36	36, 760	86	...	3	11, 074	101, 604	154, 685
Hood	5	25, 125	12	...	...	2, 980	48, 104	55, 641
Hopkins	18	57, 450	67	3	3	13, 575	100, 015	127, 910
Houston	26	55, 600	72	...	...	5, 971	67, 777	85, 954
Howard (*a*)	...	...	...	...	...	...	...	...
Hunt	21	42, 450	56	...	1	9, 943	96, 033	127, 955

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—TEXAS, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Hutchinson (a)								
Jack	12	$20,675	30			$4,709	$24,967	$37,199
Jackson	3	750	2			1,000	1,175	3,500
Jasper	4	2,500	4			300	2,215	3,062
Jefferson	10	271,600	292		27	118,400	286,710	483,000
Johnson	49	61,337	117			24,402	105,072	162,066
Jones (a)								
Karnes	5	4,000	2			375	5,590	8,300
Kaufman	38	85,950	124	1	9	29,006	293,070	399,262
Kendall	2	2,500	3			654	1,341	2,657
Kent (a)								
Kerr	4	15,500	5			1,306	17,317	21,819
Kimble (a)								
King (a)								
Kinney	1	500	1			500	8,225	11,100
Knox (a)								
Lamar	37	74,970	159	4	6	37,241	142,175	226,266
Lampasas	13	28,700	23			3,605	45,000	63,277
La Salle (a)								
Lavaca	33	54,900	72			8,608	55,114	74,739
Lee	23	42,960	38			3,961	41,452	51,819
Leon	4	8,350	22		1	2,250	11,530	17,150
Liberty	17	56,600	147		2	40,718	134,578	217,735
Limestone	31	45,000	160	2	11	30,562	89,193	151,976
Lipscomb (a)								
Live Oak	3	615					750	2,000
Llano (a)								
Lubbock (a)								
Lynn (a)								
McCulloch (a)								
McLennan	41	183,000	203	10	27	61,536	265,861	379,510
McMullen (a)								
Madison (a)								
Marion	10	78,800	240		5	63,870	71,140	164,811
Martin (a)								
Mason	2	765					380	1,300
Matagorda	5	6,000	10			830	3,080	4,820
Maverick	1	1,000	2			300	400	1,500
Medina	14	27,175	17			2,680	62,309	80,492
Menard (a)								
Milam	40	53,335	134	2		9,828	50,119	74,131
Mitchell (a)								
Montague	23	45,243	48			4,715	50,411	65,834
Montgomery	35	168,020	418		7	108,224	278,755	495,990
Morris	11	20,000	38			8,123	15,794	38,150
Motley (a)								
Nacogdoches	26	31,900	47		2	4,309	28,166	39,707
Navarro	21	42,385	78			9,487	70,897	94,338
Newton	16	12,600	34			1,505	20,084	25,324
Nolan (a)								
Nueces	3	29,500	11			2,430	1,040	4,988
Oldham (a)								
Orange	9	212,500	311		3	123,600	307,200	519,900
Palo Pinto	9	15,350	20			3,976	11,315	24,425
Panola	20	26,584	68		2	5,608	78,202	98,962
Parker	16	68,025	53			17,155	207,865	249,223
Pecos (a)								
Polk	4	12,850	29			5,952	17,175	30,600
Potter (a)								
Presidio	1	3,000	7			415	4,150	6,000
Rains	6	4,225	10			2,150	9,550	16,800
Randall (a)								
Red River	73	127,705	221		5	42,627	150,116	253,810
Refugio (a)								
Roberts (a)								
Robertson	16	17,300	41		2	7,745	26,455	41,760
Rockwall	1	2,000	3			153	1,538	1,950
Runnels (a)								
Rusk	28	28,825	95			7,881	35,677	54,175
Sabine	7	6,850	19			2,052	10,970	16,130
San Augustine	13	11,100	38		1	4,200	12,680	24,070
San Jacinto	8	30,500	33		1	11,580	40,230	66,660
San Patricio (a)								
San Saba	7	32,100	20			1,720	33,575	39,175
Scurry (a)								
Shackelford	6	13,950	13			4,044	8,487	19,012
Shelby	22	22,481	60		2	6,135	22,408	37,304
Smith	20	23,275	41		2	7,600	20,533	36,588
Somervell	3	33,700	10	1	3	2,770	33,200	42,500
Starr (a)								

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—TEXAS, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	Average number of hands employed: Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Stephens	6	$8, 350	17			$3, 150	$3, 675	$9, 500
Stonewall (*a*)								
Swisher (*a*)								
Tarrant	58	152, 741	158	2	3	56, 832	338, 825	476, 087
Taylor (*a*)								
Throckmorton (*a*)								
Titus	15	8, 750	33			3, 807	13, 645	23, 230
Tom Green	1	1, 100	1			450	2, 094	3, 415
Travis	116	485, 775	427	9	24	201, 808	418, 905	833, 538
Trinity	12	16, 850	58			7, 005	44, 209	63, 822
Tyler	7	9, 200	13			800	3, 995	6, 675
Upshur	23	45, 699	136			28, 888	104, 572	164, 212
Uvalde	2	7, 000	3			600	12, 750	15, 014
Van Zandt	21	131, 200	62	1	1	17, 352	105, 706	156, 293
Victoria	4	9, 900	4			661	9, 851	12, 040
Walker	24	62, 600	191			22, 821	103, 145	153, 564
Waller	8	92, 350	60	2	2	10, 930	73, 895	111, 500
Washington	45	65, 125	90		12	12, 860	58, 234	96, 099
Webb (*a*)								
Wharton (*a*)								
Wheeler (*a*)								
Wichita (*a*)								
Wilbarger (*a*)								
Williamson	11	43, 200	43			3, 481	63, 893	73, 734
Wilson	13	17, 250	24	3		2, 557	9, 630	17, 910
Wise	26	54, 030	52			7, 440	63, 288	87, 413
Wood	51	121, 475	247	1	4	45, 160	178, 397	294, 560
Young	9	25, 700	15			3, 565	83, 600	97, 590
Zapata	2	300	2			380	1, 000	2, 200
Zavalla (*a*)								

a Returned as having no manufactures.

B—TEXAS, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	2, 996	$9, 245, 561	11, 645	116	398	$3, 343, 087	$12, 956, 269	$20, 719, 928
Agricultural implements	13	33, 800	133		6	46, 750	46, 700	143, 700
Bags, other than paper	1	3, 000	4			2, 200	7, 000	11, 500
Bags, paper	1	4, 000	10			1, 000	4, 000	6, 000
Baking and yeast powders (see also Drugs and chemicals)	1	13, 000	7			2, 000	3, 000	6, 500
Blacksmithing (see also Wheelwrighting)	467	299, 645	688	3	16	180, 502	247, 464	727, 079
Bookbinding and blank-book making	2	1, 250	9	1	1	2, 350	1, 700	6, 000
Boots and shoes, including custom work and repairing	163	100, 152	233	2		87, 223	140, 043	372, 810
Boxes, fancy and paper	2	250	7	1	4	1, 250	1, 450	4, 500
Bread and other bakery products	26	56, 150	60	1	3	31, 415	147, 046	243, 418
Brick and tile (see also Drain and sewer pipe)	113	183, 530	1, 042	8	135	204, 499	105, 074	448, 418
Brooms and brushes	7	3, 300	25	3		5, 575	7, 520	18, 300
Carpentering	107	84, 405	352			140, 556	331, 422	661, 370
Carriages and wagons (see also Wheelwrighting)	34	150, 700	205		6	92, 014	139, 000	301, 800
Cars, railroad, street, and repairs	1	15, 000	5			2, 000	2, 000	5, 500
Cement	1	5, 000	3			400	1, 000	2, 000
Clothing, men's	30	45, 970	103	11	4	42, 639	70, 776	153, 831
Coffee and spices, roasted and ground	2	2, 500	3			1, 240	6, 000	9, 050
Coffins, burial cases, and undertakers' goods	3	7, 000	3			2, 000	2, 500	6, 000
Confectionery	16	85, 300	55	5	4	31, 830	141, 485	241, 350
Cooperage	14	25, 650	53		1	41, 525	94, 650	172, 800
Cotton compressing	1	40, 000	25			5, 000	1, 500	8, 000
Cotton goods	2	50, 000	40	10	16	2, 466	14, 827	21, 600
Cutlery and edge tools (see also Hardware; Tools)	1	1, 500	5	5		2, 560	2, 500	12, 000
Dentistry, mechanical	2	700	1			300	800	3, 500
Drain and sewer pipe (see also Brick and tile)	2	8, 500	6			3, 600	4, 200	13, 000
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	1	2, 000	7		2	5, 552	6, 000	13, 827
Fertilizers	1	25, 000	25			10, 000	80, 000	100, 000
Flavoring extracts	1	500	1			200	800	1, 300
Flouring- and grist-mill products	921	3, 082, 952	2, 602	1	6	368, 683	6, 371, 606	7, 617, 177
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	30	365, 350	349		11	149, 212	228, 151	532, 778
Furnishing goods, men's	1	800	2			400	200	1, 000
Furniture (see also Mattresses and spring beds; Upholstering)	41	76, 480	98	4	3	35, 400	61, 225	152, 150
Furniture, chairs	4	1, 925	2			250	958	2, 690
Furs, dressed	1	1, 000	2			1, 700	1, 800	4, 000
Hand-stamps	1	350					500	1, 250
Hardware (see also Cutlery and edge tools; Tools)	2	1, 600	3			1, 150	2, 150	3, 900
Hats and caps, not including wool hats	2	1, 850	3	2	1	1, 100	2, 400	5, 500
Ice, artificial	12	342, 500	79		7	46, 855	45, 485	176, 000
Iron and steel	1	40, 000	140			27, 720	23, 580	36, 000
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	1	2, 000	3			2, 500	4, 000	8, 000
Jewelry	1	10, 000	7			8, 000	2, 000	12, 000
Kindling wood	2	2, 250	9			1, 600	3, 000	6, 700
Leather, curried	21	22, 150	14		1	3, 924	46, 017	62, 535
Leather, tanned	28	31, 850	38		1	7, 411	39, 030	63, 750
Lime	3	80, 000	54			17, 400	13, 916	48, 264

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—TEXAS, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Liquors, distilled	1	$600	1			$50	$425	$650
Liquors, malt	19	45, 400	18			6, 241	28, 841	47, 059
Liquors, vinous (see also Liquors, distilled)	3	17, 500	10	1		4, 300	2, 900	9, 000
Lock- and gun-smithing	15	9, 025	11		1	4, 450	8, 135	21, 050
Looking-glass and picture frames	2	11, 500	4			3, 560	3, 750	11, 800
Lumber, planed (see also Sash, doors, and blinds)	17	143, 000	187		4	73, 775	295, 640	456, 600
Lumber, sawed	324	1, 660, 952	3, 136	1	49	732, 914	2, 096, 775	3, 673, 449
Marble and stone work	9	21, 450	42			17, 400	26, 800	68, 100
Masonry, brick and stone	4	2, 500	17			1, 440	3, 100	9, 200
Mattresses and spring beds (see also Furniture)	6	14, 900	20	2		7, 350	10, 300	23, 400
Mineral and soda waters	11	19, 450	18	6		7, 670	9, 450	28, 400
Models and patterns	2	450	2		1	700	500	2, 000
Musical instruments, pianos and materials	1	4, 000	2			2, 000	900	3, 500
Oil, cottonseed and cake	4	202, 000	151	4	3	36, 272	192, 441	276, 450
Painting and paperhanging	25	44, 200	92			50, 475	74, 400	167, 250
Patent medicines and compounds (see also Drugs and chemicals)	6	22, 000	21		2	11, 450	27, 500	64, 500
Perfumery and cosmetics	1	500	1			500	300	1, 000
Photographing	12	13, 200	7	3	1	7, 155	4, 855	28, 415
Pickles, preserves, and sauces	1	800	1			480	1, 200	3, 050
Plumbing and gasfitting	3	21, 500	18		2	17, 050	24, 400	52, 900
Printing and publishing	39	447, 900	307	19	88	232, 924	207, 438	605, 000
Pumps, not including steam pumps	1	2, 000	3			900	4, 000	10, 000
Roofing and roofing materials	2	3, 500	8			1, 500	6, 500	13, 000
Saddlery and harness	126	286, 925	260	2	8	110, 576	325, 579	587, 871
Safes, doors, and vaults, fire-proof	1	600	1			850	500	3, 500
Salt	3	92, 000	17	1	1	8, 150	9, 100	29, 700
Sash, doors, and blinds (see also Lumber, planed)	8	106, 400	81		1	49, 800	305, 200	416, 500
Shingles, split	2	1, 150	11			1, 050	700	3, 900
Shipbuilding	16	23, 350	43			30, 170	40, 340	77, 780
Shirts	1	500		5		2, 000	2, 750	8, 250
Show-cases	2	2, 500	4			3, 500	5, 000	16, 500
Silversmithing	3	495	1			50	850	2, 300
Slaughtering and meat-packing, not including retail butchering establishments.	3	202, 200	132			49, 800	280, 220	486, 400
Soap and candles	7	33, 200	18		1	7, 700	35, 000	54, 940
Stencils and brands	2	1, 400	1		1	1, 250	2, 200	6, 200
Stone- and earthen-ware	6	5, 600	19			4, 830	2, 550	13, 270
Tinware, copperware, and sheet-iron ware	86	236, 730	211		6	105, 174	259, 300	491, 420
Tobacco, cigars and cigarettes	31	31, 300	104	5	1	67, 556	99, 200	263, 810
Tools (see also Cutlery and edge tools; Hardware)	1	600					100	600
Umbrellas and canes	1	500	1			550	200	1, 500
Upholstering (see also Furniture)	3	1, 125	2	2		700	2, 800	5, 700
Watch and clock repairing	14	42, 200	15			6, 450	6, 000	22, 192
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	83	58, 100	94			23, 124	44, 690	117, 475
Wirework	1	2, 000	10			1, 600	2, 500	5, 000
Woolen goods	1	97, 500	28	8		25, 700	44, 435	80, 500

A—UTAH TERRITORY, BY TOTALS OF COUNTIES.

The Territory	640	$2, 656, 657	2, 042	221	232	$858, 863	$2, 561, 737	$4, 324, 992
COUNTIES.								
Beaver	26	103, 900	121	7	6	49, 775	108, 958	195, 245
Box Elder	28	108, 325	116	8	9	35, 090	94, 102	163, 501
Cache	33	131, 800	114	1	4	41, 287	162, 215	243, 989
Davis	31	64, 150	56	1	3	14, 931	98, 454	131, 116
Emery (*a*)								
Iron	15	42, 000	30		1	8, 780	80, 094	99, 410
Juab	9	14, 150	14		6	2, 415	16, 191	21, 831
Kane	13	15, 387	19	4	5	4, 867	28, 340	41, 142
Millard	10	23, 580	17		1	5, 650	28, 800	45, 090
Morgan	9	27, 300	19	1		3, 630	19, 583	27, 387
Pi Ute	1	2, 000	2		2	600	3, 300	4, 500
Rich	3	12, 450	5			260	3, 620	5, 485
Salt Lake	207	1, 089, 015	845	123	124	477, 791	1, 005, 518	1, 933, 221
San Juan (*a*)								
Sanpete	27	63, 100	62	1	1	15, 085	152, 490	195, 365
Sevier	14	20, 500	23		2	6, 650	48, 100	63, 066
Summit	12	31, 700	28			4, 120	26, 615	37, 122
Tooele	21	39, 450	34		1	9, 390	34, 105	55, 805
Uintah (*a*)								
Utah	106	395, 350	235	45	32	86, 095	337, 489	549, 971
Wasatch	22	35, 500	63		5	10, 190	59, 692	86, 286
Washington	12	69, 000	60	23	10	13, 749	27, 304	55, 350
Weber	41	368, 000	179	7	20	68, 508	226, 767	370, 110

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—UTAH TERRITORY, BY SPECIFIED INDUSTRIES.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	640	$2,656,657	2,042	221	232	$858,863	$2,561,737	$4,324,992
Agricultural implements	1	5,000	16			11,232	3,759	16,391
Awnings and tents	3	900	6	4		3,437	7,000	13,800
Baking and yeast powders (see also Drugs and chemicals)	1	500					300	500
Baskets, rattan and willow ware	3	1,300	2			775	750	3,420
Blacksmithing (see also Wheelwrighting)	60	30,775	78		1	33,582	29,084	99,651
Bluing	1	100		1		250	350	1,200
Bookbinding and blank-book making	1	3,000	1	1		1,500	1,800	5,700
Boots and shoes, including custom work and repairing	59	104,860	235	42	44	114,149	173,365	356,547
Brass castings	1	500	1			85	250	550
Bread and other bakery products	10	28,400	17	6	4	11,912	63,420	98,407
Brick and tile	28	121,575	147		41	34,890	19,825	85,392
Brooms and brushes	1	7,000	6		1	2,500	5,000	9,000
Carpentering	33	26,750	47			18,761	30,069	71,868
Carpets, rag	2	750	3	5	4	1,600	2,500	5,650
Carriages and wagons (see also Wheelwrighting)	5	11,400	25		1	14,980	13,515	36,600
Charcoal	4	16,000	53			18,000	27,960	60,280
Cheese and butter (factory)	11	22,402	14		6	2,035	12,095	21,928
Clothing, men's	8	12,610	29	33		20,750	31,894	61,544
Confectionery	4	17,000	9	2	2	6,475	32,888	51,180
Cooperage	3	575	3			541	480	1,566
Cordage and twine	1	300					300	1,000
Cotton goods	1	20,000	16	8	5	2,100	3,472	7,937
Dentistry, mechanical	6	8,100	4	2		2,250	2,850	18,950
Drugs and chemicals (see also Baking and yeast powders)	1	1,200		2		200	1,000	1,800
Flouring- and grist-mill products	85	595,950	157			56,557	1,136,176	1,364,619
Foundery and machine-shop products	11	95,000	72	9	2	46,311	50,110	131,670
Furniture (see also Mattresses and spring beds; Upholstering)	25	55,350	70	4	5	32,465	30,705	94,900
Iron and steel (*a*)	3	150,000						
Iron railings, wrought	1	2,000	4			3,744	3,000	8,100
Jewelry	3	2,600	7			6,783	9,150	19,362
Kaolin and ground earths	1	500	1		1	500	1,000	2,000
Lasts	1	400					75	600
Leather, curried	12	26,300	14			5,556	40,171	59,088
Leather, dressed skins	2	5,700	6			2,112	5,400	12,400
Leather, tanned	13	43,200	22		4	9,768	27,331	47,267
Lime	5	37,300	21		2	7,720	4,560	19,250
Liquors, malt	14	153,500	47		3	20,719	77,011	139,239
Lock- and gun-smithing	1	400	1			250	230	850
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	1	15,000	5			1,000	1,000	3,000
Lumber, sawed	107	272,750	375		10	65,175	238,274	375,164
Marble and stone work	3	4,400	5			3,868	3,300	9,400
Masonry, brick and stone	4	620	2			250	260	2,535
Mattresses and spring beds (see also Furniture)	1	150	1			250	300	800
Mineral and soda waters	2	6,500	6		1	1,512	4,200	7,700
Painting and paperhanging	4	11,500	18	1	6	12,533	8,126	28,630
Paper	1	5,000	4	2		3,000	8,000	12,000
Photographing	5	6,600	8	4	2	5,663	3,170	16,300
Plumbing and gasfitting	2	3,000	8		2	5,400	13,000	21,053
Printing and publishing	7	159,660	118	13	17	94,861	72,054	214,625
Saddlery and harness	22	35,130	49		4	23,753	74,255	118,850
Salt	10	13,400	62	3	8	20,932	4,000	60,280
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	5	42,600	26		1	14,670	22,350	45,500
Saws	1	300					50	600
Soap and candles	2	18,200	4		1	2,498	51,142	58,360
Stencils and brands	1	500					150	800
Stone- and earthen-ware	2	4,000	5			1,800	800	5,000
Tinware, copperware, and sheet-iron ware	9	35,400	29		5	22,550	51,200	93,470
Tobacco, cigars and cigarettes	2	13,500	10		1	6,940	3,500	12,400
Trunks and valises	2	625	1			384	1,000	3,125
Upholstering (see also Furniture)	2	1,150	4			2,600	1,000	4,750
Vinegar	1	10,000	6			3,000	2,000	10,000
Watch and clock repairing	2	350	2			1,100	250	1,800
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	3	3,875	8			2,015	1,450	5,645
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	2	1,200	1			200	400	2,100
Wooden ware	1	50	1			312	435	875
Woolen goods	11	382,000	150	79	48	68,108	147,226	279,424

a Not in operation.

A—VERMONT, BY TOTALS OF COUNTIES.

The State	2,874	$23,265,224	14,438	2,271	831	$5,164,479	$18,330,677	$31,354,360
COUNTIES.								
Addison	167	706,950	536	18	17	135,951	647,005	1,006,921
Bennington	195	3,263,796	1,835	759	298	761,986	2,380,615	4,009,222
Caledonia	174	3,691,234	1,296	34	26	516,542	1,013,671	3,224,139
Chittenden	246	3,265,156	2,466	454	202	918,400	4,513,870	6,244,391
Essex	44	367,400	185		30	50,876	319,419	456,467

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—VERMONT, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Franklin	198	$976, 650	639	21	17	$191, 495	$883, 320	$1, 393, 002
Grand Isle	8	6, 900	11			773	3, 588	7, 240
Lamoille	126	404, 850	319	5	4	60, 567	309, 168	500, 081
Orange	190	694, 720	550	50	9	135, 717	604, 789	959, 635
Orleans	207	906, 486	710	36	35	163, 640	688, 915	1, 118, 795
Rutland	358	2, 560, 045	1, 874	74	59	678, 349	1, 505, 014	3, 076, 452
Washington	271	1, 245, 997	798	60	7	271, 217	1, 243, 992	1, 920, 210
Windham	310	2, 288, 135	1, 346	175	18	603, 596	1, 616, 264	3, 219, 079
Windsor	380	2, 886, 905	1, 873	585	109	675, 370	2, 601, 047	4, 218, 732

B—VERMONT, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	2, 874	$23, 265, 224	14, 438	2, 271	831	$5, 164, 479	$18, 330, 677	$31, 354, 366
Agricultural implements	35	640, 900	462	2		165, 894	357, 639	718, 455
Baskets, rattan and willow ware	4	20, 000	54	20	3	8, 896	5, 450	25, 250
Billiard tables and materials	1	1, 000	2		1	2, 000	2, 000	5, 000
Blacksmithing (see also Wheelwrighting)	426	317, 930	399		4	106, 531	187, 847	522, 575
Bookbinding and blank-book making	1	5, 000	7	4	1	3, 000	5, 000	9, 500
Boot and shoe findings	2	23, 000	25	17	1	12, 258	8, 150	24, 500
Boots and shoes, including custom work and repairing	111	190, 575	335	41	2	107, 562	364, 590	565, 415
Boxes, fancy and paper	1	2, 000	2	5		2, 155	4, 325	8, 813
Boxes, wooden, packing	4	51, 700	81		15	27, 700	154, 880	196, 800
Bread and other bakery products	11	113, 400	71	3	1	30, 354	128, 530	226, 305
Brick and tile (see also Drain and sewer pipe)	25	133, 250	216		8	38, 610	18, 735	83, 650
Brooms and brushes	5	41, 000	47	14	6	12, 281	41, 300	66, 900
Buttons	2	56, 000	48	47	2	27, 140	42, 014	74, 854
Carpentering	26	54, 625	101		2	38, 551	79, 323	158, 486
Carriage and wagon materials	8	27, 350	30			7, 675	7, 250	20, 400
Carriages and sleds, children's	6	102, 000	168	10	12	53, 437	76, 083	151, 851
Carriages and wagons (see also Wheelwrighting)	21	141, 800	157			57, 040	62, 850	174, 885
Charcoal	9	145, 000	216			63, 400	23, 500	121, 500
Cheese and butter (factory)	85	202, 300	126	28	2	22, 535	284, 422	393, 122
Clothing, men's	23	53, 550	33	103		40, 410	89, 013	161, 659
Coffee and spices, roasted and ground	2	5, 000	5			1, 400	40, 000	46, 500
Coffins, burial cases, and undertakers' goods	12	41, 200	36			9, 800	43, 750	71, 920
Confectionery	4	40, 000	18	6		8, 850	61, 700	95, 000
Cooperage	73	112, 925	177	1	8	36, 905	47, 109	134, 996
Cordage and twine	1	1, 500	3	3		1, 080	3, 000	7, 000
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	8	956, 096	219	354	181	173, 748	555, 297	915, 864
Cutlery and edge tools (see also Hardware; Tools)	4	19, 950	20			7, 250	11, 835	24, 300
Dentistry, mechanical	15	10, 700	8	1		3, 500	6, 525	21, 230
Drain and sewer pipe (see also Brick and tile)	1	5, 000	4			1, 500	3, 000	6, 000
Drugs and chemicals (see also Patent medicines and compounds)	3	135, 000	44			10, 800	9, 800	28, 805
Dyeing and cleaning	1	700	1			100	250	900
Electroplating	1	1, 000	2			600	3, 000	4, 200
Emery wheels	1	8, 000	3			536	1, 361	7, 500
Fancy articles	1	12, 000	26	2		4, 500	6, 000	15, 000
Fertilizers	1	1, 000	2			500	800	1, 650
Files	1	3, 800	8		2	3, 900	800	5, 800
Flouring- and grist-mill products	227	1, 152, 461	331			81, 589	2, 602, 641	3, 038, 688
Foundery and machine-shop products	45	1, 137, 675	578	6	4	243, 426	326, 770	783, 828
Furniture (see also Upholstering)	56	296, 150	288		5	91, 617	155, 452	333, 522
Furniture, chairs	15	133, 150	159		17	55, 950	68, 700	160, 300
Glass, cut, stained, and ornamented	1	5, 000	5			1, 600	1, 100	4, 600
Handles, wooden	11	24, 075	48		1	8, 150	12, 750	32, 486
Hardware (see also Cutlery and edge tools; Tools)	1	50, 000	25			10, 000	20, 000	80, 000
Hones and whetstones	3	17, 500	19	1		6, 095	965	12, 500
Hosiery and knit goods (see also Cotton goods; Woolen goods)	6	492, 000	138	227	18	101, 037	359, 938	595, 270
Iron and steel	4	410, 000	190		1	50, 035	240, 900	392, 300
Iron nails and spikes, cut and wrought	1	100, 000	21	3	6	10, 000	50, 000	80, 000
Kaolin and ground earths	7	63, 500	68			15, 800	9, 300	45, 500
Lasts	3	18, 020	19			7, 650	2, 325	23, 200
Leather, curried	24	113, 950	63			22, 245	457, 632	530, 337
Leather, tanned	53	433, 300	184		1	62, 461	838, 426	1, 084, 503
Lime	9	41, 050	105			27, 328	39, 403	92, 078
Lock- and gun-smithing	6	7, 000	5			2, 075	2, 330	9, 350
Looking-glass and picture frames	4	6, 750	11			3, 150	4, 550	12, 850
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	18	854, 800	528		19	170, 948	2, 371, 512	2, 709, 522
Lumber, sawed	688	3, 274, 250	2, 411		100	426, 953	2, 021, 868	3, 258, 816
Mantels, slate, marble, and marbleized	6	22, 000	47		6	21, 900	29, 500	73, 500
Marble and stone work	69	904, 575	1, 032		4	394, 400	535, 837	1, 303, 790
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	7	776, 000	361	253	82	190, 775	845, 910	1, 277, 903
Musical instruments and materials (not specified)	1	2, 000					250	900
Musical instruments, organs and materials	2	803, 000	367	35		206, 200	304, 500	680, 800
Needles and pins	1	6, 000	10			3, 000	2, 500	12, 000
Painting and paperhanging	9	4, 300	13			4, 425	4, 175	12, 925
Paints	2	33, 000	35			9, 508	13, 000	25, 000
Paper (see also Wood pulp)	13	785, 500	283	92	2	189, 889	556, 667	1, 237, 484

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—VERMONT, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Patent medicines and compounds (see also Drugs and chemicals)	10	$246, 450	48	21		$24, 495	$136, 825	$208, 275
Paving materials	1	250	5			376	125	694
Photographing	9	9, 700	9	3		6, 375	6, 175	21, 025
Pickles, preserves, and sauces	3	4, 100	9	1		360	3, 680	6, 250
Plated and britannia ware	1	8, 000	15			5, 000	10, 000	20, 000
Plumbing and gasfitting	4	7, 900	12			5, 773	9, 400	19, 800
Printing and publishing	18	99, 600	101	21	8	42, 727	62, 086	131, 799
Pumps, not including steam pumps	1	10, 000	12			2, 500	5, 000	10, 000
Refrigerators	1	7, 500	3			2, 000	6, 000	18, 000
Roofing and roofing materials	6	220, 000	100	2		36, 600	60, 900	155, 000
Saddlery and harness	101	107, 295	127	2		38, 008	119, 583	230, 185
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	35	263, 050	282		60	98, 445	278, 865	447, 185
Scales and balances	3	3, 051, 481	783			410, 786	215, 215	2, 080, 474
Screws	2	9, 000	4			1, 800	800	6, 400
Sewing machines and attachments	1	25, 000	40			15, 000	14, 000	40, 000
Shipbuilding	3	20, 700	12			4, 400	9, 200	17, 800
Shirts	6	14, 000	8	97		19, 200	44, 500	72, 100
Shoddy (see also Mixed textiles)	2	15, 000	6	9		3, 896	37, 000	56, 000
Silk and silk goods (see also Mixed textiles)	1	2, 000		2		125	1, 210	2, 100
Soap and candles	4	10, 000	8			1, 950	5, 500	11, 950
Sporting goods	2	33, 800	37	10	2	12, 400	21, 000	63, 000
Springs, steel, car, and carriage	1	6, 000	3			1, 200	2, 000	10, 000
Starch	13	31, 200	35			2, 509	21, 554	32, 660
Stencils and brands	1	500	1			400	600	2, 000
Stone- and earthen-ware	2	60, 000	24			12, 200	11, 000	35, 000
Surgical appliances	1	1, 000	2			500	200	3, 000
Tinware, copperware, and sheet-iron ware	95	291, 300	253	6	3	94, 966	216, 690	429, 715
Tobacco, cigars and cigarettes	10	32, 150	47	4	1	23, 825	43, 720	83, 955
Tools (see also Cutlery and edge tools; Hardware)	1	4, 000	3			1, 200	500	4, 000
Toys and games	5	31, 500	45	1	1	10, 910	27, 069	52, 171
Upholstering (see also Furniture)	1	500	1			150	700	1, 400
Upholstering materials	2	3, 000	4	1		1, 700	2, 500	7, 500
Veneering	1	20, 000	30	6	14	6, 000	6, 000	30, 000
Vinegar	2	7, 000	8			550	2, 400	6, 000
Washing-machines and clothes-wringers	1	28, 000	8			3, 984	36, 157	46, 650
Watch and clock repairing	11	13, 800	15			6, 100	5, 000	21, 350
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	186	230, 690	227			60, 205	89, 215	251, 672
Window blinds and shades	3	55, 000	38		10	21, 000	67, 000	123, 000
Wood pulp	6	79, 000	53			17, 595	3, 343	61, 850
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	30	194, 440	261	12	79	87, 600	87, 126	240, 882
Wooden ware	17	52, 900	88	12	5	24, 897	32, 350	75, 180
Woolen goods (see also Mixed textiles)	44	2, 320, 161	1, 171	783	130	544, 138	2, 012, 490	3, 217, 807

A—VIRGINIA, BY TOTALS OF COUNTIES.

	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	5, 710	$26, 968, 990	28, 779	6, 144	5, 261	$7, 425, 261	$32, 883, 933	$51, 780, 992
COUNTIES.								
Accomac	47	60, 750	134	16	1	21, 735	58, 090	112, 291
Albemarle	112	278, 200	315	34	22	69, 908	310, 211	486, 990
Alexandria	120	659, 390	683	12	32	189, 475	494, 747	914, 289
Alleghany	19	1, 065, 800	167	1	6	67, 688	121, 495	229, 603
Amelia	33	80, 600	75			9, 908	82, 552	114, 394
Amherst	33	134, 990	126		1	13, 602	116, 465	146, 368
Appomattox	19	45, 400	47	4	1	6, 527	52, 346	71, 427
Augusta	208	973, 276	499	9	23	97, 864	668, 833	932, 612
Bath	8	83, 300	5			716	19, 505	22, 584
Bedford	120	244, 716	358	101	220	63, 263	389, 696	550, 228
Bland	6	16, 750	4			1, 250	18, 020	21, 964
Botetourt	106	390, 330	235	28	6	64, 266	216, 855	307, 484
Brunswick	33	50, 700	66		2	5, 608	83, 595	105, 250
Buchanan (*a*)								
Buckingham	44	75, 250	85		3	10, 122	95, 804	125, 012
Campbell	164	1, 020, 720	1, 623	530	715	478, 264	1, 622, 071	2, 510, 591
Caroline	43	114, 300	129		34	18, 349	83, 343	124, 026
Carroll	63	51, 800	83			10, 361	77, 934	112, 248
Charles City	16	26, 400	52			6, 612	32, 275	53, 221
Charlotte	40	66, 275	90			8, 675	99, 666	129, 606
Chesterfield	50	475, 680	469	177	161	154, 427	470, 605	754, 695
Clarke	41	55, 200	91	2		12, 485	95, 175	139, 413
Craig	17	19, 698	14	1		1, 592	32, 599	41, 259
Culpeper	67	93, 855	140		8	22, 175	167, 090	232, 084
Cumberland	45	62, 825	71		2	9, 000	139, 385	188, 009
Dinwiddie	146	1, 863, 740	2, 282	1, 245	742	609, 043	3, 320, 453	4, 694, 147
Elizabeth City	43	79, 735	196	113	37	39, 145	87, 814	160, 458
Essex	37	91, 150	161	25	26	21, 265	105, 465	166, 270
Fairfax	47	239, 500	114			24, 745	195, 765	267, 916
Fauquier	69	77, 040	88		2	11, 602	96, 768	148, 268
Floyd	105	75, 360	97		4	16, 943	130, 341	180, 329
Fluvanna	37	44, 380	84		2	9, 955	69, 320	100, 975
Franklin	73	97, 766	141	9	18	12, 862	149, 552	203, 745
Frederick	105	790, 034	477	245	18	149, 880	774, 262	1, 201, 802
Giles	41	93, 705	177		2	12, 638	54, 978	82, 163

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—VIRGINIA, BY TOTALS OF COUNTIES—Continued.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Gloucester	16	$46, 550	48	....	1	$7, 816	$54, 590	$75, 813
Goochland	29	77, 810	69	1	1	7, 599	100, 522	128, 278
Grayson	46	57, 825	41	....	2	6, 978	83, 918	106, 134
Greene	19	34, 000	31	....	....	4, 100	51, 758	64, 937
Greensville	27	68, 975	92	1	1	10, 416	57, 248	92, 067
Halifax	101	156, 270	248	16	41	33, 089	272, 403	368, 927
Hanover	49	92, 355	154	20	18	18, 740	91, 620	137, 909
Henrico	626	6, 991, 316	9, 386	2, 878	1, 988	3, 038, 624	12, 279, 415	20, 997, 134
Henry	56	251, 825	320	61	166	44, 994	256, 186	397, 320
Highland	8	13, 200	12	....	2	2, 335	31, 876	39, 545
Isle of Wight	30	143, 450	154	....	1	25, 134	87, 590	143, 977
James City	14	28, 000	58	....	....	7, 222	42, 186	63, 127
King and Queen	33	44, 975	62	....	....	6, 390	54, 975	77, 087
King George	9	16, 350	20	....	....	2, 959	28, 910	37, 225
King William	22	47, 125	104	....	3	16, 965	89, 106	128, 300
Lancaster	12	33, 200	69	....	....	4, 712	25, 660	40, 661
Lee	48	60, 563	60	....	....	6, 466	76, 304	98, 578
Loudoun	171	265, 425	279	....	2	45, 737	295, 700	433, 140
Louisa	50	117, 450	104	2	4	12, 670	136, 026	183, 284
Lunenburg	15	20, 750	29	....	....	2, 496	34, 310	44, 616
Madison	62	85, 950	114	3	3	15, 635	126, 484	168, 234
Mathews	15	23, 050	26	....	....	4, 922	33, 533	47, 864
Mecklenburg	47	81, 475	90	....	1	9, 275	184, 065	223, 011
Middlesex	23	26, 750	63	....	1	10, 175	48, 703	73, 982
Montgomery	48	83, 800	79	....	1	14, 054	92, 265	141, 962
Nansemond	20	58, 050	87	....	....	18, 189	59, 995	101, 362
Nelson	40	81, 940	57	....	....	11, 604	96, 167	129, 387
New Kent	22	57, 435	79	....	....	10, 224	57, 920	90, 803
Norfolk	145	929, 051	1, 400	65	54	481, 986	1, 298, 225	2, 194, 137
Northampton	12	21, 200	56	....	....	6, 550	19, 071	34, 845
Northumberland	42	33, 050	82	....	....	18, 490	38, 579	67, 810
Nottoway	32	52, 400	76	....	11	9, 459	69, 758	100, 285
Orange	32	56, 150	42	....	4	6, 441	87, 545	112, 622
Page	55	660, 750	345	2	16	94, 236	234, 978	378, 343
Patrick	6	32, 500	31	2	....	3, 657	45, 531	55, 266
Pittsylvania	156	1, 006, 282	1, 457	351	566	391, 649	1, 330, 628	2, 133, 681
Powhatan	24	44, 450	49	....	....	4, 291	51, 885	67, 310
Prince Edward	30	50, 200	87	....	....	12, 453	79, 020	118, 632
Prince George	10	39, 400	64	....	....	7, 976	30, 930	49, 667
Princess Anne	20	32, 460	41	....	1	6, 615	42, 100	63, 445
Prince William	18	44, 675	48	....	....	7, 012	51, 319	73, 306
Pulaski	34	203, 985	212	2	2	15, 284	95, 129	136, 380
Rappahannock	47	90, 025	106	3	....	17, 659	151, 327	193, 329
Richmond	7	23, 100	15	....	....	2, 307	20, 930	27, 737
Roanoke	105	264, 250	295	54	83	67, 060	317, 445	488, 038
Rockbridge	93	491, 760	137	6	5	28, 654	227, 516	319, 776
Rockingham	169	557, 261	348	4	6	64, 482	605, 054	831, 190
Russell	23	45, 600	34	....	....	5, 470	33, 801	51, 880
Scott	47	36, 552	51	....	....	6, 811	110, 170	136, 882
Shenandoah	197	628, 165	462	1	50	95, 122	506, 447	701, 380
Smyth	74	1, 272, 750	352	34	28	61, 187	246, 428	453, 010
Southampton	44	58, 525	130	....	2	16, 937	81, 190	130, 249
Spotsylvania	81	423, 650	345	56	26	90, 497	664, 784	903, 541
Stafford	4	6, 700	[illegible]	....	....	473	10, 725	12, 893
Surry	16	82, 850	130	....	1	15, 210	64, 785	103, 320
Sussex	22	46, 100	80	....	....	13, 666	53, 238	87, 509
Tazewell	54	98, 150	82	3	....	10, 835	110, 280	145, 569
Warren	53	317, 150	147	16	7	38, 625	260, 868	396, 763
Warwick (*a*)	....	....	....	....	....	....	....	....
Washington	112	219, 020	206	6	40	44, 922	234, 182	384, 398
Westmoreland	7	17, 400	32	....	....	4, 150	23, 776	36, 009
Wise	9	6, 220	6	....	....	498	27, 240	36, 605
Wythe	98	382, 530	482	5	35	113, 652	242, 425	425, 350
York	12	30, 200	30	....	....	9, 475	34, 100	54, 450

a Returned as having no manufactures.

B—VIRGINIA, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	5, 710	$26, 968, 990	28, 779	6, 144	5, 261	$7, 425, 261	$32, 883, 933	$51, 780, 992
Agricultural implements	51	536, 030	519	....	11	162, 634	244, 377	602, 959
Bagging, flax, hemp, and jute	1	40, 000	15	2	5	6, 500	25, 000	32, 500
Bags, other than paper	1	12, 000	4	10	26	6, 000	18, 000	35, 000
Bags, paper	3	12, 000	1	39	14	5, 200	14, 300	23, 000
Baskets, rattan and willow ware	1	150	1	....	....	400	100	600
Blacksmithing (see also Wheelwrighting)	688	213, 657	830	....	15	134, 455	188, 706	602, 627
Bookbinding and blank-book making	1	10, 000	12	7	....	8, 580	4, 500	18, 000
Boot and shoe uppers	2	550	2	1	....	650	3, 800	7, 000
Boots and shoes, including custom work and repairing	289	153, 839	532	46	11	117, 869	260, 491	575, 180
Boxes, cigar	4	6, 600	16	14	5	6, 168	22, 500	37, 100

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—VIRGINIA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Boxes, fancy and paper	3	$18, 000	52	87	102	$48, 596	$26, 210	$107, 410
Boxes, wooden, packing	15	134, 300	180		18	66, 570	155, 235	284, 966
Brass castings	2	4, 500	7		2	2, 620	11, 000	18, 000
Bread and other bakery products	51	131, 700	222	31	20	81, 661	442, 190	644, 560
Brick and tile	84	290, 085	1, 180		245	186, 072	80, 420	398, 789
Bridges	2	5, 500	19			3, 400	15, 550	19, 800
Brooms and brushes	4	18, 350	48		5	9, 458	33, 700	57, 800
Carpentering	171	145, 620	717	2	27	227, 395	403, 315	850, 444
Carriage and wagon materials	4	23, 000	23			6, 150	10, 744	23, 050
Carriages and wagons (see also Wheelwrighting)	43	258, 700	404		11	128, 769	243, 400	508, 400
Cement	1	15, 000	6			1, 000	1, 810	5, 500
Cheese and butter (factory)	4	33, 700	8			950	6, 786	10, 621
Clothing, men's	57	221, 202	258	481	2	147, 149	272, 716	584, 077
Coffins, burial cases, and undertakers' goods	23	18, 960	24			7, 249	13, 485	35, 750
Coffee and spices, roasted and ground	6	49, 500	39	1	1	14, 460	144, 000	244, 800
Coke	2	30, 000						
Confectionery	25	91, 372	100	7	7	35, 233	144, 246	221, 330
Cooperage	75	77, 751	463		15	73, 430	146, 021	279, 964
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	1	1, 400	3			1, 300	1, 200	5, 200
Cotton goods (see also Mixed textiles)	8	1, 190, 100	274	530	281	169, 789	640, 391	1, 040, 962
Dentistry, mechanical	3	1, 600	1			180	1, 400	6, 000
Drugs and chemicals (see also Patent medicines and compounds)	20	281, 000	344	2	5	63, 535	280, 740	438, 030
Dyeing and cleaning	6	5, 350	13	7	1	5, 100	10, 600	24, 600
Engraving, wood	1	500	3			2, 000	200	4, 000
Fertilizers	17	415, 400	293	3		46, 970	424, 000	624, 300
Flouring- and grist-mill products	1, 385	5, 791. 137	2, 200	3	2	409, 639	10, 574, 211	12, 210, 272
Food preparations (see page 39)	1	15, 000	16	3	1	5, 300	36, 000	52, 000
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	56	767, 400	1, 401	1	80	396, 997	663, 167	1, 361, 231
Fruits and vegetables, canned and preserved	10	43, 700	210	207	69	25, 700	95, 700	145, 500
Furniture (see also Upholstering)	118	225, 700	317	11	14	102, 564	157, 770	401, 282
Furniture, chairs	7	3, 375	7			750	1, 530	5, 400
Furs, dressed	1	2, 000	2	2		900	8, 500	15, 000
Gloves and mittens (see also Woolen goods)	6	55, 400	41	231		28, 825	20, 700	70, 100
Grease and tallow	2	15, 000	6			1, 800	37, 500	52, 000
Hairwork	4	7, 500	5	36		8, 200	16, 900	33, 000
Instruments, professional and scientific	1	5, 000	10		1	2, 640	12, 000	16, 500
Iron and steel	44	4, 329, 713	2, 399	2	121	665, 432	1, 496, 151	2, 585, 999
Iron bolts, nuts, washers, and rivets	1	30, 000	40		60	30, 000	180, 000	240, 000
Iron forgings	2	61, 000	61			20, 000	112, 080	214, 160
Iron railing, wrought	1	150	1			250	500	1, 500
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	2	32, 000	25		2	10, 000	19, 700	42, 650
Jewelry	1	13, 000	16			5, 000	8, 000	15, 000
Kaolin and ground earths	5	50, 500	71		16	22, 225	17, 655	49, 100
Kindling wood	2	1, 150	8			1, 100	2, 200	4, 800
Leather, curried	123	89, 750	91			13, 893	173, 051	232, 989
Leather, tanned	163	658, 973	328		1	80, 251	706, 333	1, 011, 830
Lime	9	44, 100	99			25, 400	22, 486	78, 510
Liquors, distilled	34	175, 540	37	1		8, 860	75, 553	114, 895
Liquors, malt	2	253, 500	51			16, 375	73, 672	137, 807
Liquors, vinous (see also Liquors, distilled)	3	6, 000	12	4	2	1, 350	3, 230	6, 600
Lithographing (see also Printing and publishing)	2	24, 600	18	3	13	13, 125	40, 150	56, 823
Lock- and gun-smithing	10	7, 620	15			5, 345	7, 600	22, 250
Looking-glass and picture frames	7	8, 950	28		9	10, 400	21, 850	50, 500
Lumber, planed (see also Sash, doors, and blinds)	9	67, 200	120		2	37, 420	189, 950	284, 000
Lumber, sawed	907	2, 122, 925	3, 922		89	540, 231	1, 983, 777	3, 434, 163
Marble and stone work	24	39, 260	95			35, 299	40, 953	110, 525
Masonry brick and stone	10	13, 100	104		7	27, 250	13, 554	56, 750
Mineral and soda waters	8	9, 200	14		4	5, 350	7, 900	23, 000
Mixed textiles (see also Cotton goods; Woolen goods)	2	83, 000	28	17		16, 000	58, 060	108, 500
Musical instruments, organs and materials	1	500	3			1, 000	500	2, 000
Nets and seines	1	6, 000		10	10	750	3, 000	4, 700
Oil, cottonseed and cake	1	3, 000	8			1, 200	2, 500	8, 000
Oil, essential	7	8, 100	31		1	4, 680	9, 345	20, 800
Oil, linseed	1	1, 000	1			120	100	700
Oil, lubricating	3	12, 000	7		1	990	11, 300	20, 500
Oil, neat's-foot	1	1, 200	2			200	208	500
Painting and paperhanging	29	25, 940	74		1	25, 491	39, 563	92, 843
Paints	2	1, 500	6			1, 160	2, 000	5, 500
Paper	3	170, 000	87	26	2	40, 000	128, 014	261, 000
Patent medicines and compounds (see also Drugs and chemicals)	12	39, 425	41	1		11, 025	27, 975	58, 450
Photographing	17	25, 750	39	1	2	18, 712	14, 200	61. 600
Pickles, preserves, and sauces	1	20, 000	5	25	10	5, 000	15, 000	35, 000
Pipes, tobacco	1	12, 000	2	3	1	390	500	1, 700
Plumbing and gasfitting	15	38, 725	71		8	34, 780	65, 200	141, 550
Printing and publishing (see also Lithographing)	45	344, 900	486	15	33	237, 918	211, 854	624, 975
Pumps, not including steam pumps	3	570	3			900	1, 100	4, 100
Regalia and society banners and emblems	1	1, 500	1	3		1, 000	3, 000	7, 000
Saddlery and harness	84	107, 710	184		9	72, 183	171, 655	328, 778
Salt	1	1, 000, 000	76			14, 219	39, 000	127, 678
Sash, doors, and blinds (see also Lumber, planed)	15	130, 000	183			67, 909	249, 667	400, 835
Saws	1	12, 000	15			5, 320	2, 800	12, 000
Shipbuilding	65	185, 960	146			75, 526	74, 578	181, 024
Shirts	1	100	1	5		320	300	1, 000
Silversmithing	2	850					640	1, 300
Slaughtering and meat-packing, not including retail butchering establishments.	4	89, 000	53			13, 750	967, 900	1, 054, 500

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—VIRGINIA, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Soap and candles	4	$28,000	21	1	....	$8,300	$25,400	$48,000
Stationery goods	2	8,500	9	2	....	2,700	6,000	12,000
Stencils and brands	2	800	3	....	1	980	1,300	3,150
Stone- and earthen-ware	15	16,850	29	....	3	6,155	6,515	26,597
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	104	223,215	370	1	7	134,078	315,598	608,150
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	143	3,551,100	6,729	3,671	3,514	1,859,447	7,705,717	13,231,038
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	56	182,080	385	21	83	115,230	210,468	483,953
Tobacco stemming	27	435,184	360	470	202	81,215	767,973	1,074,005
Trunks and valises	2	9,000	24	....	....	8,400	18,000	41,000
Type founding	1	5,000	6	1	3	3,000	2,000	10,000
Umbrellas and canes	1	200	....	....	....	....	500	900
Upholstering (see also Furniture)	4	2,800	8	2	....	2,750	2,330	7,450
Upholstering materials	1	2,000	13	....	....	1,200	5,100	7,300
Washing-machines and clothes-wringers	1	2,500	5	....	....	600	1,000	2,000
Watch and clock repairing	24	41,200	39	....	3	21,987	14,330	58,525
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	328	207,722	506	....	10	90,963	146,432	407,768
Windmills	1	7,000	15	....	....	5,000	20,000	30,000
Wirework	2	1,500	3	....	1	630	2,775	5,200
Wooden ware	1	50,000	60	....	15	23,000	38,000	71,000
Woolen goods (see also Gloves and mittens; Mixed textiles)	48	456,750	251	95	19	71,720	383,080	577,968

A—WASHINGTON TERRITORY, BY TOTALS OF COUNTIES.

The Territory	261	$3,202,497	1,110	25	12	$532,226	$1,967,469	$3,250,134
COUNTIES.								
Chehalis	5	15,200	8	....	....	2,424	12,250	18,892
Clallam	1	500	1	....	....	1,580	1,800	3,500
Clarke	12	15,000	14	....	....	6,195	12,988	29,006
Columbia	10	60,100	39	8	3	12,625	69,326	108,650
Cowlitz	5	18,800	5	....	....	1,200	9,700	15,100
Island	11	112,800	60	....	....	17,950	176,300	273,430
Jefferson	6	223,967	57	....	....	32,956	169,957	223,984
King	29	402,970	174	....	....	102,891	252,636	469,235
Kitsap	14	1,482,900	276	....	....	119,275	554,400	814,600
Klikitat	25	49,325	29	....	1	12,360	41,175	77,050
Lewis	9	37,500	22	....	....	5,980	46,578	67,247
Mason (*a*)	....	....	....	....	....	....	....	....
Pacific	3	60,300	21	....	3	8,350	34,400	54,000
Pierce	6	243,300	126	....	4	53,411	192,051	288,720
San Juan	2	25,000	22	2	....	10,000	8,350	28,000
Skamania (*a*)	....	....	....	....	....	....	....	....
Snohomish	3	1,800	....	....	....	....	250	1,700
Spokane	9	9,225	7	....	....	2,300	7,250	19,190
Stevens	4	6,300	4	....	....	1,014	3,113	6,005
Thurston	36	140,150	66	15	1	34,890	66,085	144,460
Wahkiakum (*a*)	....	....	....	....	....	....	....	....
Walla Walla	42	249,400	145	....	....	88,607	251,058	496,760
Whatcom	1	4,000	4	....	....	1,650	11,000	16,000
Whitman	15	30,000	18	....	....	8,943	34,825	63,000
Yakima	13	13,960	12	....	....	7,625	11,977	31,695

a Returned as having no manufactures.

B—WASHINGTON TERRITORY, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	261	$3,202,497	1,110	25	12	$532,226	$1,967,469	$3,250,134
Bagging, flax, hemp, and jute	1	5,000	1	....	....	450	1,200	2,000
Blacksmithing (see also Wheelwrighting)	47	55,225	62	....	....	37,029	63,220	160,175
Bookbinding and blank-book making	1	1,600	....	1	....	300	600	1,500
Boots and shoes, including custom work and repairing	20	15,810	29	....	....	19,342	28,600	67,210
Boxes, wooden, packing	1	10,000	10	....	....	3,500	3,000	10,000
Bread and other bakery products	2	10,350	3	....	....	4,000	5,450	12,900
Brick and tile	2	3,000	16	....	....	2,430	1,150	6,000
Carpentering	16	16,095	19	....	....	9,500	53,550	78,980
Carpets, rag	1	100	....	....	....	....	175	500
Carriages and wagons (see also Wheelwrighting)	3	7,700	12	....	....	6,820	7,500	20,500
Cheese and butter (factory)	2	16,467	8	....	....	1,600	11,794	18,820
Clothing, men's	1	500	....	....	....	....	500	700
Coffee and spices, roasted and ground	1	1,500	....	....	....	....	3,200	5,000
Coffins, burial cases, and undertakers' goods	2	4,000	3	....	....	500	1,800	4,000
Cooperage	4	11,500	77	....	3	32,385	13,450	56,000
Confectionery	2	1,750	2	....	....	600	8,700	13,800
Drugs and chemicals	1	800	....	....	....	....	600	1,500
Flouring- and grist-mill products	9	42,300	23	....	....	7,125	87,810	114,086
Foundery and machine-shop products	6	31,800	33	....	....	21,600	24,500	54,775
Fruits and vegetables, canned and preserved	1	700	....	2	....	300	100	500

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—WASHINGTON TERRITORY, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Furniture	13	$51, 500	39			$19, 065	$27, 625	$88, 780
Furniture, chairs	1	1, 000	2			1, 000	400	2, 200
Gloves and mittens (see also Woolen goods)	2	1, 650	3	7	1	3, 150	3, 400	9, 800
Leather, curried	2	5, 750	2			1, 225	24, 600	29, 500
Leather, tanned	2	14, 250	4			3, 075	19, 260	27, 000
Lime	2	25, 000	22	2		10, 000	8, 350	28, 000
Liquors, malt	18	101, 500	39			12, 247	46, 430	83, 011
Lock- and gun-smithing	2	600					150	1, 175
Lumber, planed (see also Sash, doors, and blinds)	3	24, 000	18			6, 609	7, 600	29, 000
Lumber, sawed	37	2, 456, 450	495		4	200, 539	1, 188, 075	1, 734, 742
Marble and stone work	2	1, 600	1			600	2, 100	4, 500
Mineral and soda waters	1	3, 000	2			550	4, 000	7, 000
Printing and publishing	3	9, 500	10	5		6, 000	2, 700	13, 500
Saddlery and harness	14	72, 500	34			23, 950	83, 600	156, 880
Sash, doors, and blinds (see also Lumber, planed)	5	58, 500	25			16, 700	16, 730	61, 500
Shipbuilding	11	33, 000	62			51, 298	121, 300	184, 500
Soap and candles	1	1, 200	2			500	4, 000	5, 600
Stone- and earthen-ware	1	1, 000	2			500	500	1, 500
Tinware, copperware, and sheet-iron ware	9	56, 500	24			19, 677	29, 900	65, 100
Tobacco, cigars and cigarettes	2	2, 200	5		1	2, 750	4, 200	8, 400
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	6	5, 600	3			1, 310	3, 750	9, 500
Woolen goods (see also Gloves and mittens)	1	40, 000	18	8	3	4, 000	52, 000	70, 000

A—WEST VIRGINIA, BY TOTALS OF COUNTIES.

The State	2, 375	$13, 883, 390	12, 900	346	1, 065	$4, 313, 965	$14, 027, 388	$22, 867, 126
COUNTIES.								
Barbour	53	67, 405	72	3	3	10, 037	90, 893	128, 763
Berkeley	104	530, 945	227	1	3	54, 939	435, 500	630, 112
Boone	4	5, 400	6			875	14, 200	17, 062
Braxton	22	84, 240	75		10	8, 214	31, 180	51, 074
Brooke	47	206, 775	221	18	31	49, 158	184, 479	312, 073
Cabell	58	163, 275	214	9	11	60, 242	225, 140	360, 937
Calhoun	3	8, 500	6		1	1, 550	4, 605	8, 094
Clay (*a*)								
Doddridge	51	65, 786	142			32, 706	167, 729	256, 792
Fayette	39	554, 300	248		1	91, 130	308, 861	512, 764
Gilmer	17	28, 010	23			3, 878	42, 005	53, 617
Grant	25	39, 625	38	1		4, 784	50, 365	65, 482
Greenbrier	51	186, 385	89	3	7	15, 765	100, 678	147, 331
Hampshire	54	150, 957	84	4	5	13, 133	149, 658	195, 777
Hancock	54	256, 475	235		8	87, 794	106, 725	276, 018
Hardy	41	114, 612	86		2	8, 513	45, 750	69, 572
Harrison	86	221, 626	202	6	1	46, 337	293, 949	418, 598
Jackson	69	101, 780	136	9	3	35, 485	238, 349	305, 332
Jefferson	113	449, 335	348	1	6	85, 645	490, 614	704, 615
Kanawha	73	327, 480	436	15	24	102, 871	312, 030	488, 882
Lewis	68	111, 430	150		3	35, 342	160, 586	247, 180
Lincoln (*a*)								
Logan	2	7, 000	3			578	10, 680	12, 963
McDowell (*a*)								
Marion	93	330, 175	313	6	11	79, 314	432, 906	615, 396
Marshall	87	1, 085, 526	1, 105		105	372, 938	1, 146, 821	1, 871, 656
Mason	67	1, 081, 575	890	1	57	207, 812	478, 862	843, 986
Mercer	1	300					2, 000	2, 500
Mineral	36	98, 668	92	3	5	31, 461	107, 045	173, 633
Monongalia	73	157, 850	161	2	3	30, 877	198, 134	281, 073
Monroe	32	103, 400	77	6		18, 597	129, 933	185, 578
Morgan	16	118, 320	122		1	46, 600	451, 098	648, 407
Nicholas	24	26, 650	37	9	2	2, 484	18, 112	26, 235
Ohio	250	4, 897, 483	4, 697	196	667	2, 202, 550	5, 254, 675	9, 335, 780
Pendleton	26	45, 050	33	4		5, 405	69, 860	87, 892
Pleasants	39	64, 775	72		2	17, 504	121, 391	174, 142
Pocahontas	24	24, 875	19		3	3, 335	34, 240	45, 544
Preston	108	409, 555	697	8	13	150, 657	336, 341	568, 397
Putnam	8	20, 500	39		2	9, 050	31, 345	52, 433
Raleigh	7	15, 300	17			3, 350	24, 695	35, 066
Randolph	20	27, 650	22			2, 860	36, 295	49, 487
Ritchie	48	146, 647	129			33, 118	150, 752	230, 255
Roane	23	28, 415	47			7, 249	56, 460	78, 179
Summers	21	54, 320	76		2	13, 029	55, 248	85, 561
Taylor	75	496, 150	193	15	15	50, 093	256, 716	367, 314
Tucker	5	7, 000	10			860	3, 660	5, 608
Tyler	47	135, 410	174	13	14	23, 345	172, 301	238, 942
Upshur	38	75, 225	63	1		10, 309	42, 391	71, 322
Wayne	22	32, 000	73		12	13, 774	96, 112	129, 812
Webster	1	1, 500	3			400	1, 025	2, 140
Wetzel	52	198, 575	224		15	63, 092	275, 508	429, 903
Wirt	17	58, 600	79	2	5	17, 999	112, 647	159, 773
Wood	81	510, 555	395	10	12	146, 927	466, 739	778, 074
Wyoming (*a*)								

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a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—WEST VIRGINIA, BY SPECIFIED INDUSTRIES.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	2, 375	$13, 883, 390	12, 900	346	1, 065	$4, 313, 965	$14, 027, 388	$22, 867, 126
Agricultural implements	8	73, 050	63	....	....	18, 105	17, 535	60, 340
Bagging, flax, hemp, and jute	1	7, 000	3	2	....	1, 000	1, 000	3, 500
Baking and yeast powders (see also Drugs and chemicals)	1	3, 000	1	1	....	500	15, 000	20, 000
Baskets, rattan and willow ware	3	2, 200	3	....	....	1, 580	1, 100	4, 700
Blacksmithing (see also Wheelwrighting)	278	99, 475	235	....	1	47, 455	83, 806	257, 095
Bone-, ivory-, and lamp-black	1	5, 000	5	....	....	2, 400	5, 000	15, 000
Bookbinding and blank-book making	1	300	2	....	....	550	350	1, 100
Boots and shoes, including custom work and repairing	146	94, 345	159	3	....	41, 508	89, 540	202, 488
Boxes, fancy and paper	1	6, 000	1	10	....	2, 000	3, 950	8, 000
Brass castings	1	1, 500	2	....	....	1, 400	3, 300	5, 200
Bread and other bakery products	5	15, 800	8	....	....	3, 825	19, 100	26, 900
Brooms and brushes	3	9, 100	36	....	....	4, 640	22, 740	30, 750
Brick and tile	47	242, 950	384	1	61	111, 391	39, 961	218, 710
Carpentering	40	62, 525	140	....	1	48, 193	113, 188	210, 450
Carriage and wagon materials	4	25, 000	38	....	[illegible]	13, 350	10, 610	36, 701
Carriages and wagons (see also Wheelwrighting)	8	251, 000	217	....	1	69, 160	166, 486	341, 025
Clothing, men's	47	119, 150	218	33	15	71, 790	153, 950	312, 784
Cheese and butter (factory)	7	7, 550	8	3	....	1, 104	6, 378	10, 238
Coffee and spices, roasted and ground	1	5, 000	3	5	....	1, 456	7, 835	11, 523
Coffins, burial cases, and undertakers' goods	7	9, 800	10	....	....	2, 175	3, 650	8, 700
Coke	12	330, 000	159	....	4	48, 942	138, 964	216, 588
Confectionery	6	12, 050	19	2	....	6, 202	52, 500	68, 464
Cooperage	49	66, 876	278	....	52	100, 767	152, 806	306, 147
Cordage and twine	1	600	2	....	....	250	400	1, 000
Dentist's materials	1	3, 000	3	....	....	600	1, 200	3, 500
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	10	87, 100	54	....	1	21, 745	66, 210	180, 196
Dyeing and finishing textiles	1	30, 000	8	....	....	6, 500	42, 800	54, 000
Fertilizers	2	13, 000	23	....	2	3, 760	11, 800	17, 800
Files	1	350	1	....	....	200	90	700
Flouring- and grist-mill products	472	1, 777, 297	742	1	1	140, 508	3, 384, 797	3, 942, 818
Food preparations (see page 39)	1	4, 000	4	....	....	1, 560	7, 088	10, 000
Foundery and machine-shop products	35	388, 300	405	....	1	158, 474	168, 921	466, 862
Fruits and vegetables, canned and preserved	1	1, 000	[illegible]	....	....	500	1, 200	2, 200
Furniture (see also Mattresses and spring beds)	37	82, 300	166	....	2	55, 486	50, 957	154, 068
Glass	4	550, 522	615	100	231	311, 650	208, 064	748, 500
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	2	4, 000	2	7	....	950	3, 250	7, 500
Glue	1	2, 000	4	....	2	1, 085	800	3, 000
Hardware	1	110, 000	60	....	40	27, 500	63, 000	190, 000
Handles, wooden	1	1, 500	10	....	2	2, 375	2, 000	7, 250
Hosiery and knit goods (see also Gloves and mittens; Woolen goods)	1	5, 000	2	....	2	700	1, 700	2, 600
Iron and steel	20	3, 913, 616	3, 780	....	341	1, 541, 816	3, 484, 625	6, 054, 032
Iron nails and spikes, cut and wrought	1	60, 000	15	10	18	15, 000	30, 000	110, 000
Lamps and reflectors	1	20, 000	16	8	[illegible]	13, 000	36, 000	75, 000
Leather, curried	80	229, 535	112	....	....	45, 810	586, 755	725, 010
Leather, tanned	[illegible]	515, 855	296	1	4	99, 338	1, 089, 620	1, 451, 528
Lime	2	6, 800	4	....	....	450	6, 060	9, 500
Liquors, distilled	2	201, 000	26	....	....	8, 808	113, 420	169, 230
Liquors, malt	[illegible]	221, 017	95	....	....	36, 434	168, 741	280, 966
Lock- and gun-smithing	2	1, 000	....	....	....	....	175	1, 760
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	15	284, 100	149	....	2	58, 566	237, 800	353, 550
Lumber, sawed	472	1, 668, 920	2, 057	....	126	459, 945	1, 375, 372	2, 431, 857
Marble and stone work	13	20, 450	50	....	....	20, 135	20, 500	60, 334
Masonry, brick and stone	4	2, 076	38	....	....	12, 190	6, 019	23, 400
Mattresses and spring beds (see also Furniture)	1	200	1	....	....	50	200	600
Painting and paperhanging	4	2, 200	11	....	....	4, 566	6, 567	14, 050
Paper	3	160, 000	74	1	3	25, 200	145, 900	211, 000
Patent medicines and compounds (see also Drugs and chemicals)	2	8, 500	2	....	2	502	10, 600	16, 200
Plumbing and gasfitting	6	54, 015	45	....	....	23, 288	58, 113	99, 453
Printing and publishing	18	137, 000	152	15	35	74, 432	46, 764	185, 756
Pumps, not including steam pumps	2	13, 000	14	....	1	6, 300	9, 700	20, 000
Roofing and roofing materials	3	1, 200	6	....	1	1, 400	6, 000	11, 100
Saddlery and harness	74	73, 870	95	....	1	28, 494	88, 210	170, 825
Salt	15	910, 500	702	....	34	160, 227	192, 113	380, 369
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	3	43, 750	38	....	....	11, 556	23, 600	54, 500
Shipbuilding	19	55, 000	99	....	....	51, 510	162, 300	231, 130
Shirts	4	1, 200	....	40	....	9, 200	20, 240	33, 890
Soap and candles	2	5, 000	7	....	7	3, 460	2, 626	8, 124
Slaughtering and meat-packing, not including retail butchering establishments.	6	100, 161	30	....	....	13, 050	273, 840	307, 500
Stencils and brands	1	2, 000	1	....	....	600	1, 125	3, 550
Stone- and earthen-ware	6	25, 100	56	2	....	16, 111	9, 208	22, 700
Tinware, copperware, and sheet-iron ware	51	100, 185	122	....	5	46, 423	118, 086	219, 136
Tobacco, cigars and cigarettes	67	167, 815	300	5	27	111, 739	258, 830	452, 993
Vinegar	1	500	1	....	....	150	300	500
Watch and clock repairing	2	2, 200	1	....	....	225	800	1, 500
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	64	41, 915	87	....	1	20, 383	27, 210	78, 400
Whips	1	30, 000	90	....	....	16, 000	40, 000	60, 000
Wirework	1	900	....	....	....	....	1, 000	1, 500
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	1	1, 000	3	....	....	200	100	800
Woolen goods (see also Gloves and mittens)	55	293, 170	226	96	31	44, 161	245, 843	356, 986

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

A—WISCONSIN, BY TOTALS OF COUNTIES.

Counties.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
The State	7,674	$73,821,802	48,255	6,241	2,613	$18,814,917	$85,796,178	$128,255,480
Adams	21	39,250	29	1		4,717	57,236	73,570
Ashland	5	95,000	75		8	15,960	65,990	101,725
Barron	28	103,810	79	7	4	16,778	114,142	172,117
Bayfield	4	32,500	30		11	11,596	32,984	59,400
Brown	190	1,342,605	1,543	7	49	585,167	1,986,493	3,413,227
Buffalo	51	171,475	88		9	23,768	155,645	226,250
Burnett	9	22,200	14		2	2,201	14,920	22,376
Calumet	137	349,566	258	6	3	56,687	418,916	607,086
Chippewa	28	765,775	367	2	12	103,955	658,768	901,581
Clark	62	333,420	226	1	7	55,654	337,151	501,591
Columbia	143	460,890	278	41	2	100,216	525,887	845,952
Crawford	71	312,900	130	1	8	41,175	324,799	467,503
Dane	290	1,015,775	1,043	57	23	440,773	1,373,784	2,234,841
Dodge	285	2,374,532	1,041	69	23	306,007	1,884,318	2,636,731
Door	21	258,500	155		20	43,212	276,452	302,187
Douglas	3	54,000	31			11,550	53,700	79,000
Dunn	79	602,775	595	10	43	193,764	741,026	1,164,713
Eau Claire	50	2,770,500	1,106	16	46	344,821	2,191,479	3,079,705
Fond du Lac	297	2,330,048	1,527	90	82	580,082	2,524,110	3,704,325
Grant	158	419,710	276	8	5	90,361	488,531	740,945
Green	191	484,925	382	44	5	129,308	584,421	887,772
Green Lake	85	347,250	300	47	5	107,508	409,527	714,194
Iowa	117	280,920	196	2		56,503	424,141	615,114
Jackson	78	570,300	286	7		74,593	556,014	774,833
Jefferson	238	1,290,955	988	64	90	355,667	1,741,003	2,548,068
Juneau	72	1,157,264	425	18	15	132,932	978,991	1,339,341
Kenosha	91	1,034,542	605	4	61	340,640	1,285,583	1,874,116
Kewaunee	79	246,470	220	3	13	55,167	321,283	467,086
La Crosse	133	3,148,860	1,204	61	72	493,392	2,203,816	3,184,447
La Fayette	85	173,326	140	1		34,718	233,452	336,182
Langlade	2	5,000	6			700	5,500	8,550
Lincoln	6	89,700	92	7		28,436	196,000	262,470
Manitowoc	268	1,138,565	1,183	59	69	385,574	1,664,237	2,444,883
Marathon	127	1,404,865	861	32	36	283,081	1,260,926	1,856,934
Marinette	23	4,576,750	562	1	21	269,612	1,431,750	2,094,514
Marquette	55	249,550	105	19	5	31,657	206,235	290,951
Milwaukee	886	19,847,664	16,416	3,936	956	7,083,520	29,543,456	44,494,549
Monroe	76	385,750	244	15	10	73,395	488,223	687,687
Oconto	52	1,566,850	502		7	142,801	896,813	1,247,563
Outagamie	157	1,644,428	934	100	105	424,147	1,851,355	2,869,832
Ozaukee	137	555,875	306	2	15	103,719	866,803	1,219,005
Pepin	25	61,375	30			8,306	89,635	122,185
Pierce	95	522,850	230	2	5	63,835	705,576	924,426
Polk	26	180,750	130	1	7	36,600	206,225	293,242
Portage	92	815,740	533	12	17	163,221	1,014,351	1,447,867
Price	4	33,100	21			8,406	54,325	75,200
Racine	224	4,728,608	3,157	195	209	1,438,836	3,901,619	7,138,447
Richland	111	237,975	182	8	3	43,830	348,844	509,533
Rock	255	2,129,831	1,698	388	121	793,715	2,690,761	4,347,333
Saint Croix	112	740,197	293	5	9	107,469	1,105,263	1,488,192
Sauk	157	540,164	375	24	8	110,232	809,330	1,158,887
Shawano	40	125,200	107		1	22,636	147,432	212,882
Sheboygan	354	1,460,757	1,467	145	93	508,907	2,749,605	3,987,502
Taylor	10	152,850	95	6	5	31,450	207,015	290,500
Trempealeau	65	211,525	108	2		29,478	369,723	462,415
Vernon	61	149,736	103		1	28,370	223,656	311,614
Walworth	155	954,519	612	16	3	237,945	829,872	1,406,389
Washington	235	618,130	377	16	15	97,809	669,470	1,030,868
Waukesha	181	618,150	369	38	65	135,753	760,863	1,100,111
Waupaca	147	505,191	356	5	12	94,585	693,449	972,954
Waushara	54	124,600	74	15		18,554	220,313	289,353
Winnebago	321	3,963,441	2,652	624	166	1,066,121	5,735,595	7,923,002
Wood	60	892,073	438	1	31	129,755	797,456	1,119,662

B—WISCONSIN, BY SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.								
All industries	7,674	$73,821,802	48,255	6,241	2,613	$18,814,917	$85,796,178	$128,255,480
Agricultural implements	108	3,747,095	1,999		68	874,667	1,373,547	3,742,069
Artificial feathers and flowers	1	6,000	1	49		4,320	5,000	12,500
Artificial limbs	1	3,000	2			1,800	2,500	7,000
Bags, paper	1	6,000	5	3	1	2,600	40,000	50,000
Baking and yeast powders (see also Drugs and chemicals)	2	1,800	6	2		2,355	6,000	11,720
Baskets, rattan and willow ware	9	117,700	161	15	181	65,960	56,675	158,800
Blacksmithing (see also Wheelwrighting)	1,007	928,021	1,145	1	17	366,663	594,742	1,581,417
Bookbinding and blank-book making	15	34,000	79	58	21	44,482	40,751	115,336
Boot and shoe uppers	2	5,000	4	6	1	3,021	10,100	18,115
Boots and shoes, including custom work and repairing	802	1,191,464	1,923	144	88	674,758	1,704,728	3,025,062

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—WISCONSIN, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Boxes, cigar	3	$11, 000	26	26	2	$11, 000	$34, 400	$58, 000
Boxes, fancy and paper	2	6, 000	14	12	9	3, 000	9, 000	21, 500
Boxes, wooden, packing	15	46, 265	85	48	7	32, 341	65, 477	121, 100
Brass castings	7	110, 800	142	2	2	51, 592	78, 436	170, 114
Bread and other bakery products	82	223, 401	219	30	36	87, 040	471, 177	697, 289
Brick and tile (see also Drain and sewer pipe)	119	560, 872	1, 205	8	182	231, 351	161, 400	607, 609
Bridges	3	21, 700	41	....	....	17, 412	46, 013	82, 102
Brooms and brushes	16	23, 750	78	6	1	23, 315	34, 874	85, 125
Carpentering	186	322, 437	1, 278	4	18	498, 148	946, 038	1, 721, 507
Carpets, rag	7	5, 400	19	26	....	4, 950	14, 875	25, 850
Carriage and wagon materials	13	285, 000	366	1	31	132, 260	207, 800	418, 020
Carriages and sleds, children's	1	2, 000	3	1	3	2, 000	1, 000	6, 000
Carriages and wagons (see also Wheelwrighting)	156	2, 771, 212	2, 481	20	86	1, 135, 443	2, 403, 658	4, 350, 454
Cement	1	350, 000	70	....	....	16, 000	13, 000	70, 000
Charcoal	11	51, 900	95	....	....	31, 165	53, 940	103, 225
Cheese and butter (factory)	414	613, 643	497	62	2	98, 920	1, 036, 357	1, 501, 087
Clothing, men's	212	2, 380, 403	2, 475	2, 637	56	1, 208, 752	2, 847, 660	4, 883, 797
Clothing, women's	4	64, 000	34	163	....	29, 900	109, 000	147, 160
Coffee and spices, roasted and ground	10	258, 621	127	19	15	90, 550	695, 042	935, 640
Coffins, burial cases, and undertakers' goods	6	59, 300	49	1	4	15, 491	9, 950	36, 437
Confectionery	9	149, 254	117	32	21	45, 798	386, 162	488, 446
Cooperage	198	429, 160	1, 292	....	88	518, 008	757, 266	1, 563, 208
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	5	42, 850	24	....	....	12, 792	27, 370	52, 892
Cordage and twine	5	24, 800	29	....	....	9, 700	18, 600	35, 600
Corsets	1	5, 000	7	60	13	25, 000	15, 000	50, 000
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	1	200, 000	61	149	56	67, 209	194, 556	328, 389
Cutlery and edge tools (see also Hardware; Tools)	4	14, 700	13	1	....	6, 150	14, 210	26, 700
Dentistry, mechanical	14	12, 225	15	1	2	9, 900	19, 400	54, 650
Drain and sewer pipe (see also Brick and tile)	1	10, 000	14	....	....	5, 776	7, 171	21, 545
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	14	62, 972	31	15	1	14, 361	76, 879	118, 568
Dyeing and cleaning	3	9, 800	18	7	8	6, 785	3, 400	22, 580
Electroplating	1	500	2	....	....	700	450	2, 150
Engraving and die-sinking	1	1, 500	12	....	....	3, 000	1, 500	7, 365
Engraving, wood	2	1, 500	5	....	....	2, 600	750	5, 800
Fertilizers	2	40, 000	35	....	....	11, 600	11, 000	29, 000
Files	3	6, 800	16	....	....	5, 175	1, 135	9, 816
Flavoring extracts	1	100	2	....	....	420	570	1, 700
Flax, dressed	4	15, 800	41	....	....	13, 964	12, 900	31, 700
Flouring- and grist-mill products	705	9, 199, 735	2, 418	....	3	861, 302	24, 306, 982	27, 639, 430
Food preparations (see page 39)	3	40, 000	6	....	5	4, 550	35, 500	55, 000
Foundery and machine-shop products (see also Steam-fittings and heating apparatus).	129	2, 502, 252	2, 542	6	61	1, 168, 257	1, 910, 106	3, 965, 652
Furnishing goods, men's	3	7, 000	7	9	1	1, 890	17, 000	28, 850
Furniture (see also Mattresses and spring beds; Upholstering)	177	815, 424	1, 005	15	44	409, 209	500, 462	1, 225, 933
Furniture, chairs	10	596, 080	933	187	136	381, 856	367, 368	951, 240
Furs, dressed	4	65, 500	15	38	6	25, 600	91, 300	139, 000
Galvanizing	1	20, 000	12	....	....	6, 000	18, 000	27, 000
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	6	24, 850	13	68	....	11, 800	22, 650	48, 100
Glue	3	30, 000	36	8	....	9, 472	22, 500	41, 600
Grease and tallow	1	400	1	....	....	100	125	852
Gunpowder	1	35, 000	14	....	....	7, 000	45, 000	60, 000
Hairwork	8	11, 800	1	21	....	4, 850	10, 475	23, 000
Hand-knit goods	5	26, 000	2	538	52	14, 500	45, 500	83, 000
Handles, wooden	2	6, 000	10	....	....	3, 000	6, 200	15, 700
Hardware (see also Cutlery and edge tools; Tools)	10	128, 150	199	1	37	79, 110	112, 760	270, 445
Hardware, saddlery	1	10, 000	5	1	....	2, 700	17, 000	28, 000
Hats and caps, not including wool hats	4	36, 000	10	22	2	8, 500	23, 928	42, 000
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	4	10, 010	6	20	2	3, 364	9, 125	18, 817
Ink	1	3, 500	6	....	....	1, 000	2, 000	7, 000
Iron and steel	9	2, 843, 218	2, 088	....	65	1, 004, 931	3, 830, 667	6, 580, 301
Iron doors and shutters	1	1, 875	3	....	....	1, 549	1, 800	4, 500
Iron nails and spikes, cut and wrought	1	50, 000	14	....	12	15, 000	25, 000	46, 000
Jewelry	5	15, 100	19	....	....	8, 716	32, 000	48, 800
Lamps and reflectors	1	4, 000	6	....	[illegible]	2, 400	10, 000	15, 000
Lead, bar, pipe, sheet, and shot	1	4, 000	6	....	....	1, 600	11, 100	13, 000
Leather, curried	61	1, 299, 425	657	....	1	281, 412	3, 769, 914	4, 496, 729
Leather, dressed skins	10	78, 700	61	1	1	25, 999	81, 465	128, 476
Leather, tanned	73	1, 697, 825	815	....	....	337, 211	3, 367, 360	4, 324, 433
Lightning rods	2	5, 000	5	....	....	2, 000	3, 500	10, 000
Lime	28	123, 960	166	1	2	38, 773	85, 975	185, 000
Liquors, distilled	6	394, 000	44	....	....	18, 400	205, 296	302, 213
Liquors, malt	203	7, 253, 205	1, 680	....	....	823, 124	3, 536, 438	6, 312, 173
Lithographing (see also Printing and publishing)	4	69, 125	116	2	13	57, 751	79, 640	166, 860
Lock- and gun-smithing	9	19, 400	12	....	....	3, 200	9, 000	20, 150
Looking-glass and picture frames	5	13, 975	12	....	....	7, 822	20, 700	37, 970
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	27	256, 350	258	4	14	75, 873	322, 650	519, 378
Lumber, sawed	704	19, 824, 059	7, 748	250	467	2, 257, 218	12, 471, 473	17, 952, 347
Malt	3	140, 000	31	....	....	15, 070	278, 500	316, 000
Marble and stone work	72	297, 710	366	....	4	155, 803	207, 879	504, 713
Masonry, brick and stone	22	40, 300	182	....	2	78, 335	74, 125	178, 800
Matches	1	325, 000	50	320	....	56, 200	454, 800	532, 932

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—WISCONSIN, BY SPECIFIED INDUSTRIES—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Mattresses and spring beds (see also Furniture)	9	$33, 600	41	5	5	$15, 297	$37, 718	$70, 016
Mineral and soda waters	23	75, 200	67	6	11	19, 612	47, 595	104, 825
Mixed textiles (see also Cotton goods; Woolen goods)	2	100, 805	25	23	9	19, 048	56, 493	106, 243
Models and patterns	2	1, 000	2	....	....	1, 080	900	3, 620
Musical instruments, organs and materials	2	4, 500	4	....	....	1, 600	3, 000	6, 500
Musical instruments, pianos and materials	2	10, 600	8	....	2	4, 250	4, 500	12, 750
Oil, linseed	3	166, 000	30	....	....	14, 480	253, 400	320, 400
Painting and paperhanging	72	85, 900	324	....	6	113, 567	148, 397	337, 452
Paints	3	36, 500	17	....	....	6, 400	50, 000	78, 000
Paper (see also Wood pulp)	13	943, 000	401	165	20	235, 955	773, 150	1, 277, 736
Patent medicines and compounds (see also Drugs and chemicals)	6	13, 050	10	....	....	2, 822	9, 019	30, 800
Perfumery and cosmetics	1	5, 000	2	4	....	1, 200	9, 000	14, 000
Photographing	29	42, 200	30	7	1	17, 243	19, 441	67, 715
Pickles, preserves, and sauces	3	24, 000	26	6	6	7, 150	31, 600	49, 500
Plated and britannia ware	1	60, 000	52	15	....	35, 000	20, 000	55, 000
Plumbing and gasfitting	11	58, 200	105	....	1	48, 700	80, 700	159, 400
Printing and publishing (see also Lithographing)	82	729, 800	827	93	88	429, 777	337, 290	1, 093, 510
Pumps, not including steam pumps	27	39, 625	54	....	1	16, 585	35, 626	82, 245
Refrigerators	4	11, 000	22	....	....	12, 100	21, 800	44, 550
Roofing and roofing materials	4	110, 000	76	15	....	40, 460	73, 160	141, 100
Saddlery and harness	344	494, 085	573	1	50	197, 249	574, 384	1, 064, 235
Safes, doors, and vaults, fire-proof	2	14, 000	12	....	....	5, 850	8, 600	19, 000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	83	1, 616, 700	1, 837	17	128	636, 281	1, 715, 145	2, 975, 687
Scales and balances	3	29, 500	32	....	2	10, 600	16, 900	56, 600
Shipbuilding	24	208, 700	474	....	....	223, 573	268, 303	576, 305
Shirts	4	3, 600	7	29	....	8, 990	8, 790	25, 650
Show-cases	2	6, 750	8	....	....	4, 550	7, 400	14, 000
Slaughtering and meat-packing, not including retail butchering establishments.	13	959, 000	1, 003	....	29	203, 805	5, 898, 483	6, 533, 926
Soap and candles	15	173, 500	89	6	12	38, 965	272, 100	396, 740
Springs, steel, car, and carriage	1	4, 000	8	....	....	4, 500	3, 500	11, 000
Starch	2	40, 000	32	12	9	14, 000	34, 500	56, 550
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	1, 000	4	....	....	1, 044	3, 145	5, 587
Stencils and brands	1	1, 200	1	....	....	600	1, 000	2, 700
Stereotyping and electrotyping (see also Type founding)	1	400	3	....	....	600	400	2, 000
Stone- and earthen-ware	14	85, 900	80	....	4	20, 611	25, 405	78, 850
Straw goods	1	85, 000	125	275	....	50, 000	125, 000	250, 000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	279	533 075	556	2	12	226, 628	498, 195	996, 608
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	3	331, 000	200	6	20	78, 500	786, 645	978, 281
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	152	424, 750	1, 074	44	95	445, 504	575, 377	1, 346, 925
Tools (see also Cutlery and edge tools; Hardware)	2	16, 000	32	....	....	11, 500	7, 100	30, 000
Toys and games	3	8, 150	17	2	4	6, 450	12, 125	22, 500
Trunks and valises	8	249, 500	371	....	60	139, 220	231, 100	463, 600
Type founding (see also Stereotyping and electrotyping)	2	25, 000	23	3	15	19, 011	19, 000	45, 000
Upholstering (see also Furniture)	9	14, 800	50	....	....	25, 059	104, 850	156, 970
Upholstering materials	1	6, 000	7	....	....	2, 000	3, 400	7, 200
Vinegar	12	94, 000	53	....	....	26, 715	54, 900	178, 945
Watch and clock repairing	31	26, 700	24	....	1	11, 004	15, 350	46, 050
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	466	472, 735	562	....	7	169, 873	267, 827	729, 872
Whips	2	4, 200	4	6	....	2, 550	7, 000	12, 200
Windmills	9	119, 400	172	....	....	65, 555	87, 500	215, 325
Window blinds and shades	1	4, 000	8	....	....	3, 600	4, 000	8, 200
Wirework	9	26, 850	56	....	....	15, 160	29, 690	68, 285
Wood preserving	1	100, 000	24	....	....	7, 000	20, 000	40, 000
Wood pulp	3	64, 000	47	....	1	16, 564	21, [illegible]48	76, 000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	7	13, 200	23	....	5	6, 946	10, 782	29, 430
Wooden ware	5	106, 500	172	....	10	69, 900	106, 000	219, 200
Woolen goods (see also Gloves and mittens; Mixed textiles)	48	1, 349, 954	426	378	43	214, 993	892, 793	1, 480, 069

A—WYOMING TERRITORY, BY TOTALS OF COUNTIES.

The Territory	57	$364, 673	380	....	11	$187, 798	$601, 214	$898, 494
COUNTIES.								
Albany	14	251, 203	223	....	10	101, 430	459, 912	591, 880
Carbon	9	19, 600	29	....	....	8, 600	24, 492	41, 955
Crook (*a*)	....	....	....	....	....	....	....	....
Johnson (*a*)	....	....	....	....	....	....	....	....
Laramie	28	77, 870	117	....	1	76, 787	109, 457	253, 356
Sweetwater	6	16, 000	11	....	....	981	7, 353	11, 303
Uinta (*a*)	....	....	....	....	....	....	....	....

a Returned as having no manufactures.

TABLE IV.—MANUFACTURES IN EACH STATE AND TERRITORY: 1880.

B—WYOMING TERRITORY, BY SPECIFIED INDUSTRIES.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	57	$364, 673	380	....	11	$187, 798	$601, 214	$898, 494
Awnings and tents	1	150	1	....	....	642	1, 000	2, 000
Blacksmithing (see also Wheelwrighting)	9	21, 100	33	....	1	21, 015	12, 400	50, 700
Boots and shoes, including custom work and repairing	12	7, 370	14	....	....	9, 580	15, 450	41, 316
Brick and tile	2	1, 500	28	....	....	5, 300	1, 400	8, 500
Carpentering	5	5, 600	22	....	....	16, 578	33, 500	59, 000
Carriages and wagons (see also Wheelwrighting)	1	3, 850	8	....	....	8, 020	6, 300	16, 860
Flouring- and grist-mill products	1	7, 000	3	....	....	150	3, 740	4, 790
Iron and steel	1	212, 603	174	....	10	79, 650	403, 568	491, 345
Jewelry	1	1, 000	4	....	....	6, 240	5, 000	15, 000
Liquors, malt	6	35, 000	16	....	....	6, 403	24, 326	43, 293
Lock- and gun-smithing	1	4, 000	1	....	....	100	2, 000	3, 000
Lumber, sawed	7	26, 700	38	....	....	6, 380	27, 350	40, 990
Photographing	1	2, 000	2	....	....	1, 020	2, 000	6, 000
Saddlery and harness	4	15, 500	21	....	....	15, 500	16, 720	43, 000
Salt	1	3, 000	2	....	....	1, 460	1, 460	8, 760
Sash, doors, and blinds	1	10, 000	5	....	....	5, 000	30, 000	40, 000
Tinware, copperware, and sheet-iron ware	2	2, 300	4	....	....	2, 760	12, 000	17, 000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	1	6, 000	4	....	....	2, 000	3, 000	7, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, IN EACH STATE AND TERRITORY: 1880.

NOTE.—The following table, containing the selected statistics of manufactures, by counties, is intended to embrace only those industries which are so far considerable in amount as to justify space being given to them in the present publication. With this view, counties having a gross production of less than $100,000 annually, and all industries in any county producing less than $20,000, have been omitted. Moreover, those industries which may be called "neighborhood industries" (*i. e.*, where the production is presumably for use and consumption within the immediate locality) are excluded from the table. These industries, according to the classification here adopted, are as follows, viz: "blacksmithing," "carpentering," "custom boot and shoe making," "dentistry, mechanical," "dyeing and cleaning," "kindling wood," "lock- and gun-smithing," "masonry, brick and stone," "painting and paperhanging," "photographing," "plumbing and gasfitting," "watch and clock repairing," and "wheelwrighting" The production of each of these branches of mechanical effort is duly included in Table IV (B), which presents the full manufacturing statistics of each state by specified industries, while Table IV (A) exhibits the entire manufacturing and mechanical production of each county in each state, embracing the production of the industries which, for the purpose of the following table, are discarded. The reason for thus selecting the industries embraced in this table is found in the fact that the publication of the unabridged list, by counties, would consume an amount of space wholly disproportionate to the importance of the information conveyed. It can always be assumed that wherever communities of men in a civilized state exist these trades will be found, and they will, in any American community, bear a pretty definite proportion to the population. What cannot be assumed of any county is the existence of branches of industry which produce articles for export or for consumption, irrespective of locality; it is for the purpose of more precisely locating industrial establishments of this grade that the following tables have been prepared.

(See Introductory note, pages 1 to 3.)

ALABAMA.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
AUTAUGA:								
Cotton goods	1	$110,000	32	50	60	$24,000	$124,800	$180,000
Flouring- and grist-mill products	24	18,100	17	....	....	2,753	36,139	38,455
Foundery and machine-shop products	1	130,000	62	....	9	36,512	27,633	104,058
Lumber, sawed	10	56,250	67	....	1	23,325	156,075	224,503
BALDWIN:								
Lumber, sawed	8	92,500	122	....	10	36,400	88,900	158,900
Tar and turpentine, not including farm products	10	45,000	324	45	15	94,700	19,400	186,950
BARBOUR:								
Carriages and wagons	2	13,500	19	1	....	6,000	9,000	23,500
Flouring- and grist-mill products	19	130,097	58	....	16	15,560	293,845	320,333
Lumber, sawed	8	25,900	28	....	7	5,975	12,380	25,800
BIBB:								
Lumber, sawed	7	53,500	124	....	....	33,517	45,450	115,430
BLOUNT:								
Flouring- and grist-mill products	10	18,150	14	....	....	1,565	57,325	65,191
BUTLER:								
Flouring- and grist-mill products	19	35,750	28	....	....	3,385	39,130	45,672
Leather, tanned	1	5,666	3	....	....	533	16,000	25,000
Lumber, sawed	5	46,600	32	....	....	8,960	82,100	108,000
CALHOUN:								
Flouring- and grist-mill products	18	56,500	21	....	....	3,485	80,666	86,409
Iron and steel	1	586,396	515	....	23	185,857	124,261	299,594
Leather, tanned	4	7,715	11	....	....	2,574	13,810	21,950
Lumber, planed	1	2,000	6	....	....	3,600	25,000	30,000
Saddlery and harness	3	5,700	7	....	1	2,250	13,400	26,000
CHAMBERS:								
Flouring- and grist-mill products	21	48,990	30	....	....	6,146	110,332	122,489
Lumber, sawed	6	10,300	16	....	....	3,210	12,815	22,300
CHEROKEE:								
Flouring- and grist-mill products	20	35,200	16	....	....	2,385	28,078	32,505
Iron and steel	5	530,000	476	....	....	102,525	88,691	201,938
Lumber, sawed	14	39,700	47	....	1	10,953	49,699	75,820
CHILTON:								
Lumber, sawed	7	54,000	94	....	....	36,000	163,450	236,400
CLAY:								
Flouring- and grist-mill products	22	30,750	18	....	....	3,194	73,926	92,579
DALLAS:								
Cotton goods	1	150,000	45	57	23	22,012	73,351	125,334
Flouring- and grist-mill products	13	27,700	40	....	1	6,377	106,269	120,284
Foundery and machine-shop products	2	24,000	28	....	....	11,400	20,325	38,589
Oil, cottonseed and cake	1	20,000	50	....	....	12,500	56,000	75,200
Saddlery and harness	1	4,000	11	1	....	8,000	25,000	40,000
ELMORE:								
Cotton goods	1	450,000	135	200	150	76,814	290,980	432,759
Flouring- and grist-mill products	19	38,100	30	....	....	6,236	149,498	174,038
Lumber, sawed	10	13,700	29	....	....	7,150	26,595	42,500
ESCAMBIA:								
Lumber, sawed	11	37,000	45	....	1	13,850	64,500	118,560
ETOWAH:								
Flouring- and grist-mill products	12	24,340	28	....	....	3,835	60,485	66,953
Lumber, sawed	4	125,000	112	....	4	38,450	167,000	281,000
JACKSON:								
Flouring- and grist-mill products	15	27,050	26	....	....	3,736	57,330	67,570
Lumber, sawed	11	20,300	22	....	....	4,720	23,475	37,850
JEFFERSON:								
Coke	3	135,500	64	....	....	38,500	76,618	148,026
Flouring- and grist-mill products	19	38,325	19	....	....	4,057	38,855	48,753
Iron and steel	3	1,233,800	200	....	....	51,257	214,931	516,362
LAUDERDALE:								
Cotton goods	2	46,000	26	51	13	11,971	37,597	58,841
Flouring- and grist-mill products	17	35,230	28	....	1	2,289	58,121	66,394
Lumber, sawed	9	14,630	25	....	2	4,600	18,345	30,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

ALABAMA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
LEE:								
Flouring- and grist-mill products	22	$69, 150	32			$5, 490	$80, 554	$92, 666
Furniture	2	11, 000	34	6	4	9, 000	12, 800	27, 500
LIMESTONE:								
Flouring- and grist-mill products	21	42, 500	33			4, 908	57, 950	67, 276
Lumber, sawed	7	14, 700	19			2, 845	14, 528	24, 324
MADISON:								
Cotton goods	1	150, 000	20	65	15	14, 000	24, 000	47, 000
Flouring- and grist-mill products	26	69, 700	38			5, 663	136, 051	151, 873
Lumber, sawed	6	18, 300	15			2, 210	11, 885	20, 880
Printing and publishing	3	8, 400	14	1	3	7, 650	12, 600	24, 000
MARENGO:								
Flouring- and grist-mill products	14	26, 400	18			3, 662	63, 780	72, 787
MOBILE:								
Bread and other bakery products	9	25, 200	25	4	2	9, 558	42, 470	75, 000
Brick and tile	4	31, 200	67		14	14, 950	11, 050	33, 100
Carriages and wagons	4	10, 400	26			12, 600	19, 500	43, 100
Cotton goods	2	65, 000	27	29	30	10, 377	56, 688	74, 109
Confectionery	2	6, 000	11	1	1	6, 520	25, 000	52, 500
Flouring- and grist-mill products	10	41, 000	53			19, 170	356, 021	417, 958
Foundery and machine-shop products	5	59, 808	73		5	28, 550	19, 547	59, 900
Lumber, planed	2	17, 000	8		2	3, 300	19, 000	25, 800
Lumber, sawed	14	497, 000	185		3	59, 450	190, 230	317, 500
Printing and publishing	5	37, 000	27			17, 740	27, 941	58, 375
Shipbuilding	1	25, 000	25			22, 500	25, 000	60, 000
Tar and turpentine, not including farm products	10	38, 500	168	29	13	44, 000	36, 825	115, 190
Tinware, copperware, and sheet-iron ware	7	12, 950	28			10, 600	28, 400	52, 750
MONTGOMERY:								
Brick and tile	5	10, 950	75		27	10, 425	8, 220	24, 665
Carriages and wagons	5	9, 800	54			20, 820	18, 000	54, 000
Clothing, men's	4	3, 600	13	5		9, 555	15, 400	35, 000
Confectionery	2	6, 000	15			3, 300	31, 350	44, 000
Flouring- and grist-mill products	17	132, 050	77			14, 446	387, 754	440, 425
Foundery and machine-shop products	4	54, 300	50			18, 320	28, 800	66, 400
Lumber, sawed	5	35, 200	35			8, 665	33, 235	52, 090
Oil, cottonseed and cake	1	62, 000	100			30, 000	102, 000	172, 782
Printing and publishing	3	20, 000	27			11, 100	18, 375	43, 200
MORGAN:								
Flouring- and grist-mill products	12	25, 150	26			3, 960	90, 350	112, 740
Lumber, sawed	6	30, 200	31			6, 420	24, 000	39, 020
PIKE:								
Carriages and wagons	2	10, 000	9			4, 000	15, 000	24, 000
Flouring- and grist-mill products	15	15, 200	22	2		3, 315	66, 291	74, 072
Sash, doors, and blinds	1	9, 000	10			3, 300	25, 000	35, 000
RANDOLPH:								
Cotton goods	1	50, 000	17	22	45	15, 120	32, 500	50, 000
Flouring- and grist-mill products	15	36, 850	21			3, 390	73, 225	77, 710
Lumber, sawed	9	13, 600	20		1	3, 757	11, 410	24, 200
SHELBY:								
Flouring- and grist-mill products	22	36, 355	24			3, 014	69, 737	77, 992
Iron and steel	2	725, 000	240		22	172, 074	136, 190	354, 962
Lime	2	7, 000	75			22, 200	18, 500	56, 000
Lumber, sawed	10	21, 200	38			8, 820	36, 900	57, 346
TALLADEGA:								
Flouring- and grist-mill products	11	60, 700	17			5, 475	146, 595	158, 001
Iron and steel	1	130, 000	150			60, 000	37, 000	80, 000
Lumber, sawed	10	13, 900	29			6, 201	20, 394	36, 750
TUSCALOOSA:								
Cotton goods	3	200, 000	100	200	84	85, 200	123, 960	260, 580
Flouring- and grist-mill products	15	30, 035	20			2, 920	35, 893	42, 784
Lumber, sawed	5	14, 500	22			8, 100	16, 300	29, 850
WASHINGTON:								
Lumber, sawed	3	9, 000	49		2	19, 190	69, 632	99, 742
Tar and turpentine, not including farm products	5	14, 800	125			21, 500	21, 500	61, 000

ARIZONA TERRITORY.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
MARICOPA:								
Flouring- and grist-mill products	2	$54, 000	12			$5, 950	$89, 658	$96, 085
PIMA:								
Flouring- and grist-mill products	2	18, 500	7			1, 600	16, 270	23, 040
Lumber, sawed	6	41, 500	37			17, 025	68, 036	109, 128
PINAL:								
Flouring- and grist-mill products	2	13, 500	4			787	17, 090	21, 262
Lumber, sawed	3	31, 450	20		1	10, 200	31, 500	55, 500

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

ARKANSAS.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
BENTON:								
Flouring- and grist-mill products	12	$30, 500	24	....	....	$5, 519	$181, 913	$191, 964
Lumber, sawed	6	18, 100	22	....	8	3, 075	13, 770	23, 825
BOONE:								
Flouring- and grist-mill products	8	27, 300	38	....	....	6, 503	196, 285	222, 509
CLARK:								
Flouring- and grist-mill products	12	16, 450	18	....	....	1, 301	38, 909	43, 640
Lumber, sawed	15	32, 200	66	....	4	10, 205	50, 060	82, 325
CLAY:								
Flouring- and grist-mill products	3	5, 550	3	....	....	464	28, 595	28, 698
Lumber, sawed	5	27, 000	60	....	4	11, 260	36, 300	64, 620
HEMPSTEAD:								
Lumber, sawed	12	37, 300	71	....	10	12, 973	72, 350	106, 700
JEFFERSON:								
Carriages and wagons	1	10, 000	30	....	....	11, 250	3, 000	20, 000
Foundery and machine-shop products	3	26, 000	29	....	....	10, 875	11, 000	37, 000
Lumber, planed	1	2, 000	12	....	....	4, 500	20, 000	30, 000
Oil, cottonseed and cake	1	25, 000	40	....	....	10, 400	40, 000	100, 000
MADISON:								
Flouring- and grist-mill products	8	17, 500	28	....	....	4, 100	97, 107	107, 953
MILLER:								
Lumber, sawed	4	33, 000	27	....	....	13, 692	108, 800	148, 000
PHILLIPS:								
Lumber, sawed	8	55, 280	64	....	....	9, 030	46, 425	68, 488
Oil, cottonseed and cake	2	50, 000	57	....	....	19, 000	88, 000	165, 000
Tinware, copperware, and sheet-iron ware	2	5, 500	7	....	....	6, 700	15, 000	33, 000
POPE:								
Flouring- and grist-mill products	7	22, 500	10	....	....	708	21, 430	25, 091
Lumber, sawed	14	28, 500	71	....	1	5, 845	35, 160	57, 240
PULASKI:								
Brick and tile	2	7, 500	98	....	2	22, 000	12, 000	44, 400
Carriages and wagons	3	25, 000	33	....	....	18, 180	40, 600	71, 000
Clothing, men's	3	7, 000	13	2	....	9, 200	10, 000	28, 800
Cooperage	2	5, 500	22	....	....	12. 500	5, 500	24, 000
Cotton goods	1	40, 000	7	8	16	4, 000	24, 000	30, 000
Flouring- and grist-mill products	3	27, 000	27	....	....	13, 100	213, 500	255, 190
Foundery and machine-shop products	4	23, 800	65	....	....	30, 500	35, 500	101, 000
Furniture	4	12, 750	18	....	1	8, 200	8, 000	32, 800
Lumber, sawed	12	103, 080	197	....	6	47, 738	107, 010	235, 300
Oil, cottonseed and cake	1	200, 000	140	....	....	50, 000	250, 000	325, 000
Printing and publishing	1	15, 000	28	2	4	18, 500	10, 000	60, 000
Saddlery and harness	5	21, 500	20	....	....	10, 000	27, 500	56, 050
Slaughtering and meat-packing, not including retail butchering establishments.	2	4, 500	10	....	....	3, 800	61, 175	85, 680
Tinware, copperware, and sheet-iron ware	11	4, 800	28	....	....	11, 500	29, 120	48, 000
Tobacco, cigars and cigarettes	2	7, 000	11	....	6	13, 000	32, 000	66, 000
SEBASTIAN:								
Flouring- and grist-mill products	15	32, 450	47	....	....	3, 681	52, 036	60, 255
Furniture	3	19, 500	28	2	1	9, 050	17, 700	37, 000
Saddlery and harness	3	12, 400	9	....	....	3, 680	21, 700	34, 000
WASHINGTON:								
Flouring- and grist-mill products	19	83, 000	41	....	....	9, 171	261, 517	298, 950
Lumber, sawed	8	22, 550	36	....	....	3, 155	12, 495	23, 040
WHITE:								
Flouring- and grist-mill products	13	16, 900	21	....	2	1, 702	37, 860	43, 966
Lumber, sawed	10	47, 600	67	....	2	6, 411	31, 170	50, 900
YELL:								
Flouring- and grist-mill products	14	27, 500	33	....	....	3, 007	69, 874	82, 995
Lumber, sawed	12	35, 300	49	....	....	6, 089	16, 450	33, 070

CALIFORNIA.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ALAMEDA:								
Agricultural implements	3	$122, 200	126	....	....	$66, 045	$193, 000	$285, 895
Bags, other than paper	1	300, 000	600	....	....	180, 000	275, 000	500, 000
Boxes, wooden, packing	1	5, 000	15	....	....	6, 000	18, 000	26, 500
Bread and other bakery products	6	10, 400	22	1	....	14, 700	54, 900	88, 000
Carriages and wagons	5	29, 872	37	1	....	24, 300	32, 500	83, 800
Cars, railroad, street, and repairs	1	2, 000	25	....	....	1, 500	25, 000	30, 000
Confectionery	2	8, 000	7	5	....	4, 200	20, 000	36, 000
Flouring- and grist-mill products	6	253, 000	54	....	....	27, 686	795, 400	898, 347
Foundery and machine-shop products	7	45, 500	64	....	....	23, 440	26, 400	71, 472
Fruits and vegetables, canned and preserved	1	25, 000	100	....	....	30, 000	20, 000	75, 000
Furniture	1	85, 000	22	1	....	18, 000	20, 000	50, 500
Ice, artificial	2	50, 000	14	....	....	9, 260	14, 000	36, 000
Leather, tanned	1	25, 000	16	....	....	6, 000	48, 000	60, 000
Liquors, malt	9	151, 000	76	....	....	32, 283	118, 743	215, 880
Lumber, planed	3	169, 535	108	....	....	77, 538	72, 000	178, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

CALIFORNIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
ALAMEDA—continued.								
Saddlery and harness	12	$23, 550	27	....	....	$12, 088	$24, 260	$53, 788
Salt	21	353, 850	174	....	....	48, 420	17, 915	111, 000
Shipbuilding	4	120, 400	174	....	....	188, 711	484, 268	689, 296
Slaughtering and meat-packing, not including retail butchering establishments.	4	135, 000	37	....	4	22, 800	832, 025	901, 840
Soap and candles	3	53, 350	53	....	11	31, 720	155, 500	218, 000
Stone- and earthen-ware	2	18, 000	14	....	....	11, 500	10, 000	36, 000
Sugar and molasses, beet	1	115, 000	120	....	....	24, 131	89, 724	127, 988
Terra-cotta ware	1	25, 000	75	....	....	75, 000	10, 000	98, 000
Tinware, copperware, and sheet-iron ware	10	60, 800	44	....	2	22, 178	26, 650	79, 500
Tobacco, cigars and cigarettes	6	7, 800	17	....	1	4, 850	11, 650	26, 000
AMADOR:								
Flouring- and grist-mill products	2	35, 000	8	....	....	6, 350	67, 883	80, 871
Foundery and machine-shop products	2	50, 000	41	....	....	31, 200	24, 000	81, 600
Lumber, sawed	4	13, 800	12	....	....	7, 880	26, 400	50, 000
BUTTE:								
Carriages and wagons	2	5, 500	15	....	....	7, 516	9, 000	30, 000
Flouring- and grist-mill products	5	227, 885	27	....	....	12, 510	168, 800	204, 020
Lumber, sawed	15	233, 000	123	....	5	59, 250	153, 350	270, 000
Marble and stone work	3	10, 500	15	....	....	5, 900	15, 300	29, 000
Saddlery and harness	4	8, 600	7	....	....	4, 095	9, 300	20, 870
Tinware, copperware, and sheet-iron ware	2	8, 500	27	....	....	9, 200	18, 000	36, 000
COLUSA:								
Flouring- and grist-mill products	3	43, 000	12	....	....	8, 200	187, 900	220, 000
Lumber, planed	1	6, 000	6	....	....	3, 500	5, 000	22, 000
CONTRA COSTA:								
Brick and tile	2	103, 000	72	....	....	21, 500	10, 000	42, 800
Flouring- and grist-mill products	1	5, 000	5	....	....	1, 500	22, 500	26, 400
High explosives	1	500, 000	18	....	....	9, 720	100, 000	200, 000
Liquors, distilled	1	250, 000	30	....	5	18, 000	140, 000	200, 000
DEL NORTE:								
Lumber, sawed	3	139, 000	45	....	....	23, 750	66, 000	121, 000
EL DORADO:								
Lumber, sawed	10	69, 700	30	....	....	15, 004	43, 345	81, 796
FRESNO:								
Flouring- and grist-mill products	2	16, 000	5	....	....	1, 944	31, 865	38, 967
Lumber, sawed	3	155, 000	63	....	....	12, 850	42, 125	71, 000
Sash, doors, and blinds	1	10, 000	25	....	....	2, 500	25, 000	30, 000
Slaughtering and meat-packing, not including retail butchering establishments.	1	10, 000	3	....	....	1, 000	19, 300	30, 132
HUMBOLDT:								
Flouring- and grist-mill products	6	16, 700	11	....	....	3, 030	46, 935	55, 542
Lumber, sawed	19	1, 112, 000	650	....	....	220, 667	415, 923	803, 206
KERN:								
Flouring- and grist-mill products	2	45, 000	11	....	....	7, 700	91, 500	103, 000
LAKE:								
Flouring- and grist-mill products	5	53, 500	19	....	....	5, 135	98, 427	119, 825
Lumber, sawed	4	20, 950	21	....	....	6, 020	17, 450	32, 250
LOS ANGELES:								
Bread and other bakery products	4	10, 350	13	....	1	7, 060	21, 800	38, 980
Brick and tile	3	12, 400	42	....	....	9, 140	14, 750	32, 400
Carriages and wagons	4	22, 880	19	....	....	14, 200	11, 900	30, 510
Cheese and butter (factory)	8	37, 750	10	1	....	1, 837	22, 456	31, 777
Flouring- and grist-mill products	7	203, 600	33	....	2	21, 435	329, 455	385, 350
Foundery and machine-shop products	1	10, 000	15	....	....	8, 775	11, 000	22, 750
Liquors, distilled	7	257, 900	12	....	....	4, 250	38, 517	60, 000
Liquors, malt	4	32, 000	12	....	....	5, 690	23, 506	39, 370
Liquors, vinous (see also Liquors, distilled)	3	85, 000	185	....	25	12, 300	94, 500	211, 000
Lumber, planed	3	35, 000	21	....	....	16, 000	23, 800	43, 500
Saddlery and harness	7	12, 150	15	....	....	10, 280	15, 987	36, 288
Slaughtering and meat-packing, not including retail butchering establishments.	3	25, 000	23	....	....	13, 500	123, 715	167, 410
Soap and candles	1	12, 000	5	....	....	3, 000	20, 000	30, 000
Tinware, copperware, and sheet-iron ware	10	9, 750	22	....	1	15, 355	45, 850	69, 205
Upholstering	4	2, 800	7	1	....	5, 450	19, 400	31, 730
Woolen goods	1	20, 000	11	....	2	6, 578	21, 715	38, 100
MARIN:								
Brick and tile	2	56, 000	123	....	....	40, 671	20, 495	102, 550
Cheese and butter (factory)	114	142, 750	119	....	8	32, 333	172, 438	302, 073
Furniture	1	60, 000	175	....	....	25, 000	90, 000	125, 000
Leather, curried	1	1, 500	9	....	....	2, 025	33, 400	54, 000
Leather, tanned	1	1, 500	9	....	....	2, 025	31, 000	32, 400
Paper	1	75, 000	25	....	1	12, 700	20, 000	45, 280
Saddlery and harness	2	19, 000	107	....	....	25, 800	66, 000	125, 000
Sash, doors, and blinds	1	25, 000	170	....	....	19, 800	40, 000	75, 000
Wooden ware	1	15, 000	40	....	....	6, 000	15, 000	30, 000
MENDOCINO:								
Flouring- and grist-mill products	6	40, 000	24	....	....	2, 646	85, 189	103, 474
Lumber, sawed	18	1, 496, 768	872	....	....	221, 657	297, 186	798, 599

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

CALIFORNIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
MERCED:								
Flouring- and grist-mill products	2	$35,000	5	3	....	$3,400	$51,127	$60,695
Woolen goods	1	85,000	45	1	1	19,250	60,745	93,375
MODOC:								
Flouring- and grist-mill products	4	31,000	14	....	....	5,388	53,779	70,102
Lumber, sawed	9	35,600	72	....	....	16,600	20,585	53,210
MONO:								
Foundery and machine-shop products	1	14,000	10	....	....	6,000	14,000	36,000
Lumber, sawed	7	109,000	129	....	....	67,500	192,600	350,050
Tinware, copperware, and sheet-iron ware	4	13,500	24	....	....	20,500	24,000	59,000
NAPA:								
Flouring- and grist-mill products	2	33,000	11	....	....	4,050	87,500	114,250
Liquors, distilled	10	209,500	8	....	2	4,116	31,225	50,250
Liquors, vinous (see also Liquors, distilled)	17	146,500	77	....	....	19,381	86,900	172,400
Leather, curried	1	1,500	13	....	....	4,200	103,000	115,000
Leather, tanned	2	152,000	133	....	4	54,000	330,000	466,000
Slaughtering and meat-packing, not including retail butchering establishments.	2	30,000	21	....	....	10,200	64,725	82,417
Windmills	1	50,000	29	....	1	7,000	13,000	25,000
NEVADA:								
Foundery and machine-shop products	3	47,000	26	....	....	22,710	27,000	64,817
Liquors, malt	13	156,500	43	....	....	20,094	75,310	136,600
Lumber, sawed	7	109,000	96	....	....	33,769	61,267	119,792
Slaughtering and meat-packing, not including retail butchering establishments.	3	17,000	11	....	1	9,800	98,350	116,600
Tinware, copperware, and sheet-iron ware	3	19,500	12	....	....	6,668	22,500	39,000
PLACER:								
Brick and tile	2	90,100	32	....	....	21,250	39,120	81,500
Lumber, sawed	7	304,600	138	....	....	46,900	118,800	203,300
PLUMAS:								
Lumber, sawed	11	46,000	44	....	....	11,080	24,274	51,550
SACRAMENTO:								
Agricultural implements	3	14,000	6	....	....	3,840	18,050	31,125
Boxes, wooden, packing	1	25,000	11	....	11	13,500	51,000	66,000
Bread and other bakery products	9	50,400	28	....	2	19,881	81,241	127,338
Brick and tile	3	17,600	72	....	....	25,300	14,700	53,200
Carriage and wagon materials	2	40,000	14	....	....	13,000	59,000	85,000
Carriages and wagons	4	69,000	42	....	....	24,477	26,600	74,445
Clothing, men's	1	12,000	10	....	....	12,000	40,000	55,000
Coffee and spices, roasted and ground	5	17,650	7	....	....	3,300	32,300	43,660
Confectionery	5	34,050	16	....	....	15,028	65,315	112,200
Cooperage	3	35,000	25	....	15	16,000	25,000	59,500
Flouring- and grist-mill products	3	350,000	56	....	....	47,300	1,158,000	1,315,936
Foundery and machine-shop products	5	120,000	65	....	4	41,600	50,600	114,700
Furniture (see also Upholstering)	7	76,000	83	....	4	40,441	97,000	158,600
Grease and tallow	1	100,000	13	....	....	9,000	287,000	325,000
Liquors, distilled	2	107,000	5	....	....	2,000	18,103	28,000
Liquors, malt	8	120,000	56	....	....	26,098	99,310	178,730
Lumber, planed (see also Sash, doors, and blinds)	2	40,000	35	....	....	30,460	308,428	371,495
Malt	1	45,000	7	....	....	6,000	38,300	50,000
Marble and stone work	9	45,700	38	....	....	27,308	27,900	77,700
Saddlery and harness	11	50,200	57	....	....	37,144	78,725	138,324
Sash, doors, and blinds (see also Lumber, planed)	1	15,000	15	....	....	12,520	13,000	29,120
Slaughtering and meat-packing, not including retail butchering establishments.	3	65,000	19	....	....	8,800	120,550	138,500
Soap and candles	1	5,000	5	....	....	2,300	20,000	30,600
Tinware, copperware, and sheet-iron ware	7	12,100	19	....	2	17,300	21,500	52,400
Tobacco, cigars and cigarettes	8	14,600	25	....	2	9,232	68,680	102,100
Upholstering (see also Furniture)	3	9,600	9	....	....	6,480	9,400	20,750
Woolen goods	1	150,000	48	5	....	9,900	50,700	100,000
SAN BENITO:								
Flouring- and grist-mill products	2	56,000	7	....	....	5,000	126,130	145,687
Tobacco, cigars and cigarettes	1	100,000	51	....	....	11,749	23,500	40,000
SAN BERNARDINO:								
Flouring- and grist-mill products	3	15,500	4	....	....	600	16,523	20,935
Liquors, vinous	1	50,000	15	....	....	6,000	10,000	40,000
Lumber, sawed	3	14,000	36	....	....	5,750	12,500	26,650
SAN DIEGO:								
Flouring- and grist-mill products	1	15,000	5	....	....	2,013	20,130	24,357
SAN FRANCISCO (see Table VI).								
SAN JOAQUIN:								
Agricultural implements	5	123,000	65	....	9	38,050	73,000	145,500
Brick and tile	3	35,000	80	....	....	18,740	10,575	39,000
Carriages and wagons	6	72,000	53	....	1	34,588	50,306	105,565
Clothing, men's	5	13,500	18	....	2	11,460	25,027	51,227
Flouring- and grist-mill products	7	428,000	69	1	5	43,310	1,200,374	1,329,541
Foundery and machine-shop products	4	84,000	40	....	....	24,790	64,200	119,280
Furniture (see also Upholstering)	1	25,000	35	....	5	20,000	30,000	56,000
Leather, curried	2	78,000	26	....	....	18,700	223,800	261,500
Leather, tanned	2	79,000	29	....	....	19,000	173,000	219,000
Liquors, vinous	5	56,500	23	....	....	5,800	8,900	31,600

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

CALIFORNIA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
SAN JOAQUIN—continued.								
Lumber, planed (see also Sash, doors, and blinds)	1	$20,000	11			$6,000	$25,000	$60,000
Lumber, sawed	1	25,000	18			5,500	12,000	20,000
Paper	1	300,000	73	5	2	42,722	138,815	187,774
Patent medicines and compounds	4	13,200	9		13	4,505	22,980	35,200
Saddlery and harness	5	26,575	17		6	13,016	30,000	54,300
Sash, doors, and blinds (see also Lumber, planed)	1	10,000	20		5	13,852	24,000	48,000
Slaughtering and meat-packing, not including retail butchering establishments.	1	140,000	12		1	7,560	99,280	128,626
Tinware, copperware, and sheet-iron ware	5	53,000	28	1	3	22,009	23,500	57,500
Upholstering (see also Furniture)	2	21,000	7			4,600	9,500	24,000
Wirework	1	2,000	2			2,000	20,000	25,000
Woolen goods	1	30,000	25			10,000	44,000	60,000
SAN LUIS OBISPO:								
Flouring- and grist-mill products	3	27,000	10			3,984	66,725	78,120
SAN MATEO:								
Cheese and butter (factory)	6	147,175	30			5,360	14,860	27,280
Lumber, sawed	8	127,500	83			17,250	36,100	70,350
SANTA BARBARA:								
Cheese and butter (factory)	9	75,900	31	1		3,970	17,269	29,984
Flouring- and grist-mill products	3	27,000	7			2,600	49,800	55,869
Slaughtering and meat-packing, not including retail butchering establishments.	1	10,000	4			2,000	51,100	61,700
SANTA CLARA:								
Boxes, wooden, packing	2	15,000	16		1	6,000	21,800	32,200
Bread and other bakery products	13	18,995	24		1	10,408	26,673	48,936
Brick and tile	5	20,400	135			20,225	13,300	45,200
Carriages and wagons	3	14,200	20			16,750	9,300	32,700
Clothing, men's	8	13,665	14	4	1	13,100	21,680	46,594
Coffee and spices, roasted and ground	1	12,796	6			3,400	16,825	23,300
Coffins, burial cases, and undertakers' goods	2	25,000	14			9,800	8,000	39,000
Confectionery	3	13,800	5	1		3,493	15,285	20,871
Flouring- and grist-mill products	9	246,500	34			21,064	343,280	395,519
Foundery and machine-shop products	7	82,550	70		1	43,464	35,300	106,810
Fruits and vegetables, canned and preserved	4	200,000	258	167	1	52,913	202,452	331,798
Furniture	2	20,075	20			12,000	15,085	35,600
Gloves and mittens (see also Woolen goods)	3	56,000	33	32		24,170	23,720	58,400
Leather, curried	1	20,000	16			8,000	43,760	65,000
Leather, tanned	2	90,000	45	1		26,340	148,000	204,400
Liquors, malt	7	110,000	59			26,471	100,960	183,073
Marble and stone work	5	13,700	12			9,307	13,000	36,130
Paper	3	205,000	41			22,000	62,800	115,493
Printing and publishing	9	40,000	36	6	1	22,192	19,100	82,110
Saddlery and harness	10	30,800	24			11,710	14,002	38,430
Sash, doors, and blinds	3	233,000	94			81,000	84,535	194,666
Slaughtering and meat-packing, not including retail butchering establishments.	3	23,000	10			3,520	52,215	71,572
Tinware, copperware, and sheet-iron ware	8	23,150	21			13,117	14,700	42,800
Woolen goods (see also Gloves and mittens)	1	217,000	60	16	14	34,300	92,650	166,583
SANTA CRUZ:								
Cheese and butter (factory)	6	73,000	25	7		4,100	19,807	36,581
Explosives and fireworks	1	40,000	5			3,780	20,000	33,000
Flouring- and grist-mill products	4	73,000	20			12,540	194,400	208,150
Foundery and machine-shop products	2	9,000	12			6,000	9,600	20,000
Gunpowder	1	1,000,000	76			37,200	137,800	390,000
Leather, curried	2	26,000	9			3,562	58,191	71,885
Leather, tanned	4	87,000	34			15,750	163,329	254,983
Lime	3	209,000	77			33,600	54,000	135,000
Liquors, malt	4	22,500	8			3,590	14,731	26,031
Lumber, planed	1	15,000	12			6,000	10,000	30,000
Lumber, sawed	14	463,500	232		1	89,778	142,143	297,600
Paper	1	30,000	17			10,200	19,400	37,650
Slaughtering and meat-packing, not including retail butchering establishments.	3	31,000	15			10,620	82,370	109,000
Sugar and molasses, beet	1	100,000	30			15,000	15,000	35,000
Tinware, copperware, and sheet-iron ware	5	28,800	16			7,450	15,900	28,300
SHASTA:								
Flouring- and grist-mill products	3	38,000	7			2,103	40,580	48,045
Lumber, sawed	13	149,600	62		2	15,890	48,825	90,775
SIERRA:								
Foundery and machine-shop products	1	15,000	4			5,200	18,000	34,000
Lumber, sawed	18	125,100	123			34,549	92,155	160,600
SISKIYOU:								
Flouring- and grist-mill products	4	48,000	5			2,802	42,207	53,200
Lumber, sawed	14	45,000	48		1	12,985	42,980	75,030
SOLANO:								
Flouring- and grist-mill products	5	554,000	63			52,065	1,640,386	1,863,860
Foundery and machine-shop products	1	50,000	30			30,000	40,000	100,000
Leather, curried	4	58,200	33			20,176	224,240	262,900
Leather, tanned	4	116,600	63			43,588	242,150	358,540
Liquors, malt	5	53,000	19			8,244	31,459	56,280

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

CALIFORNIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
SONOMA:								
Carriages and wagons	2	$19,000	10			$8,000	$11,400	$28,800
Cheese and butter (factory)	18	148,200	59	6		10,120	34,223	64,293
Flouring- and grist-mill products	11	167,500	43			13,645	270,342	300,562
Leather, curried	6	11,890	7			2,610	34,180	42,420
Leather, tanned	6	17,700	11			6,310	60,100	94,500
Liquors, distilled	5	17,980	5			1,537	14,107	22,000
Liquors, malt	5	37,400	7			3,396	14,3[illegible]3	24,260
Liquors, vinous (see also Liquors, distilled)	3	105,000	14			6,200	32,500	54,000
Lumber, planed	2	12,000	11			7,050	10,000	22,000
Lumber, sawed	11	370,000	99			27,305	95,670	140,000
Marble and stone work	4	10,800	15			9,725	9,700	25,800
Printing and publishing	3	24,500	20	1	4	12,971	8,800	29,492
Saddlery and harness	11	25,050	22			13,365	23,300	48,900
TEHAMA:								
Flouring- and grist-mill products	2	180,000	31			19,500	533,000	633,625
Lumber, sawed	3	1,055,000	168			74,690	115,900	233,000
Sash, doors, and blinds	1	25,300	40		10	10,000	150,000	200,000
TULARE:								
Flouring- and grist-mill products	4	71,000	21			13,427	216,000	274,795
TUOLUMNE:								
Flouring- and grist-mill products	4	90,500	11			4,213	64,198	77,245
Lumber, planed	2	4,500	5			1,600	25,500	31,000
Lumber, sawed	5	45,000	44			18,900	42,470	75,112
Pickles, preserves, and sauces	1	5,000	6			4,000	10,000	21,000
VENTURA:								
Flouring- and grist-mill products	2	50,000	5			2,315	52,550	69,050
YOLO:								
Flouring- and grist-mill products	4	67,000	18			11,050	199,979	232,131
Slaughtering and meat-packing, not including retail butchering establishments.	1	30,000	8			4,500	32,750	56,140
YUBA:								
Agricultural implements	1	30,000	26			10,000	15,075	30,000
Bags, other than paper	1	25,000	17			2,285	30,000	37,500
Carriages and wagons	2	3,000	15			6,959	7,000	21,000
Flouring- and grist-mill products	2	116,500	60			35,120	588,251	660,000
Foundery and machine-shop products	1	30,000	20			13,600	22,000	39,000
Lumber, sawed	4	47,500	31			9,000	35,900	59,500
Sash, doors, and blinds	2	35,000	33			20,750	115,000	151,750
Slaughtering and meat-packing, not including retail butchering establishments.	2	28,000	9			7,320	61,522	76,375
Woolen goods	1	170,000	62	5		30,000	151,878	214,765

COLORADO.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ARAPAHOE:								
Awnings and tents	2	$19,500	13	62		$15,000	$95,000	$135,000
Bread and other bakery products	16	97,200	100	6	11	82,800	355,900	574,552
Brick and tile	24	104,800	441		24	118,710	92,808	286,028
Brooms and brushes	1	3,800	3		1	1,800	15,000	30,000
Carriages and wagons	9	261,000	123		2	102,000	194,000	435,000
Clothing, men's	6	3,350	5	16		13,225	27,350	52,350
Clothing, women's	3	18,300		130	5	60,200	92,150	176,500
Coffee and spices, roasted and ground	1	30,000	3	5		4,500	17,500	27,000
Confectionery	6	7,900	23	1	4	17,250	20,700	49,550
Drugs and chemicals	1	5,000	5			4,900	14,000	35,000
Flouring- and grist-mill products	7	162,000	85			44,486	926,112	1,124,442
Foundery and machine-shop products	10	176,500	249		10	157,420	426,130	771,522
Fruits and vegetables, canned and preserved	1	10,000	8	2	5	8,000	60,000	100,000
Furniture (see also Upholstering)	7	68,400	42	3	2	33,300	43,000	138,850
Iron and steel	1	100,000	125			7,000	131,700	225,000
Leather, curried	3	16,700	13	1		8,500	53,250	90,550
Leather, tanned	3	16,700	13	1		9,000	38,300	55,800
Liquors, malt	6	281,500	70			32,065	119,470	217,710
Lithographing (see also Printing and publishing)	1	10,000	23			12,222	18,000	40,000
Lumber, planed (see also Sash, doors, and blinds)	2	150,000	160			113,000	975,000	1,225,000
Marble and stone work	5	19,500	62			23,600	21,750	61,500
Mineral and soda waters	3	6,100	9			6,500	14,750	32,675
Pickles, preserves, and sauces	1	10,000	5			4,000	8,000	20,000
Printing and publishing (see also Lithographing)	4	181,000	156	12	19	135,050	95,200	305,500
Saddlery and harness	9	91,250	61	2	12	47,050	94,600	207,350
Sash, doors, and blinds (see also Lumber, planed)	1	90,000	135			67,000	350,000	580,000
Slaughtering and meat-packing, not including retail butchering establishments.	4	49,000	35		5	15,990	536,920	590,945
Soap and candles	2	53,000	15	3	3	14,315	37,500	64,320
Stencils and brands	2	6,650	22			12,500	16,000	51,000
Tinware, copperware, and sheet-iron ware	12	25,250	47		10	26,650	60,900	128,100
Tobacco, cigars and cigarettes	9	14,150	23	3		16,578	33,500	77,025
Trunks and valises	2	7,500	13		1	12,000	23,000	60,000
Upholstering (see also Furniture)	1	3,600	19	1		10,400	10,000	25,000
Vinegar	3	13,000	10		3	4,300	13,000	24,500

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

COLORADO—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Boulder:								
Flouring- and grist-mill products	6	$111, 500	30	....	....	$19, 085	$418, 375	$470, 200
Slaughtering and meat-packing, not including retail butchering establishments.	1	10, 000	2	....	....	2, 000	48, 200	54, 345
Clear Creek:								
Lumber, sawed	8	31, 000	28	....	....	3, 900	28, 250	44, 200
Slaughtering and meat-packing, not including retail butchering establishments.	4	16, 000	14	....	....	12, 600	99, 705	127, 000
Custer:								
Lumber, sawed	9	31, 000	83	....	....	9, 200	86, 269	120, 670
Slaughtering and meat-packing, not including retail butchering establishments.	2	20, 000	14	....	....	8, 400	111, 600	132, 000
El Paso:								
Lumber, sawed	6	67, 700	99	....	8	9, 900	99, 650	132, 800
Fremont:								
Boots and shoes	1	60, 000	75	....	....	17, 500	78, 100	125, 000
Flouring- and grist-mill products	1	2, 000	6	....	....	2, 500	28, 700	34, 452
Gilpin:								
Foundery and machine-shop products	1	5, 000	10	....	....	7, 800	15, 000	25, 000
Liquors, malt	3	18, 000	7	....	....	3, 369	12, 542	22, 640
Lumber, sawed	3	18, 000	14	....	....	3, 450	17, 000	26, 000
Slaughtering and meat-packing, not including retail butchering establishments.	1	7, 000	4	....	....	2, 400	29, 180	40, 000
Jefferson:								
Brick and tile	3	220, 000	160	....	....	96, 000	75, 750	213, 000
Flouring- and grist-mill products	3	42, 600	16	....	....	3, 550	167, 500	199, 075
Liquors, malt	1	40, 000	8	....	4	5, 343	19, 855	35, 560
Lumber, sawed	11	59, 600	156	....	....	32, 625	151, 225	238, 665
Paper	1	25, 000	14	1	5	6, 000	10, 350	27, 300
Lake:								
Brick and tile	4	10, 000	73	....	2	17, 500	7, 125	33, 300
Carriages and wagons	1	20, 000	10	....	....	10, 000	15, 000	40, 000
Charcoal	25	17, 864	75	....	....	23, 930	27, 096	81, 873
Clothing, men's	3	3, 550	9	....	....	8, 000	7, 500	24, 000
Foundery and machine-shop products	3	44, 000	58	....	....	51, 800	111, 200	210, 000
Furniture	1	3, 000	10	....	....	9, 000	5, 000	20, 000
Liquors, malt	2	65, 000	22	....	....	10, 654	38, 760	70, 310
Lumber, planed	2	8, 500	6	....	....	6, 000	14, 000	32, 000
Lumber, sawed	8	27, 900	82	....	....	12, 900	58, 920	97, 050
Mineral and soda waters	1	10, 000	6	....	....	4, 680	5, 000	20, 000
Saddlery and harness	4	11, 650	14	....	....	11, 500	24, 200	55, 500
Slaughtering and meat-packing, not including retail butchering establishments.	2	64, 000	13	....	....	9, 800	100, 460	138, 400
Tinware, copperware, and sheet-iron ware	3	24, 000	12	....	....	12, 500	35, 500	73, 000
Larimer:								
Flouring- and grist-mill products	3	62, 000	19	....	....	9, 800	318, 500	380, 000
Lumber, sawed	7	19, 000	30	....	1	2, 086	19, 905	33. 625
Las Animas:								
Coke	1	150, 000	75	....	....	13, 500	30, 100	93, 000
Flouring- and grist-mill products	4	27, 500	10	....	....	4, 900	80, 800	102, 830
Lumber, sawed	2	8, 000	19	....	....	2, 700	17, 500	28, 000
Pueblo:								
Flouring- and grist-mill products	2	30, 000	6	....	....	5, 680	83, 350	96, 160

CONNECTICUT.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Fairfield:								
Ammunition	1	$300, 000	240	240	....	$203, 481	$738, 852	$1, 031, 852
Belting and hose, rubber	1	200, 000	240	2	2	110, 000	663, 000	850, 000
Billiard tables and materials	1	100, 000	200	....	....	62, 266	100, 000	400, 000
Boots and shoes	11	361, 500	510	238	4	290, 925	628, 695	1, 087, 225
Boxes, fancy and paper	7	62, 500	67	162	7	67, 100	89, 000	224, 500
Boxes, wooden, packing	3	19, 850	15	4	....	8, 040	56, 000	70, 050
Brass and copper, rolled	1	243, 000	155	35	28	87, 912	186, 183	359, 716
Bread and other bakery products	14	25, 300	78	10	....	40, 564	134, 354	210, 540
Buttons	9	74, 000	76	63	3	40, 403	59, 450	132, 609
Carpets, other than rag (see also Woolen goods)	1	85, 000	27	40	....	39, 500	74, 775	144, 000
Carriage and wagon materials	4	104, 400	51	1	....	25, 973	68, 888	120, 236
Carriages and wagons	22	136, 950	196	....	1	87, 201	136, 049	310, 885
Cheese and butter (factory)	1	5, 000	4	....	....	2, 340	24, 923	28, 867
Clothing, men's	5	106, 000	37	205	26	46, 252	135, 922	206, 428
Coffee and spices, roasted and ground	1	20, 000	6	....	....	2, 500	20, 000	23, 500
Coffins, burial cases, and undertakers' goods	2	12, 700	6	....	....	2, 600	16, 500	23, 000
Confectionery	9	19, 100	20	4	4	10, 356	31, 169	60, 603
Corsets	4	278, 500	80	761	98	226, 000	325, 500	640, 000
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	1	150, 000	100	76	55	65, 000	88, 000	175, 000
Cutlery and edge tools (see also Hardware; Tools)	5	245, 500	484	55	32	247, 800	207, 875	512, 600
Drugs and chemicals (see also Patent medicines and compounds)	3	110, 000	62	1	....	35, 000	167, 000	238, 000
Dyestuffs and extracts	1	200, 000	175	....	....	120, 000	636, 340	863, 400
Electroplating	2	143, 000	125	10	8	81, 500	78, 000	241, 000
Felt goods (see also Woolen goods)	2	405, 754	135	39	....	53, 535	313, 325	429, 496
Fertilizers	4	87, 000	23	....	....	5, 100	13, 000	51, 80

Table V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

CONNECTICUT—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year	Value of materials.	Value of products.
FAIRFIELD—continued.								
Fire-arms	1	$323, 834	148	2		$44, 400	$22, 304	$91, 052
Flouring- and grist-mill products	35	148, 880	41			13, 555	281, 129	340, 958
Food preparations (see page 39)	1	3, 000	7	4		7, 000	32, 000	75, 000
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	26	420, 451	613		28	280, 401	325, 757	706, 075
Furniture	11	174, 900	148	2	1	57, 460	90, 697	206, 531
Grease and tallow	3	11, 800	10			3, 276	42, 200	58, 000
Hardware (see also Cutlery and edge tools; Tools)	11	882, 150	612	24	21	278, 642	399, 434	937, 666
Hat and cap materials	10	262, 500	325	71	20	140, 809	501, 403	753, 551
Hats and caps, not including wool hats	31	839, 900	2, 298	849	34	1, 422, 851	1, 948, 120	4, 403, 993
Housefurnishing goods	3	40, 000	22	3		13, 886	50, 000	55, 000
Hosiery and knit goods (see also Cotton goods; Woolen goods)	1	110, 000	31	16	12	37, 000	67, 500	115, 200
Iron and steel	3	400, 000	71			41, 719	133, 902	214, 500
Iron bolts, nuts, washers, and rivets	3	353, 000	319	34	35	173, 072	427, 170	656, 585
Leather, tanned	5	17, 300	20			5, 470	34, 760	50, 300
Liquors, malt	6	121, 000	27			12, 798	72, 560	122, 943
Lumber, sawed	32	69, 550	62		1	16, 527	53, 418	93, 184
Marble and stone work	11	162, 500	97			45, 958	43, 147	124, 702
Mixed textiles (see also Cotton goods; Silk and silk goods, Woolen goods).	3	475, 000	153	110	30	127, 415	272, 421	547, 250
Models and patterns	2	5, 000	10			10, 000	4, 000	24, 500
Musical instruments, organs and materials	1	40, 000	100			62, 800	56, 714	156, 562
Needles and pins	1	40, 000	15	12	15	15, 560	36, 350	90, 000
Paper	6	146, 600	79	15	1	40, 200	182, 200	252, 300
Patent medicines and compounds (see also Drugs and chemicals)	3	61, 300	7	2		3, 786	8, 061	27, 884
Plated and britannia ware	2	75, 000	96	14	3	35, 815	78, 000	201, 000
Printing and publishing	12	116, 300	94			47, 603	45, 201	125, 344
Rubber and elastic goods	3	60, 100	33	15	8	18, 750	123, 750	176, 000
Saddlery and harness	19	44, 675	88	6	7	44, 052	83, 030	163, 350
Sash, doors, and blinds (see also Wood, turned and carved)	10	147, 400	157		5	63, 728	213, 550	333, 300
Sewing machines and attachments	2	5, 000, 000	1, 742	22	6	1, 000, 000	588, 300	2, 432, 000
Shipbuilding	26	29, 400	18			7, 965	14, 855	24, 120
Shirts	10	447, 950	72	806		236, 904	276, 705	576, 740
Silk and silk goods (see also Mixed textiles)	1	15, 000	15	20		17, 000	14, 600	40, 000
Slaughtering and meat-packing, not including retail butchering establishments.	2	10, 500	9			2, 500	76, 400	88, 380
Soap and candles	1	15, 000	4			1, 600	18, 000	22, 000
Springs, steel, car, and carriage	3	65, 250	175			95, 416	219, 838	351, 341
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	2	380, 000	281			168, 284	261, 298	528, 498
Stone- and earthen-ware	1	18, 000	30		2	10, 975	7, 000	20, 000
Straw goods	2	80, 000	89	121		37, 338	103, 387	194, 270
Tinware, copperware, and sheet-iron ware	16	42, 300	60			29, 150	48, 640	96, 180
Tobacco, cigars and cigarettes	18	41, 125	109	8	11	48, 455	69, 200	170, 865
Tools (see also Cutlery and edge tools; Hardware)	6	54, 500	85	1	1	42, 623	74, 014	140, 224
Toys and games	1	25, 000	10	5		6, 500	42, 037	75, 000
Upholstering materials	2	15, 800	17			15, 136	12, 300	41, 200
Varnish	1	100, 000	11			18, 000	75, 000	150, 000
Wirework	5	183, 000	47	1		37, 072	72, 000	130, 500
Wood, turned and carved (see also Sash, doors, and blinds)	6	51, 000	37	2	1	16, 851	15, 900	50, 446
Wool hats (see also Woolen goods)	3	625, 000	272	211	56	188, 292	532, 976	1, 003, 892
Woolen goods (see also Carpets, other than rag; Felt goods; Mixed textiles; Wool hats).	5	863, 000	335	181	57	202, 721	695, 500	1, 314, 458
HARTFORD:								
Agricultural implements	4	204, 000	96			30, 455	31, 846	105, 493
Bags, paper	1	70, 000	8	32	5	20, 394	100, 000	140, 000
Belting and hose, leather	2	410, 000	127	14		52, 700	640, 000	747, 000
Bookbinding and blank-book making	2	29, 000	20	20	1	16, 760	13, 619	39, 527
Boots and shoes	3	146, 000	165	30	5	38, 225	312, 950	455, 500
Boxes, fancy and paper	6	33, 100	18	65	2	32, 038	38, 910	92, 430
Boxes, wooden, packing	2	10, 500	12			3, 400	16, 500	20, 900
Brass castings	5	9, 900	11	4	2	7, 793	19, 800	33, 700
Brass ware	3	315, 000	243	112	21	153, 000	309, 650	502, 200
Bread and other bakery products	17	38, 800	64	5	8	37, 548	165, 974	253, 970
Brick and tile	27	145, 525	261		12	58, 695	39, 872	132, 840
Bridges	1	50, 000	40			12, 000	30, 000	65, 000
Brooms and brushes	6	17, 000	19	7	1	9, 880	23, 930	55, 565
Carpets, other than rag (see also Woolen goods)	1	3, 000, 000	668	663	256	526, 154	1, 371, 424	2, 356, 559
Carriages and wagons	29	108, 750	170			75, 204	79, 088	207, 176
Cheese and butter (factory)	5	17, 175	12	1		6, 090	48, 725	82, 180
Clocks	8	366, 400	539	67	4	193, 023	370, 912	736, 860
Clothing, men's	54	118, 986	306	103	40	159, 955	338, 034	671, 162
Coffee and spices, roasted and ground	3	65, 000	14	8		11, 000	153, 000	195, 000
Coffins, burial cases, and undertakers' goods	5	90, 200	44			25, 900	25, 500	94, 200
Corsets	1	2, 000	5	40	5	12, 000	20, 000	36, 700
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	6	503, 000	257	191	105	153, 625	272, 345	507, 881
Cutlery and edge tools (see also Hardware; Tools)	7	195, 400	382	23	30	186, 565	114, 742	575, 732
Dyestuffs and extracts	1	30, 000	10			6, 300	536, 900	555, 000
Electroplating	1	7, 200	7	1		2, 600	25, 200	30, 000
Envelopes	1	125, 000	40	80	8	58, 000	396, 000	496, 000
Explosives and fireworks	2	60, 000	32	35	8	33, 438	135, 000	217, 000
Fire-arms	1	1, 000, 000	617	8	25	393, 232	189, 070	641, 794
Flouring- and grist-mill products	42	289, 250	124			49, 184	910, 152	1, 059, 122
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	24	1, 361, 825	971	7	5	504, 578	443, 587	1, 221, 265

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

CONNECTICUT—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
HARTFORD—continued.								
Furniture (see also Mattresses and spring beds)	12	$100, 200	84	2	3	$46, 516	$64, 134	$142, 692
Furs, dressed	5	33, 000	12	63		13, 386	37, 474	66, 782
Gold and silver leaf and foil	2	38, 000	19	7		10, 500	83, 538	106, 445
Grease and tallow	2	3, 000	2			780	33, 020	40, 500
Gunpowder	1	625, 000	100			54, 319	296, 315	375, 625
Hardware (see also Cutlery and edge tools; Tools)	28	3, 803, 200	2, 820	351	278	1, 419, 298	1, 921, 451	4, 490, 542
Hardware, saddlery	3	104, 000	104	101	15	104, 600	226, 500	510, 000
Hooks and eyes	1	50, 000	10	10	2	9, 300	30, 400	44, 800
Hosiery and knit goods (see also Cotton goods; Woolen goods)	8	1, 511, 431	410	940	221	459, 041	575, 707	1, 665, 761
Iron and steel	4	600, 000	167		19	84, 758	300, 670	489, 880
Iron bolts, nuts, washers, and rivets	7	586, 550	275	9	31	154, 370	332, 905	668, 546
Iron forgings	3	138, 000	68		15	41, 500	60, 500	137, 800
Jewelry	1	65, 000	25		1	21, 554	27, 530	67, 080
Lamps and reflectors	2	36, 000	53	1		22, 000	31, 500	60, 800
Liquors, malt	5	185, 000	37			18, 186	105, 454	177, 424
Lithographing (see also Printing and publishing)	2	115, 000	36	2	3	16, 828	28, 526	66, 835
Looking-glass and picture frames	5	27, 500	17	1		10, 725	25, 200	41, 000
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	2	42, 500	40			17, 560	65, 970	92, 400
Lumber, sawed	45	80, 050	88		1	18, 287	76, 548	125, 909
Marble and stone work	10	276, 200	71		2	45, 900	29, 587	99, 942
Mattresses and spring beds (see also Furniture)	5	126, 000	46		3	22, 204	104, 800	188, 000
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	8	489, 734	204	171	45	142, 962	384, 388	765, 555
Needles and pins	3	14, 500	28	2	4	13, 240	10, 547	29, 800
Paper (see also Envelopes)	32	1, 976, 831	652	339	44	381, 519	1, 547, 261	2, 512, 102
Patent medicines and compounds	2	17, 500	2	5		1, 976	29, 100	43, 000
Plated and britannia ware	3	63, 500	93	10	2	33, 591	150, 500	237, 175
Printing and publishing (see also Lithographing)	19	955, 200	284	78	17	204, 759	181, 456	536, 450
Roofing and roofing materials	3	11, 100	40			19, 292	83, 521	112, 500
Saddlery and harness	20	59, 275	136	35	8	79, 045	217, 510	344, 569
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	5	82, 300	44		3	20, 992	48, 800	84, 950
Screws	1	125, 000	80		2	41, 500	45, 000	125, 000
Sewing machines and attachments	2	603, 000	223	5		118, 000	164, 659	337, 741
Shipbuilding	2	82, 000	20			8, 100	13, 200	32, 600
Shirts	6	28, 750	11	97		26, 500	43, 854	96, 020
Silk and silk goods (see also Mixed textiles)	3	3, 215, 000	516	896	256	638, 760	1, 330, 204	2, 709, 590
Soap and candles	3	35, 500	17	6		9, 320	60, 525	97, 000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	30, 000	10			4, 284	39, 375	49, 978
Stone- and earthen-ware	3	51, 500	48		4	26, 500	7, 800	66, 500
Tinware, copperware, and sheet-iron ware	27	106, 750	119	1	1	61, 851	154, 985	273, 630
Tobacco, cigars and cigarettes	52	88, 150	143	27	4	84, 537	122, 235	302, 685
Tools (see also Cutlery and edge tools; Hardware)	3	660, 000	434	8	38	243, 849	352, 546	846, 786
Umbrellas and canes	1	20, 000	9	1		5, 000	30, 000	40, 000
Watch and clock materials	9	65, 050	85	4	4	42, 120	94, 642	161, 926
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	11	37, 500	73	1	4	32, 842	34, 430	98, 350
Woolen goods (see also Carpets, other than rag; Mixed textiles; Worsted goods).	9	973, 812	362	163	56	233, 526	665, 576	1, 196, 189
Worsted goods (see also Woolen goods)	1	152, 000	117	96	52	76, 896	486, 500	544, 227
LITCHFIELD:								
Agricultural implements	8	154, 000	132			74, 050	68, 007	192, 035
Brass and copper, rolled	2	535, 000	304			170, 000	845, 678	1, 192, 000
Brick and tile	5	36, 100	53			11, 710	5, 775	23, 700
Buttons	2	65, 000	60	70	3	50, 000	65, 000	140, 000
Carriages and wagons	11	43, 900	63	2	3	30, 206	36, 300	83, 636
Charcoal	15	2, 805	32		2	6, 940	7, 685	23, 005
Cheese and butter (factory)	9	10, 100	11	3		2, 890	13, 920	22, 518
Clocks	2	600, 000	750	133	97	441, 000	407, 874	938, 985
Coffins, burial cases, and undertakers' goods	2	65, 000	27	20	3	26, 300	75, 400	176, 000
Cotton goods (see also Mixed textiles)	4	575, 000	316	255	239	175, 482	529, 880	1, 032, 665
Cutlery and edge tools (see also Hardware; Tools)	14	291, 500	488	28	22	271, 444	202, 550	637, 500
Flouring- and grist-mill products	39	153, 250	43			12, 475	272, 201	317, 461
Foundery and machine-shop products	7	160, 800	170		9	86, 784	221, 099	359, 155
Furniture	5	17, 500	36	1	1	16, 100	17, 300	40, 100
Hardware (see also Cutlery and edge tools; Tools)	8	454, 639	311	39	45	151, 727	418, 995	625, 291
Hooks and eyes	1	100, 000	78	22	16	47, 783	49, 500	148, 000
Iron and steel	8	1, 297, 000	139			65, 974	471, 467	644, 911
Iron bolts, nuts, washers, and rivets	1	30, 000	50	8	6	25, 000	30, 000	60, 000
Iron forgings	3	44, 000	32			13, 100	43, 700	62, 500
Ivory and bone work	1	7, 000	8			6, 000	7, 000	30, 000
Leather, dressed skins	2	60, 000	48			27, 750	298, 200	358, 000
Leather, tanned	3	16, 500	9			3, 250	47, 395	58, 250
Lime	3	43, 000	44			14, 250	41, 650	63, 900
Lumber, sawed	62	119, 950	103			25, 551	104, 902	182, 112
Marble and stone work	9	9, 600	16			7, 925	7, 204	22, 486
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	1	60, 000	32	8	3	15, 000	76, 071	102, 378
Needles and pins	2	175, 000	90	60	16	64, 960	76, 200	255, 000
Paper	4	39, 000	21	3		10, 800	48, 880	84, 880
Rules, ivory and wood	1	50, 000	40		3	16, 000	10, 500	50, 000
Saddlery and harness	9	7, 500	15			5, 775	9, 750	21, 536

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

CONNECTICUT—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
LITCHFIELD—continued.								
Sash, doors, and blinds	5	$10,000	13	......	......	$3,800	$16,575	$30,000
Silk and silk goods (see also Mixed textiles)	3	142,000	30	117	46	49,920	204,815	256,300
Tinware, copperware, and sheet-iron ware	14	47,600	32	8	......	16,296	33,366	68,390
Tools (see also Cutlery and edge tools; Hardware)	1	16,000	29	......	......	13,200	27,200	45,600
Umbrellas and canes	1	20,000	40	......	5	21,320	22,000	51,000
Woolen goods (see also Mixed textiles)	4	257,500	99	29	16	51,000	194,271	293,378
MIDDLESEX:								
Agricultural implements	2	265,000	200	2	10	73,000	160,000	270,000
Bells	6	115,870	137	14	9	55,515	91,765	251,024
Boxes, fancy and paper	5	11,500	6	36	7	10,666	23,200	43,185
Bread and other bakery products	3	5,800	12	4	1	8,420	16,600	29,760
Brick and tile	3	28,000	31	2	1	9,900	6,400	21,704
Brooms and brushes	3	13,500	12	2	......	5,050	20,900	[illegible]
Carriages and wagons	3	17,300	21	......	......	13,250	12,100	29,400
Coffins, burial cases, and undertakers' goods	6	66,617	61	22	......	21,899	42,027	85,939
Cotton goods	12	814,000	448	375	133	235,594	651,867	1,210,067
Cutlery and edge tools (see also Hardware)	12	230,000	323	9	3	148,730	79,365	327,532
Flouring- and grist-mill products	19	109,369	32	......	......	10,604	312,527	351,756
Foundery and machine-shop products	7	717,600	286	......	14	173,226	332,100	573,600
Glass	1	130,000	130	2	28	65,600	70,000	160,000
Hardware (see also Cutlery and edge tools)	13	481,200	320	44	60	149,423	187,241	462,525
Hardware, saddlery	1	25,000	48	2	......	12,000	31,000	60,000
Ivory and bone work	7	296,300	209	32	6	102,370	314,895	465,300
Lumber, sawed	24	64,400	62	......	1	13,125	34,505	62,868
Musical instruments and materials (not specified)	1	250,000	105	15	......	62,500	160,000	240,000
Nets and seines	2	55,000	30	36	......	26,112	60,365	115,865
Paints	1	5,000	7	1	......	2,500	10,000	20,000
Paper	2	22,000	17	3	1	6,075	24,881	38,420
Plated and britannia ware	3	229,725	216	6	3	114,050	108,550	371,708
Printing and publishing	3	21,500	10	5	2	8,500	5,700	23,437
Rubber and elastic goods	2	168,000	16	18	4	11,000	70,000	99,000
Saddlery and harness	6	12,000	12	1	1	7,730	9,900	23,860
Sewing machines and attachments	1	887,650	90	......	......	40,000	50,000	200,000
Shipbuilding	7	58,900	133	......	......	77,768	55,239	147,127
Silk and silk goods	1	150,000	10	90	16	25,000	108,500	143,000
Soap and candles	1	25,000	11	......	1	4,160	26,500	38,516
Stamped ware (see also Tinware, copperware, and sheet-iron ware)	1	100,000	75	30	80	55,000	200,000	300,000
Tinware, copperware, and sheet-iron ware (see also Stamped ware)	7	14,950	36	......	......	12,941	17,341	55,722
Washing-machines and clothes-wringers	1	200,000	60	5	......	40,000	100,000	250,000
Wirework	2	31,400	16	12	......	12,700	10,900	32,000
NEW HAVEN:								
Agricultural implements	4	265,000	110	......	1	37,509	46,316	123,199
Ammunition	1	400,000	160	200	......	87,038	325,000	600,000
Bags, paper	1	20,000	7	40	......	12,000	40,000	65,000
Belting and hose, leather	1	15,000	10	......	......	4,500	20,000	29,000
Bookbinding and blank-book making	6	68,500	85	19	3	42,899	64,713	140,875
Boots and shoes	4	62,500	148	62	4	108,800	198,352	352,000
Boots and shoes, rubber	2	600,000	745	815	81	496,574	1,995,501	2,975,997
Boxes, fancy and paper	11	100,500	105	414	15	138,925	219,856	457,524
Boxes, wooden, packing	4	22,900	35	......	......	14,077	42,300	64,966
Brass and copper, rolled	12	5,934,000	2,843	638	223	1,879,762	6,009,230	9,458,755
Brass castings	8	306,000	454	138	10	272,277	536,000	1,007,500
Brass ware	6	163,782	256	189	108	195,082	374,451	621,584
Bread and other bakery products	36	145,750	298	38	16	171,626	520,152	762,202
Brick and tile (see also Drain and sewer pipe)	8	98,225	136	7	5	43,421	27,850	96,150
Brooms and brushes	4	7,700	11	2	......	4,800	12,500	23,300
Buttons	13	370,000	329	507	104	282,249	370,721	828,044
Carriage and wagon materials	25	546,699	381	28	20	216,816	266,672	686,175
Carriages and wagons	37	954,700	1,052	12	7	600,821	801,729	1,821,266
Clock cases and materials	2	6,000	44	2	......	15,000	19,000	50,500
Clocks	5	850,000	705	101	180	472,050	607,575	1,340,872
Clothing, men's	45	464,166	400	350	......	291,375	584,058	1,123,280
Clothing, women's	10	2,500	25	15	......	6,960	42,240	54,960
Coffee and spices, roasted and ground	4	55,000	22	4	2	15,100	127,000	161,000
Confectionery	13	37,450	43	25	9	23,157	105,853	188,450
Cooperage	2	10,600	22	......	......	9,533	13,951	27,000
Corsets	17	626,400	309	3,043	33	589,400	1,603,659	2,646,359
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	3	130,000	50	84	17	44,861	106,000	198,500
Cutlery and edge tools (see also Hardware; Tools)	16	647,600	685	56	39	377,474	302,615	851,744
Drain and sewer pipe (see also Brick and tile)	3	47,063	22	......	......	8,500	13,000	26,500
Drugs and chemicals (see also Patent medicines and compounds)	2	102,000	42	......	......	15,300	40,400	87,150
Electrical apparatus and supplies	2	230,000	28	......	......	18,500	40,000	100,000
Fancy articles	5	22,600	22	9	2	14,509	33,300	64,500
Fertilizers	2	30,000	30	1	......	18,500	67,000	95,000
Fire-arms	4	1,900,000	939	75	15	621,700	454,900	1,314,000
Flouring- and grist-mill products	17	122,850	30	......	......	10,454	131,212	136,765
Food preparations (see page 39)	1	25,000	4	5	......	5,000	35,000	60,000
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	40	1,002,250	1,344	36	24	722,623	932,520	2,042,068
Fruits and vegetables, canned and preserved	1	30,000	15	40	5	4,000	30,000	35,000
Furniture (see also Mattresses and spring beds)	17	201,845	190	9	7	84,859	127,858	263,645
Gas and lamp fixtures	2	620,000	745	150	20	407,500	450,000	1,000,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

CONNECTICUT—Continued.

Counties and industries.	No. of establishments.	Capital	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
NEW HAVEN—continued.								
Grease and tallow	1	$5, 000	4			$2, 000	$23, 500	$26, 000
Hardware (see also Cutlery and edge tools; Tools)	30	2, 053, 933	2, 746	190	119	1, 473, 2 8	1, 409, 309	3, 650, 157
Hooks and eyes	1	20, 000	11			4, 500	50, 000	59, 000
Hosiery and knit goods (see also Cotton goods; Woolen goods)	3	275, 000	156	183	108	153, 752	294, 417	537, 510
Iron and steel	2	285, 000	196			95, 190	315, 508	471, 370
Iron bolts, nuts, washers, and rivets	6	255, 800	162	22	10	74, 571	145, 975	277, 000
Iron forgings	4	250, 000	148			78, 389	174, 025	295, 320
Iron nails and spikes, cut and wrought	1	60, 000	30	14		30, 000	80, 000	120, 000
Kaolin and ground earths	1	20, 000	21	1		10, 000	120, 000	150, 000
Lamps and reflectors	2	12, 000	22		2	10, 800	12, 300	32, 000
Leather, curried	1	15, 000	7			2, 800	32, 880	40, 000
Liquors, malt	7	153, 600	49			24, 189	135, 919	230, 371
Lithographing (see also Printing and publishing)	1	35, 000	17		8	10, 500	15, 000	33, 000
Lumber, sawed	25	122, 300	129		2	43, 002	127, 655	212, 020
Marble and stone work	14	39, 300	79			31, 703	34, 675	84, 789
Matches	5	152, 000	77	85		51, 817	354, 454	465, 692
Mattresses and spring beds (see also Furniture)	2	8, 000	11		1	4, 200	12, 500	31, 000
Millinery and lace goods	2	20, 000	17	45		17, 500	58, 000	90, 000
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods)	3	310, 000	159	137	38	110, 000	355, 210	645, 000
Models and patterns	5	3, 750	21			13, 515	5, 010	28, 200
Musical instruments organs and materials	4	193, 000	309	2	1	130, 437	233, 912	424, 875
Musical instruments, pianos and materials	2	255, 000	290	12		142, 057	181, 918	385, 783
Needles and pins	7	407, 000	119	120	11	90, 143	266, 488	430, 185
Oil, neat's-foot	1	5, 500	5			3, 200	18, 000	30, 000
Oleomargarine	1	2, 000	30			7, 931	125, 000	150, 000
Paints	2	22, 000	7			5, 750	41, 275	68, 740
Paper	8	225, 500	84	16	2	36, 800	143, 206	287, 823
Patent medicines and compounds (see also Drugs and chemicals)	4	80, 800	15	4		7, 320	82, 650	120, 800
Photographic apparatus	1	40, 000	50	6		19, 572	26, 128	50, 000
Plated and britannia ware	14	3, 205, 000	1, 899	489	72	1, 452, 641	2, 541, 742	5 270, 193
Printing and publishing (see also Lithographing)	23	277, 400	206	20	9	146, 067	85, 838	329, 425
Rubber and elastic goods	5	406, 500	245	229	15	188, 695	504, 911	905, 761
Saddlery and harness	25	39, 310	69	1	1	31, 777	48, 403	112, 993
Sash, doors, and blinds (see also Wood, turned and carved)	7	310, 000	246			109, 573	258, 367	402, 901
Screws	2	130, 000	16	15	6	15, 000	41, 500	84, 200
Shipbuilding	30	44, 350	98			48, 171	104, 930	165, 326
Shirts	2	39, 000	6	79		12, 650	10, 118	26, 845
Silk and silk goods (see also Mixed textiles)	3	38, 500	13	31	16	9, 915	36, 192	60, 200
Slaughtering and meat-packing, not including retail butchering establishments.	7	262, 000	390		5	192, 959	3, 954, 851	4, 399, 060
Soap and candles	6	22, 000	19	1		7, 298	54, 224	73, 945
Sporting goods	5	225, 500	43	29		26, 950	41, 260	103, 500
Springs, steel, car, and carriage	4	173, 000	114			65, 500	116, 360	255, 600
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	4	122, 500	53			27, 824	89, 678	148, 946
Straw goods	1	150, 000	150	250		100, 000	100, 000	225, 000
Tinware, copperware, and sheet-iron ware	21	85, 940	91	22	1	43, 146	70, 785	137, 653
Tobacco, cigars and cigarettes	28	98, 750	112	18	7	66, 261	98, 117	231, 001
Tools (see also Cutlery and edge tools; Hardware)	12	445, 000	374	5	8	195, 888	214, 700	583, 085
Toys and games	6	42, 400	55	23	14	23, 230	22, 050	59, 200
Umbrellas and canes	1	10, 000	8	5	1	6, 500	16, 000	24, 000
Window blinds and shades	4	54, 365	26	5	3	12, 035	47, 254	74, 031
Wire	3	222, 000	241	88		136, 664	280, 906	553, 981
Wirework	2	51, 000	154	20	17	51, 800	72, 000	154, 000
Wood, turned and carved (see also Sash, doors, and blinds)	7	16, 300	12	2		5, 929	9, 814	20, 902
Woolen goods (see also Mixed textiles)	5	465, 000	195	158	32	125, 500	500, 875	843, 500
NEW LONDON:								
Belting and hose, leather	1	30, 000	16	1		10, 000	60, 000	75, 000
Boots and shoes, rubber	1	400, 000	315	150	6	175, 000	532, 000	1, 200, 000
Brass castings	1	10, 000	8			5, 000	10, 000	20, 900
Bread and other bakery products	13	99, 100	63	8	9	35, 833	169, 221	287, 570
Carriages and wagons	11	55, 700	57		2	24, 520	41, 000	89, 800
Clothing, men's	7	24, 350	21	29	1	21, 645	37, 798	73, 564
Confectionery	2	8, 500	9	1		4, 852	20, 500	27, 190
Cotton goods (see also Mixed textiles)	17	6, 145, 200	1, 935	1, 768	914	1, 172, 405	2, 523, 031	5, 117, 020
Dyeing and finishing textiles	1	200, 000	230	34	26	118, 270	360, 490	456, 000
Dyestuffs and extracts	1	75, 000	45			18, 000	120, 000	140, 000
Electroplating	2	32, 000	28	5	2	12, 000	12, 500	43, 000
Engraving, wood	1	42, 000	28	9		21, 669	3, 500	32, 374
Fertilizers	2	210, 000	110			51, 487	210, 090	275, 000
Fire-arms	5	254, 000	492		62	248, 535	86, 612	420, 552
Flouring- and grist-mill products	34	146, 200	40			9, 490	250, 728	292, 325
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	26	1, 020, 100	1, 006	2	33	442, 528	396, 252	1, 113, 391
Fruits and vegetables, canned and preserved	1	25, 000	10	15	10	5, 590	22, 700	37, 400
Furniture	5	8, 600	24			12, 800	7, 850	26, 500
Grease and tallow	1	2, 000	4			2, 500	25, 000	32, 000
Hardware	2	175, 000	258			95, 606	70, 179	198, 112
Iron and steel	2	100, 000	90		3	43, 513	119, 678	178, 037
Kaolin and ground earths	2	39, 000	30			10, 550	6, 500	25, 000
Leather, dressed skins	2	15, 000	16		3	7, 500	87, 000	102, 000
Lumber, sawed	29	44, 000	44			14, 595	47, 373	83, 935
Marble and stone work	11	16, 650	40			22, 268	10, 200	50, 526

Table V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

CONNECTICUT—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
New London—continued.								
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	13	$929,500	541	234	49	$268,112	$926,093	$1,656,779
Paper	10	690,000	283	100	3	165,700	729,550	1,035,225
Printing and publishing	5	36,300	46	4	3	29,850	9,225	53,300
Rubber and elastic goods	1	40,000	29		5	12,000	500,000	520,000
Saddlery and harness	9	8,700	12			5,974	13,900	29,900
Sash, doors, and blinds	4	19,500	29			11,800	18,000	36,500
Shipbuilding	29	119,650	231			114,845	242,201	398,487
Silk and silk goods (see also Mixed textiles)	2	16,000	5	42	18	8,500	104,550	146,250
Slaughtering and meat-packing, not including retail butchering establishments.	3	31,500	19			11,500	157,900	182,100
Soap and candles	7	41,000	22	7	3	11,369	47,766	71,649
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	9,000	8			1,100	20,000	30,000
Tinware, copperware, and sheet-iron ware	20	60,600	66			35,353	78,851	142,287
Tobacco, cigars and cigarettes	15	24,950	28		1	12,325	26,664	56,550
Woolen goods (see also Mixed textiles; Worsted goods)	21	1,813,500	950	433	125	496,915	2,164,727	3,256,570
Worsted goods (see also Woolen goods)	1	20,000	7	10		8,000	32,500	45,000
Tolland:								
Ammunition	1	24,000	18	13		13,000	45,000	75,000
Belting and hose, leather	1	3,500	15			10,000	50,000	75,000
Boxes, fancy and paper	2	9,000	4	31		8,183	8,000	20,000
Clothing, men's	4	4,500	12	7		8,430	15,900	32,825
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	11	859,000	363	326	127	195,535	575,501	937,389
Envelopes	1	200,000	25	75		30,000	289,000	325,000
Flouring- and grist-mill products	13	39,500	13			3,110	79,525	103,258
Foundery and machine-shop products	5	18,000	38	2		12,000	10,300	32,442
Hosiery and knit goods (see also Cotton goods; Woolen goods)	2	70,000	62	48	24	14,500	76,325	113,800
Lumber, sawed	36	82,550	113		2	26,175	77,324	134,630
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	14	864,000	595	266	99	300,359	1,086,963	2,060,043
Paper (see also Envelopes)	1	35,000	12			6,000	22,700	34,500
Shoddy (see also Mixed textiles)	6	82,500	86	38	8	33,645	257,000	338,100
Silk and silk goods (see also Mixed textiles)	9	560,000	127	524	198	168,360	928,750	1,627,145
Tinware, copperware, and sheet-iron ware	3	4,500	8			4,650	24,550	34,000
Woolen goods (see also Mixed textiles; Worsted goods)	23	2,569,140	1,614	635	256	845,288	3,793,345	6,686,434
Worsted goods (see also Woolen goods)	1	60,000	143	50	15	87,360	739,655	1,008,000
Windham:								
Agricultural implements	2	4,000	13			3,300	10,525	27,600
Boots and shoes	7	56,000	187	47	4	88,108	187,400	322,060
Bread and other bakery products	4	9,950	6	1		2,150	12,860	24,200
Carriages and wagons	8	41,100	48			17,450	21,150	51,028
Clothing, men's	5	41,500	27	38		18,567	46,900	99,000
Cotton goods (see also Mixed textiles)	43	11,928,000	2,894	2,544	1,366	1,707,515	4,010,398	7,871,604
Flouring- and grist-mill products	35	83,525	38			8,850	303,434	352,489
Foundery and machine-shop products	11	177,800	192		1	91,282	151,287	291,633
Lumber, sawed	47	74,500	98		1	21,074	119,844	181,797
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	1	75,000	37	26	11	25,000	44,100	142,500
Paper	2	34,000	25	2		8,906	62,638	92,300
Sash, doors, and blinds (see also Wood, turned and carved)	2	6,500	42			12,700	20,100	36,800
Silk and silk goods (see also Mixed textiles)	6	300,000	69	270	103	109,075	583,595	798,515
Wood, turned and carved (see also Sash, doors, and blinds)	4	15,300	53		8	21,200	22,030	49,200
Woolen goods (see also Mixed textiles)	11	965,500	764	350	146	387,985	2,162,693	3,296,755

DAKOTA TERRITORY.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Burleigh:								
Flouring- and grist-mill products	1	$40,000	10			$3,000	$34,250	$40,340
Cass:								
Saddlery and harness	3	11,100	12			7,000	23,000	40,000
Tinware, copperware, and sheet-iron ware	3	6,800	7			4,200	11,000	20,500
Clay:								
Flouring- and grist-mill products	4	22,000	9			2,800	92,025	108,785
Lawrence:								
Brick and tile	3	7,800	24			17,700	5,075	29,500
Flouring- and grist-mill products	1	12,000	2			1,700	20,900	29,600
Jewelry	4	17,000	15			17,300	13,200	40,500
Lumber, planed	1	10,000	10			9,000	7,000	20,000
Lumber, sawed	21	74,850	180		1	42,894	215,095	331,922
Minnehaha:								
Flouring- and grist-mill products	5	84,000	13			3,940	203,391	229,694
Union:								
Flouring- and grist-mill products	3	41,000	12			7,200	197,700	251,213
Lumber, sawed	4	11,800	35			2,500	23,500	33,550
Yankton:								
Flouring- and grist-mill products	3	26,200	17			11,430	146,800	195,911
Liquors, malt	3	25,500	8			3,466	12,911	23,055
Saddlery and harness	5	9,300	9			4,500	19,500	31,600
Tinware, copperware, and sheet-iron ware	4	17,900	10			5,500	16,500	30,600

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

DELAWARE.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
KENT:								
Agricultural implements	4	$22,700	25	....	....	$10,700	$10,100	$28,530
Baskets, rattan and willow ware	4	10,225	56	....	....	6,050	15,800	31,925
Fertilizers	10	89,700	96	....	....	22,777	170,600	234,950
Flouring- and grist-mill products	26	177,250	48	....	1	9,920	256,210	289,828
Foundery and machine-shop products	1	20,000	10	....	....	4,000	4,000	24,000
Fruits and vegetables, canned and preserved	20	352,579	324	469	147	83,021	401.683	536,040
Lumber, sawed	18	73,200	121	....	10	12,432	68,955	114,600
Mixed textiles (see also Woolen goods)	1	8,000	23	7	2	10,000	20,000	44,000
Woolen goods (see also Mixed textiles)	1	8,000	23	7	2	10,000	20,000	44,000
NEW CASTLE:								
Agricultural implements	7	43,500	40	....	....	9,774	9,395	28,571
Belting and hose, leather	1	30,000	10	....	....	3,500	38,000	44,570
Bread and other bakery products	15	110,000	45	12	15	25,330	97,855	159,000
Brick and tile	6	94,000	183	....	74	47,816	26,373	101,400
Carriage and wagon materials	8	121,000	101	....	8	46,250	55,760	140,000
Carriages and wagons	13	418,270	381	1	12	130,556	265,098	485,067
Cars, railroad, street, and repairs	2	589,100	760	....	100	319,915	775,900	1,185,688
Coffins, burial cases, and undertakers' goods	7	19,000	10	....	....	5,250	10,750	24,600
Clothing, men's	6	70,500	52	30	1	25,100	44,600	86,600
Confectionery	3	49,000	16	2	....	5,600	18,000	35,000
Cotton goods	10	929,570	303	419	223	232,727	632,205	1,057,257
Fertilizers	4	527,000	119	....	....	55,500	226,000	294,000
Flouring- and grist-mill products	35	516,865	133	....	....	55,797	785,848	898,788
Foundery and machine-shop products	14	765,600	738	....	49	261,868	325,372	677,225
Fruits and vegetables, canned and preserved	1	18,000	25	50	7	3,000	10,000	20,000
Furniture	4	38,200	22	2	1	9,000	8,700	32,800
Grease and tallow	1	15,000	4	....	....	3,000	98,000	124,000
Gunpowder	1	1,000,000	248	2	....	115,778	127,586	243,365
Iron and steel	9	1,431,469	818	....	49	344,476	1,214,050	2,347,177
Iron bolts, nuts, washers, and rivets	1	10,000	20	....	2	6,550	28,044	37,100
Iron forgings	3	51,000	53	....	....	16,590	57,043	83,782
Iron pipe, wrought	1	925,000	618	....	....	245,278	1,491,476	2,000,000
Jute and jute goods	1	25,000	8	20	18	9,358	31,306	46,422
Leather, curried	1	12,000	9	....	....	3,581	50,800	57,800
Leather, dressed skins	16	926,500	848	61	73	388,064	1,350,860	1,886,597
Liquors, malt	2	95,000	15	....	....	7,370	38,959	66,998
Lumber, planed	2	30,000	26	....	3	7,000	49,500	65,000
Lumber, sawed	9	19,200	22	....	....	2,160	14,766	15,095
Marble and stone work	3	27,500	23	....	....	8,400	10,000	22,400
Matches	1	250,000	200	....	....	44,000	446,727	550,000
Mats and matting	1	5,000	3	....	....	2,000	17,000	26,000
Paints	1	60,000	10	....	1	5,200	20,000	30,000
Paper	4	2,508,000	179	67	6	112,666	582,154	737,905
Roofing and roofing materials	3	10,500	16	....	....	8,344	11,500	29,500
Rubber, vulcanized	1	150,000	15	....	3	5,000	40,000	66,662
Saddlery and harness	11	24,700	32	....	1	13,400	29,800	60,500
Saws	1	60,000	5	....	15	6,000	10,000	23,000
Shipbuilding	8	905,500	1,454	....	....	850,248	836,608	1,974,203
Slaughtering and meat-packing, not including retail butchering establishments.	2	160,000	26	....	....	11,200	179,368	198,000
Soap and candles	3	14,800	12	....	1	5,180	13,400	22,070
Sporting goods	1	10,000	10	5	2	5,000	15,000	25,000
Springs, steel, car, and carriage	2	15,000	36	....	2	11,600	45,500	65,500
Tinware, copperware, and sheet-iron ware	15	112,600	62	....	9	31,608	82,963	160,527
Tobacco, cigars and cigarettes	23	32,300	50	13	14	24,420	34,840	78,453
Tools	1	160,000	100	....	....	52,000	65,000	130,000
Woolen goods	3	342,559	148	52	29	98,504	425,085	617,253
SUSSEX:								
Baskets, rattan and willow ware	3	50,000	48	29	18	20,000	26,700	77,300
Fertilizers	3	136,300	55	....	....	13,281	45,716	128,300
Flouring- and grist-mill products	20	66,900	38	....	....	6,514	123,045	152,410
Fruits and vegetables, canned and preserved	12	25,800	79	124	34	13,600	41,820	78,900
Lumber, sawed	59	166,850	235	....	3	26,102	159,654	271,365
Shipbuilding	9	28,700	111	....	....	46,074	120,667	176,300

DISTRICT OF COLUMBIA.

(See city of Washington, Table VI.)

FLORIDA.

ALACHUA:								
Flouring- and grist-mill products	13	$19,750	14	....	....	$1,050	$25,746	$28,009
Lumber, sawed	5	37,500	31	....	....	6,210	18,500	29,525
Tar and turpentine, not including farm products	1	12,000	26	....	....	10,500	12,000	36,000
COLUMBIA:								
Flouring- and grist-mill products	7	14,600	8	1	....	1,553	38,474	41,320
Lumber, sawed	7	39,800	54	....	12	10,987	53,595	90,118
DUVAL:								
Bread and other bakery products	2	2,000	7	....	....	3,420	13,900	20,780
Lumber, sawed	7	257,500	258	....	....	47,412	184,187	279,300
Tobacco, cigars and cigarettes	7	32,350	118	8	....	71,650	27,200	116,820

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

FLORIDA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ESCAMBIA:								
Lumber, sawed	10	$733,000	422	....	....	$170,400	$502,900	$843,900
LEVY:								
Lumber, sawed	6	91,000	102	....	15	38,500	67,990	147,500
MADISON:								
Flouring- and grist-mill products	7	42,500	19	....	....	4,558	54,405	64,710
Lumber, sawed	4	305,150	215	....	....	63,100	140,780	270,600
MONROE (Key West city):								
Shipbuilding	19	23,900	23	....	....	16,450	21,600	43,850
Tobacco, cigars and cigarettes	44	429,400	1,377	489	261	337,966	527,907	1,230,735
NASSAU:								
Lumber, sawed	8	132,000	217	....	6	54,300	237,631	337,839
Tar and turpentine, not including farm products	4	19,500	97	....	....	21,100	15,000	59,509
SANTA ROSA:								
Lumber, sawed	8	374,500	256	....	10	95,600	331,825	482,500
Sash, doors, and blinds	1	25,000	12	....	8	5,000	30,000	40,000
SUWANNEE:								
Lumber, sawed	5	16,000	21	....	3	4,600	22,525	41,500
Tar and turpentine, not including farm products	3	77,000	370	50	....	92,000	75,000	186,000
WASHINGTON:								
Lumber, sawed	4	25,000	51	....	....	15,000	58,800	110,600

GEORGIA.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
APPLING:								
Lumber, sawed	6	$91,500	88	....	....	$16,750	$53,800	$93,150
Tar and turpentine, not including farm products	9	63,600	161	....	....	28,632	19,600	116,200
BALDWIN:								
Flouring- and grist-mill products	6	33,500	17	....	....	3,042	75,270	78,998
BARTOW:								
Carriages and wagons	2	19,000	22	....	....	7,100	12,000	30,000
Cotton goods	1	46,000	15	25	20	9,000	40,000	63,152
Flouring- and grist-mill products	21	106,550	32	....	....	6,871	205,876	234,963
Iron and steel	6	197,100	135	....	....	11,585	30,860	68,040
BERRIEN:								
Lumber, sawed	2	41,500	18	....	....	5,144	30,100	42,000
Tar and turpentine, not including farm products	6	31,700	137	....	....	25,500	51,100	100,000
BIBB:								
Brick and tile	4	14,500	138	....	8	23,750	12,150	47,500
Carriages and wagons	1	10,000	25	....	....	9,600	9,600	22,080
Confectionery	2	12,000	16	....	....	5,300	25,200	34,000
Cotton goods	1	225,000	123	159	84	56,215	402,400	620,855
Drugs and chemicals	1	10,000	100	25	....	37,000	50,000	125,000
Flouring- and grist-mill products	3	26,700	15	....	....	4,655	165,340	183,569
Foundery and machine-shop products	5	97,000	103	....	1	38,690	74,456	202,500
Printing and publishing	3	122,500	64	9	14	43,300	42,000	130,000
Saddlery and harness	2	34,000	29	10	9	14,600	52,000	80,290
Sash, doors, and blinds	4	37,000	112	....	15	28,190	43,500	150,000
Tinware, copperware, and sheet-iron ware	6	14,800	16	....	....	6,212	15,400	33,394
Tobacco, cigars and cigarettes	3	8,800	17	....	2	17,610	20,300	40,912
BROOKS:								
Cotton goods	1	18,000	13	10	20	1,898	12,204	20,000
Flouring- and grist-mill products	9	10,150	3	....	....	255	50,620	52,240
BRYAN:								
Tar and turpentine, not including farm products	4	35,000	289	....	....	40,500	53,557	118,300
CAMDEN:								
Lumber, sawed	5	216,000	51	....	7	21,352	206,600	318,333
Tar and turpentine, not including farm products	1	12,000	24	....	6	8,000	20,000	30,000
CAMPBELL:								
Flouring- and grist-mill products	13	40,500	16	....	....	2,430	139,335	154,382
Lumber, sawed	10	14,650	52	....	2	3,320	15,390	28,820
CARROLL:								
Flouring- and grist-mill products	24	48,700	31	....	....	3,450	82,354	91,731
Lumber, sawed	20	38,475	101	....	1	8,600	38,594	63,235
CATOOSA:								
Flouring- and grist-mill products	4	25,500	11	....	....	2,627	122,995	140,299
Lumber, sawed	5	62,000	19	....	....	2,122	17,206	27,169
CHATHAM:								
Bread and other bakery products	15	71,250	103	....	15	30,342	208,240	272,124
Brick and tile	3	59,500	62	1	2	13,900	11,587	33,900
Carriages and wagons	3	6,300	17	....	....	7,417	7,000	20,535
Cooperage	2	3,000	17	....	....	6,950	38,400	49,372
Cotton goods	1	150,000	46	18	12	40,000	109,000	200,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

GEORGIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
CHATHAM—continued.								
Flouring- and grist-mill products	5	$121,000	57		6	$25,096	$338,225	$405,520
Foundery and machine-shop products	7	64,000	84	3	6	50,197	68,683	176,954
Lumber, sawed	5	73,000	111		12	21,904	124,590	171,292
Printing and publishing	4	104,800	109	2	14	66,603	52,600	140,500
Rice cleaning and polishing	9	263,000	111	74	24	34,957	1,309,400	1,488,769
Tar and turpentine, not including farm products	2	9,000	60			14,750	28,500	60,000
Tinware, copperware, and sheet-iron ware	6	44,000	19			9,861	22,700	46,000
Tobacco, cigars and cigarettes	11	8,000	32	1	7	12,311	14,255	34,452
CHATTOOGA								
Cotton goods	1	400,000	50	103	78	36,298	183,780	317,467
Flouring- and grist-mill products	12	43,400	14			2,706	65,582	78,007
CHEROKEE:								
Cotton goods	2	21,000	11	17	15	3,650	24,660	30,310
Flouring- and grist-mill products	14	23,366	18			1,727	33,205	40,818
CLARKE:								
Cotton goods	3	392,000	145	261	137	82,147	304,414	436,657
Flouring- and grist-mill products	5	24,500	9			1,174	21,208	22,714
Foundery and machine-shop products	1	21,600	24			11,107	12,026	29,000
Paper	1	63,000	26	15	5	7,674	38,067	47,112
Woolen goods	1	30,000	5	10	4	4,850	25,000	35,000
CLINCH:								
Lumber, sawed	2	80,000	29		3	16,000	101,000	145,900
Tar and turpentine, not including farm products	1	5,400	80			10,000	2,118	20,000
COBB:								
Boots and shoes	1	18,000	10		2	4,000	28,000	37,500
Cotton goods	2	192,000	69	152	50	44,011	156,990	252,183
Flouring- and grist-mill products	31	126,050	82			24,215	640,563	770,419
Furniture, chairs	1	6,000	12	8		5,000	5,000	30,000
Leather, curried	4	7,100	7			1,500	27,180	36,375
Leather, tanned	4	12,100	9			2,300	19,940	30,000
Paper	1	25,000	5	3		1,602	13,450	25,500
Woolen goods	2	103,833	42	26	12	16,598	72,550	114,790
COWETA:								
Agricultural implements	1	20,000	45		5	20,000	9,400	50,000
Cotton goods	2	90,000	28	13	4	7,950	33,500	44,000
Flouring- and grist-mill products	18	52,800	21			3,545	57,404	63,974
Lumber, sawed	6	11,800	33			2,825	13,850	23,170
DADE:								
Coke	1	80,000	107			13,837	124,900	140,000
Flouring- and grist-mill products	6	18,200	9			1,425	44,910	56,942
Iron and steel	1	130,000	192		8	9,000	173,183	282,150
DE KALB:								
Cotton goods	1	70,000	22	49	35	16,000	43,327	75,102
Flouring- and grist-mill products	23	90,750	37			6,505	126,486	135,563
Liquors, distilled	3	6,240	7			2,100	20,060	30,160
Lumber, sawed	12	14,700	42			3,065	12,841	23,813
Paper	3	97,000	41	9		14,292	77,446	112,960
DODGE:								
Lumber, sawed	6	22,650	84		2	19,000	73,000	119,000
Tar and turpentine, not including farm products	6	41,600	263			56,400	65,400	165,000
DOUGLAS:								
Flouring- and grist-mill products	13	31,950	11			1,970	66,226	67,352
EMANUEL:								
Lumber, sawed	4	26,000	44		4	10,400	58,160	85,750
Tar and turpentine, not including farm products	1	10,000	77			10,000	12,000	25,000
FLOYD:								
Agricultural implements	1	15,000	10		4	3,000	17,500	67,000
Fertilizers	1	20,000	8			2,000	18,000	24,000
Flouring- and grist-mill products	22	82,850	29			5,537	328,618	338,286
Foundery and machine-shop products	4	178,000	190		1	78,193	200,007	307,000
Furniture	1	4,300	15		1	5,000	2,000	30,000
Leather, tanned	4	10,400	9			3,300	19,290	30,800
Lumber, planed	2	6,500	15			5,800	2,500	32,000
Lumber, sawed	14	37,845	91		19	25,901	79,738	149,140
FULTON:								
Agricultural implements	2	125,000	95		35	36,500	260,000	380,000
Bags, paper	1	75,000	45	30	20	30,000	100,000	140,000
Boxes, fancy and paper	2	26,500	7	30	8	5,900	12,500	24,200
Bread and other bakery products	6	36,900	42	13	9	19,260	115,500	161,100
Brick and tile	19	36,890	278	1	106	52,580	38,945	123,050
Carriages and wagons	8	22,000	86		4	32,800	30,700	81,500
Clothing, men's	3	13,400	12	28		8,465	17,000	32,500
Coal-tar	1	10,000	26			3,500	10,000	20,000
Coffee and spices, roasted and ground	1	17,000	8	3	6	5,200	21,000	43,000
Coffins, burial cases, and undertakers' goods	2	17,500	41			12,700	25,300	46,500
Confectionery	4	78,300	50	23	1	18,146	215,000	263,000
Cotton goods	1	525,000	136	238	120	51,460	200,000	191,215
Flouring- and grist-mill products	20	155,350	60			18,201	557,273	616,794
Foundery and machine-shop products	7	314,866	172		7	82,793	114,784	252,908
Furniture	4	22,850	88	3	3	18,558	29,759	84,514

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

GEORGIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
FULTON—continued.								
Ice, artificial	3	$98,000	33	....	....	$11,900	$20,100	$64,000
Iron and steel	1	250,000	475	....	25	102,239	373,276	486,760
Liquors, malt	1	65,000	25	....	....	10,943	60,567	99,584
Lumber, planed	5	81,000	235	....	10	56,789	179,800	285,000
Lumber, sawed	13	12,900	48	....	....	8,300	56,110	83,255
Marble and stone work	4	14,400	25	....	....	8,950	7,800	33,100
Millstones	1	10,000	6	....	....	2,000	10,000	30,000
Patent medicines and compounds	9	102,500	59	15	7	30,492	32,700	128,500
Printing and publishing	10	183,500	163	10	15	71,112	96,549	229,883
Saddlery and harness	3	12,200	15	....	....	8,000	17,100	32,000
Slaughtering and meat-packing, not including retail butchering establishments.	9	25,700	35	....	6	9,473	269,077	309,093
Straw goods	2	21,000	8	115	9	21,000	16,200	75,000
Tinware, copperware, and sheet-iron ware	7	44,300	86	....	6	25,250	80,400	127,900
GLYNN:								
Lumber, sawed	3	846,000	83	....	5	36,500	633,500	731,000
GORDON:								
Flouring- and grist-mill products	9	53,650	21	....	....	4,140	88,950	106,030
Lumber, sawed	9	17,750	35	....	....	4,400	14,224	31,248
GREENE:								
Cotton goods	1	100,000	22	30	55	24,000	50,000	80,000
Flouring- and grist-mill products	10	60,500	24	....	....	3,767	172,510	188,070
GWINNETT:								
Flouring- and grist-mill products	27	55,500	30	....	....	5,305	135,668	157,066
Leather, tanned	4	3,250	11	....	....	2,775	25,780	36,600
Lumber, sawed	14	16,750	57	....	3	5,365	26,055	48,148
Saddlery and harness	2	2,500	17	....	3	6,160	10,000	24,000
HALL:								
Boots and shoes	2	21,800	19	....	....	5,600	29,916	42,400
Carriages and wagons	4	7,300	29	....	....	8,850	7,500	21,000
Flouring- and grist-mill products	22	40,850	27	1	2	3,343	80,819	87,661
Leather, curried	4	4,500	7	....	....	1,925	19,955	27,400
Leather, tanned	4	10,500	15	....	1	2,950	16,410	27,125
HARRIS:								
Cotton goods	1	100,000	24	25	25	14,400	48,260	81,000
Flouring- and grist-mill products	14	36,700	13	....	....	2,470	76,944	82,720
HART:								
Flouring- and grist-mill products	13	33,400	19	....	....	2,062	84,204	91,147
HENRY:								
Flouring- and grist-mill products	12	45,600	30	....	....	4,416	83,173	89,797
HOUSTON:								
Cotton goods	1	40,000	17	80	18	9,426	28,319	45,546
Flouring- and grist-mill products	11	33,300	36	....	....	3,983	70,800	80,993
Foundery and machine-shop products	1	30,000	17	....	....	5,000	9,200	35,000
JACKSON:								
Flouring- and grist-mill products	13	27,225	13	....	....	2,309	55,810	62,691
Lumber, sawed	14	16,100	40	....	2	3,990	16,747	30,527
JEFFERSON:								
Flouring- and grist-mill products	11	24,350	16	1	....	2,466	45,767	51,244
Lumber, sawed	6	9,850	22	....	....	3,750	17,810	32,200
LOWNDES:								
Flouring- and grist-mill products	10	13,300	23	....	....	1,840	33,690	40,409
Lumber, sawed	4	24,000	30	....	5	9,805	15,610	40,105
Tar and turpentine, not including farm products	2	7,500	120	....	....	16,000	11,500	33,600
McINTOSH:								
Lumber, sawed	3	170,000	94	....	....	27,875	409,125	535,000
MORGAN:								
Flouring- and grist-mill products	11	33,300	13	....	....	2,801	70,994	77,138
MUSCOGEE:								
Agricultural implements	1	28,470	30	....	....	4,790	39,286	60,118
Bagging, flax, hemp, and jute	1	40,000	17	20	13	10,400	50,000	65,000
Carriages and wagons	1	7,000	16	....	....	7,500	9,000	20,000
Clothing, men's	2	12,500	11	52	....	14,500	15,500	38,000
Cotton goods	5	1,984,657	674	1,056	319	422,221	963,927	1,883,337
Flouring- and grist-mill products	6	121,000	36	....	....	13,732	384,210	564,142
Foundery and machine-shop products	1	112,344	113	....	6	34,822	27,332	82,179
Lumber, sawed	5	17,500	42	....	....	6,332	13,780	22,200
Sash, doors, and blinds	2	22,000	37	....	....	6,500	30,000	45,000
Tinware, copperware, and sheet-iron ware	6	15,500	16	....	....	5,082	14,200	23,930
NEWTON:								
Cotton goods	2	27,000	7	33	7	5,447	26,883	43,960
Flouring- and grist-mill products	9	29,800	8	....	....	1,815	53,426	54,439
Lumber, sawed	9	16,600	37	....	....	4,519	17,275	28,575
OGLETHORPE:								
Flouring- and grist-mill products	18	48,300	27	....	....	4,340	63,140	72,193
Lumber, sawed	14	18,140	40	....	....	3,350	13,135	26,010
PICKENS:								
Cotton goods	1	30,000	11	7	12	3,000	26,200	40,000
Flouring- and grist-mill products	22	19,000	15	....	....	1,913	51,470	56,962

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

GEORGIA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
PIERCE:								
Lumber, sawed	4	$118, 000	32		6	$22, 500	$99, 300	$150, 675
Tar and turpentine, not including farm products	8	76, 000	276	11		55, 000	42, 000	146, 050
PIKE:								
Carriages and wagons	2	38, 000	36			12, 500	35, 000	80, 000
Flouring- and grist-mill products	18	63, 570	19	1		3, 527	73, 547	77, 760
Lumber, sawed	3	36, 800	19			3, 200	10, 300	21, 220
POLK:								
Flouring- and grist-mill products	9	39, 500	17			3, 137	90, 950	97, 270
Iron and steel	2	440, 000	340		4	56, 894	51, 388	143, 700
Lumber, sawed	14	44, 300	109			21, 860	47, 350	96, 625
PUTNAM:								
Flouring- and grist-mill products	14	44, 000	27			4, 745	109, 491	115, 857
RICHMOND:								
Brick and tile	3	68, 100	140	12		50, 250	26, 040	104, 200
Carriages and wagons	4	80, 450	62		2	24, 456	52, 750	91, 746
Confectionery	2	17, 200	7		1	2, 251	14, 500	20, 575
Cotton goods	6	1, 360, 000	222	493	234	223, 633	1, 038, 466	1, 460, 982
Fertilizers	2	220, 000	56		3	20, 877	185, 000	222, 500
Flouring- and grist-mill products	13	165, 800	58		6	19, 420	776, 055	875, 950
Foundery and machine-shop products	4	56, 000	107	4	14	37, 620	79, 699	146, 250
Ice, artificial	2	110, 000	16			7, 037	3, 150	23, 500
Printing and publishing	2	80, 000	57		13	27, 037	21, 857	62, 171
Sash, doors, and blinds	2	85, 000	130		5	33, 884	75, 000	140, 000
Tinware, copperware, and sheet-iron ware	4	4, 100	14		1	4, 250	17, 200	27, 700
Woolen goods	1	30, 000	7	6	9	1, 200	15, 750	22, 500
ROCKDALE:								
Flouring- and grist-mill products	11	39, 300	12			3, 275	89, 820	98, 400
Lumber, sawed	9	12, 550	37			4, 875	16, 185	35, 050
Paper	1	20, 000	15	4	2	5, 600	15, 000	25, 000
SCREVEN:								
Lumber, sawed	7	79, 300	95			20, 095	57, 165	104, 980
SPALDING:								
Carriages and wagons	1	4, 000	15			9, 000	9, 000	25, 000
Flouring- and grist-mill products	5	27, 000	6			1, 750	63, 255	70, 735
SUMTER:								
Flouring- and grist-mill products	7	16, 000	10			1, 070	24, 955	25, 260
Lumber, sawed	6	48, 632	44			4, 480	17, 200	35, 176
TALBOT:								
Flouring- and grist-mill products	16	44, 600	44			3, 475	108, 035	115, 187
TELFAIR:								
Lumber, sawed	3	8, 700	19		1	3, 300	17, 749	31, 844
Tar and turpentine, not including farm products	5	28, 500	107			31, 759	5, 500	80, 000
TERRELL:								
Carriages and wagons	2	8, 560	19		2	9, 000	11, 075	24, 750
Flouring- and grist-mill products	4	8, 500	8			1, 203	30, 275	31, 250
Lumber, sawed	8	22, 000	43			5, 560	15, 980	30, 350
TROUP:								
Cotton goods	2	300, 000	93	77	57	34, 000	149, 899	250, 525
Flouring- and grist-mill products	24	67, 200	25			4, 795	111, 798	120, 856
UPSON:								
Cotton goods	2	150, 000	35	58	31	14, 500	57, 240	105, 000
Flouring- and grist-mill products	17	52, 360	33			4, 941	129, 882	147, 943
Lumber, sawed	9	9, 800	28			2, 892	14, 017	26, 088
WALKER:								
Flouring- and grist-mill products	12	39, 150	9			2, 369	112, 311	133, 126
WALTON:								
Cotton goods	1	120, 000	34	52	49	20, 400	50, 162	109, 000
Flouring- and grist-mill products	17	53, 400	20			3, 168	71, 135	77, 887
WARE:								
Lumber, sawed	4	73, 000	46			14, 400	83, 200	141, 000
Tar and turpentine, not including farm products	2	8, 500	168			16, 000	23, 000	44, 000
WARREN:								
Cotton goods	1	100, 000	49	50	21	19, 177	62, 526	120, 882
Flouring- and grist-mill products	7	20, 000	28			2, 280	62, 600	68, 587
WAYNE:								
Lumber, sawed	7	111, 000	99		1	40, 500	219, 350	293, 325
Tar and turpentine, not including farm products	13	81, 600	279	11	8	70, 275	54, 500	172, 144
WHITFIELD:								
Flouring- and grist-mill products	15	66, 000	23			5, 828	169, 959	191, 598
Lumber, sawed	7	7, 050	27			4, 600	20, 125	35, 430
WORTH:								
Flouring- and grist-mill products	3	6, 500	5			860	51, 000	51, 920
Lumber, sawed	3	15, 000	21			6, 000	18, 950	36, 875
Tar and turpentine, not including farm products	6	25, 000	107		20	25, 400	31, 600	82, 075

Table V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

IDAHO TERRITORY.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Ada:								
Flouring- and grist-mill products	4	$189,000	20	2	....	$8,700	$273,080	$315,500
Saddlery and harness	3	9,000	5	....	....	4,200	20,000	31,000
Nez Percé:								
Flouring- and grist-mill products	1	30,000	4	....	....	1,260	20,100	23,500
Lumber, sawed	4	18,060	32	....	....	5,850	26,500	45,000
Oneida:								
Flouring- and grist-mill products	4	25,000	5	....	....	2,300	96,400	108,770
Lumber, sawed	12	33,500	51	....	2	9,252	76,570	103,900
ILLINOIS.								
Adams:								
Agricultural implements	5	$160,000	137	....	....	$52,326	$66,019	$171,600
Bone-, ivory-, and lamp-black	2	5,000	13	....	....	3,900	25,000	38,000
Boxes, wooden, packing	3	16,500	28	8	....	10,000	15,550	26,210
Bread and other bakery products	19	56,850	93	17	....	33,875	154,565	189,785
Brick and tile	12	27,600	77	....	3	16,700	8,505	52,400
Carriages and wagons	5	277,000	193	....	20	86,355	170,639	351,300
Clothing, men's	13	30,800	59	1	1	23,470	46,500	95,600
Coffee and spices, roasted and ground	2	17,000	13	4	3	16,000	70,000	115,000
Cooperage	43	37,400	163	....	4	39,225	71,313	148,075
Drugs and chemicals	8	33,000	29	2	2	12,690	18,700	49,500
Flouring- and grist-mill products	28	482,500	152	....	....	81,320	2,091,302	2,320,487
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	11	869,900	425	....	15	213,319	300,826	954,464
Furniture	7	199,300	197	10	12	87,750	59,500	194,700
Lime	5	51,500	93	....	....	35,505	70,832	140,675
Liquors, malt	7	406,650	88	....	....	39,970	171,871	306,980
Lumber, planed	4	62,000	126	....	4	39,000	69,000	187,000
Lumber, sawed	6	81,400	76	....	15	21,800	103,610	164,280
Marble and stone work	7	11,100	66	....	....	17,721	26,751	48,662
Musical instruments, organs and materials	2	52,000	39	....	....	30,900	60,800	122,500
Paper	1	90,000	45	4	3	17,578	45,000	95,000
Printing and publishing	4	54,000	80	4	17	56,820	67,580	135,900
Saddlery and harness	17	54,050	69	....	....	25,786	60,926	106,880
Slaughtering and meat-packing, not including retail butchering establishments.	4	180,000	100	....	1	18,500	836,000	967,650
Soap and candles	1	40,000	15	....	....	5,000	42,000	70,000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	75,000	32	....	8	19,800	21,000	58,000
Tinware, copperware, and sheet-iron ware	20	37,200	44	....	4	16,274	59,500	84,100
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	4	740,250	161	75	178	151,075	822,535	1,176,070
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	25	34,625	85	....	10	31,839	38,602	102,200
Alexander:								
Cooperage	5	14,000	54	....	1	21,300	35,100	64,525
Flouring- and grist-mill products	5	277,000	80	....	....	39,310	969,038	1,136,645
Foundery and machine-shop products	3	17,000	18	....	....	9,300	11,000	30,500
Lumber, sawed	10	101,900	136	....	10	33,815	75,160	133,000
Bond:								
Flouring- and grist-mill products	7	23,300	11	....	....	3,412	104,670	122,768
Lumber, sawed	9	16,465	29	....	....	5,025	22,805	58,400
Boone:								
Cheese and butter (factory)	15	41,450	31	1	1	10,930	105,577	137,745
Flouring- and grist-mill products	8	50,500	15	....	....	4,625	75,170	88,965
Brown:								
Flouring- and grist-mill products	8	31,500	18	....	....	5,509	72,175	84,984
Lumber, sawed	6	6,400	18	....	1	2,800	13,345	22,650
Stone- and earthen-ware	9	9,960	51	....	2	9,228	15,661	34,465
Bureau:								
Bread and other bakery products	4	10,800	7	1	1	2,734	17,770	22,375
Brick and tile	12	25,250	96	....	8	14,600	14,765	39,227
Clothing, men's	5	13,400	16	....	....	7,400	12,900	24,000
Flouring- and grist-mill products	14	123,800	35	....	....	9,077	225,800	255,485
Saddlery and harness	11	11,550	13	....	....	3,925	19,700	31,865
Carroll:								
Cheese and butter (factory)	10	30,100	22	2	....	4,835	49,058	80,691
Flouring- and grist-mill products	10	87,200	18	....	....	6,520	172,249	193,971
Cass:								
Flouring- and grist-mill products	6	56,500	22	....	....	6,150	172,980	194,360
Furniture	2	8,500	4	....	3	2,650	32,500	37,000
Champaign:								
Brick and tile	14	32,700	70	....	14	12,160	19,375	42,795
Clothing, men's	8	14,300	25	3	2	8,400	11,050	26,500
Flouring- and grist-mill products	15	141,850	45	....	....	14,690	192,746	237,434
Saddlery and harness	15	34,915	33	....	....	11,422	31,400	65,100
Slaughtering and meat-packing, not including retail butchering establishments.	3	10,000	12	....	1	2,700	52,250	65,185
Tinware, copperware, and sheet-iron ware	11	38,850	29	....	....	8,528	16,200	33,620
Tobacco, cigars and cigarettes	2	11,000	19	....	1	7,800	11,200	23,500

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

ILLINOIS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
CHRISTIAN:								
Brick and tile	8	$19, 200	42		2	$7, 816	$8, 548	$22, 400
Flouring- and grist-mill products	7	84, 200	43			14, 670	347, 132	423, 318
Lumber, sawed	6	12, 000	29			6, 730	28, 675	44, 380
Saddlery and harness	7	7, 875	12			4, 100	10, 825	23, 825
Slaughtering and meat-packing, not including retail butchering establishments.	4	11, 200	16			6, 380	50, 980	66, 745
CLARK:								
Flouring- and grist-mill products	9	84, 750	56			11, 670	292, 698	348, 346
Lumber, sawed	18	37, 100	53		1	10, 220	46, 640	77, 760
CLAY:								
Flouring- and grist-mill products	11	52, 500	37			8, 130	149, 125	182, 434
Lumber, sawed	11	18, 600	34		3	4, 599	30, 030	46, 550
CLINTON:								
Flouring- and grist-mill products	9	313, 000	134			48, 140	965, 560	1, 129, 640
Lumber, sawed	6	8, 150	32			5, 912	11, 345	23, 004
COLES:								
Brick and tile	11	23, 300	52		1	9, 271	13, 894	31, 916
Brooms and brushes	3	21, 300	71			18, 203	39, 400	62, 200
Clothing, men's	6	8, 250	15	5		12, 192	11, 900	32, 675
Cooperage	4	4, 900	25			9, 600	14, 700	31, 500
Flouring- and grist-mill products	14	105, 460	56			18, 225	421, 560	506, 069
Foundery and machine-shop products	3	45, 000	51		1	27, 625	33, 000	69, 500
Lumber, sawed	11	17, 260	41			7, 245	22, 660	42, 284
Saddlery and harness	6	27, 000	18			5, 850	22, 500	37, 000
Slaughtering and meat-packing, not including retail butchering establishments.	2	66, 000	32		2	2, 600	83, 216	96, 080
Woolen goods	1	46, 253	17	9	4	8, 650	32, 830	60, 000
COOK:								
Agricultural implements	8	3, 511, 100	1, 056		40	583, 632	1, 678, 278	2, 778, 230
Awnings and tents	8	10, 360	20	24	1	13, 540	46, 872	72, 031
Axle-grease	2	200, 500	19	2	3	14, 300	60, 737	132, 000
Bags, other than paper	1	25, 000	13	7		12, 000	130, 000	150, 000
Bags, paper	2	100, 000	29	31	5	24, 000	532, 000	608, 000
Baking and yeast powders (see also Drugs and chemicals)	3	135, 000	75	37	1	44, 134	485, 000	635, 000
Baskets, rattan and willow ware	11	107, 750	119		14	48, 750	54, 225	120, 400
Belting and hose, leather	2	192, 796	58			26, 710	225, 000	302, 275
Billiard tables and materials	4	263, 200	300			137, 225	283, 900	665, 400
Bookbinding and blank-book making	26	176, 100	208	163	39	165, 102	203, 725	481, 131
Boots and shoes	28	902, 000	1, 132	233	41	631, 390	1, 218, 679	2, 123, 271
Boxes, cigar	6	54, 800	40	43	22	36, 268	114, 090	179, 411
Boxes, fancy and paper	12	66, 200	68	178	32	81, 550	116, 400	254, 792
Boxes, wooden, packing	14	525, 000	892		95	414, 953	1, 271, 682	1, 883, 073
Brass castings	11	442, 500	517			232, 125	361, 700	737, 500
Bread and other bakery products	120	555, 700	683	159	38	399, 911	1, 824, 958	2, 631, 386
Brick and tile (see also Terra-cotta ware)	53	500, 300	1, 561	13	81	560, 665	182, 224	1, 014, 200
Bridges	3	348, 000	642			311, 763	1, 473, 000	1, 974, 000
Brooms and brushes	41	243, 200	255	106	46	132, 830	271, 337	517, 324
Carriages and wagons	40	1, 361, 080	1, 152	35	123	590, 166	702, 532	1, 809, 759
Cars, railroad, street, and repairs	5	421, 500	562		20	286, 742	675, 291	1, 043, 682
Cheese and butter (factory)	18	66, 000	40		1	17, 904	248, 274	310, 864
Clothing, men's	106	6, 445, 283	4, 118	4, 001	374	3, 536, 969	11, 642, 189	17, 363, 018
Clothing, women's	19	353, 500	72	1, 488	23	334, 885	1, 017, 720	1, 585, 990
Coffee and spices, roasted and ground	10	477, 900	185	40	45	137, 496	2, 342, 021	2, 808, 879
Coffins, burial cases, and undertakers' goods	5	179, 650	107	12	2	67, 020	164, 500	290, 600
Confectionery	24	413, 200	310	163	132	211, 604	1, 424, 830	1, 953, 558
Cooperage	68	331, 360	703		20	319, 652	647, 880	1, 157, 994
Cordage and twine	1	7, 000	6		4	3, 000	18, 000	25, 000
Cork cutting	3	45, 800	24	15	17	22, 103	125, 038	217, 220
Corsets	1	15, 000	10	100		37, 450	100, 000	175, 000
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	2	98, 000	45	15	53	24, 002	90, 403	135, 667
Cutlery and edge tools (see also Hardware; Tools)	12	113, 700	135	8	27	69, 581	49, 670	177, 000
Dentists' materials	3	11, 000	18	5		11, 300	12, 000	46, 000
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	15	468, 500	180	50	11	103, 940	667, 800	1, 039, 850
Dyeing and finishing textiles	11	69, 850	72	13	7	46, 519	45, 565	135, 521
Electrical apparatus and supplies	3	271, 200	127	25		100, 603	143, 587	543, 000
Electroplating	9	24, 800	31	2	6	18, 645	9, 820	59, 000
Engraving and die-sinking	5	18, 000	22	3		17, 397	13, 550	49, 000
Engraving, wood	16	35, 825	66	3	8	51, 785	12, 970	116, 775
Explosives and fireworks	2	45, 000	14	8	15	7, 000	11, 500	30, 000
Fertilizers	4	445, 000	206			106, 500	497, 707	715, 000
Files (see also Saws)	2	9, 000	21		5	13, 000	8, 000	36, 000
Fire extinguishers, chemical	2	370, 000	113		2	82, 500	75, 000	190, 000
Flavoring extracts	4	71, 200	65	40	5	36, 730	334, 500	461, 500
Flouring- and grist-mill products	24	745, 300	198			105, 764	2, 007, 018	2, 297, 745
Food preparations (see page 39)	5	89, 600	27	12	8	15, 940	58, 500	119, 000
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	134	4, 475, 417	4, 776	6	145	2, 389, 361	5, 110, 619	8, 984, 629
Fruits and vegetables, canned and preserved	5	90, 000	113	40	27	58, 700	417, 415	587, 223
Furnishing goods, men's	13	586, 100	141	1, 119	47	392, 700	1, 143, 275	1, 835, 597
Furniture (see also Mattresses and spring beds; Upholstering)	151	2, 448, 275	4, 160	57	347	2, 028, 371	3, 000, 388	6, 183, 314
Furniture, chairs	6	216, 500	278		57	121, 200	139, 440	334, 072
Furs, dressed	10	160, 500	49	88	2	51, 058	227, 000	370, 000
Gas and lamp fixtures	3	17, 100	46	1	2	18, 600	41, 225	96, 000
Gas machines and meters	3	45, 500	42			19, 723	28, 884	64, 800

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

ILLINOIS—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
COOK—continued.								
Glass, cut, stained, and ornamented	6	$39,600	76	1	3	$47,545	$38,564	$113,612
Gloves and mittens (see also Hosiery and knit goods; Woolen goods).	7	50,200	36	109	5	40,075	110,150	170,800
Glue	3	465,000	199	75	8	95,700	281,000	563,500
Gold and silver leaf and foil	3	22,000	34	45	2	25,750	41,000	85,000
Gold and silver, reduced and refined (not from the ore)	2	40,000	18			11,170	96,810	126,470
Grease and tallow	8	667,000	211			118,044	1,433,025	1,727,009
Hairwork	15	48,650	8	110		26,782	45,300	135,915
Hand-knit goods	7	14,900	4	106	9	14,065	43,470	64,072
Hand-stamps	4	5,500	11	1	1	7,140	11,600	26,050
Hardware (see also Cutlery and edge tools; Tools)	13	134,870	136		31	70,293	89,595	244,018
Hardware, saddlery	3	30,100	32	1	20	18,200	48,200	87,000
Hats and caps, not including wool hats	11	18,950	34	27	7	28,226	36,500	88,200
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	7	57,800	121	541	63	66,966	184,831	300,577
Ink	4	53,750	19	3	13	12,250	23,000	73,000
Iron and steel	11	3,875,000	2,871		125	1,477,563	8,006,970	10,441,891
Iron bolts, nuts, washers, and rivets	1	25,000	60		30	30,000	150,000	250,000
Iron doors and shutters, wrought	3	7,500	18			11,720	19,800	40,500
Iron forgings	5	145,800	155			73,130	424,337	585,551
Iron nails and spikes, cut and wrought	3	248,000	136	17	28	78,528	199,430	429,270
Iron pipe, wrought	2	735,000	690	12	70	321,521	881,027	1,155,470
Iron railing, wrought	5	10,000	27			15,590	17,400	42,882
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	11	64,000	133		12	68,294	170,900	303,900
Jewelry	12	73,600	81	4	5	53,396	103,380	242,004
Labels and tags	2	15,600	7	2	4	5,820	16,500	27,700
Lamps and reflectors	4	453,500	345	25	55	159,250	648,408	1,051,346
Lard, refined	1	1,000,000	315	40	75	175,000	4,600,000	5,000,000
Lasts	3	16,500	34		2	19,988	34,075	61,700
Lead, bar, pipe, sheet, and shot	2	150,000	22	1	2	16,279	80,750	143,051
Leather, curried	9	481,002	225			129,196	1,762,756	2,146,500
Leather, tanned	19	1,932,998	981	99	29	541,184	3,790,522	1,914,556
Lightning rods	2	21,000	20			13,233	37,500	64,500
Lime	2	160,000	160			71,000	52,000	160,000
Lithographing (see also Printing and publishing)	13	494,150	307	12	11	220,955	263,549	698,387
Liquors, distilled	7	1,175,000	750			330,000	2,961,281	4,387,545
Liquors, malt	23	3,487,500	923	1		454,995	1,956,487	3,499,733
Looking-glass and picture frames	52	338,675	787	31	156	357,625	600,540	1,268,855
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	15	471,008	686		56	297,730	3,441,100	4,080,900
Malt	17	890,200	236		1	109,109	1,589,019	1,968,780
Marble and stone work	52	518,600	941		15	482,564	606,249	1,336,591
Matches	2	51,500	16	51		16,065	195,894	235,000
Mattresses and spring beds (see also Furniture)	24	216,950	281	63	48	131,286	333,900	739,908
Millinery and lace goods	12	108,100	48	289	65	85,280	244,060	430,900
Mineral and soda waters	14	121,150	197		6	84,830	184,310	410,700
Mixed textiles (see also Cotton goods; Silk and silk goods)	2	23,000	13	87	3	21,650	69,685	112,100
Models and patterns	16	11,400	57		1	31,380	8,251	64,272
Musical instruments, organs and materials	9	81,500	177		22	105,307	195,028	376,650
Musical instruments, pianos and materials	5	20,300	27			16,902	11,800	37,675
Oil, lard	3	190,000	82		3	42,600	928,000	1,107,000
Oil, linseed	6	705,000	171	4	11	93,005	2,040,500	2,504,093
Oleomargarine	3	208,800	63		7	21,310	328,500	437,800
Paints (see also Varnish)	12	785,500	251	18	7	153,128	2,110,845	2,796,000
Patent medicines and compounds (see also Drugs and chemicals)	12	176,050	94	32	2	45,878	516,500	674,280
Paving materials	3	58,500	81			36,787	244,500	307,000
Pickles, preserves, and sauces	9	32,500	58	8	4	28,675	263,970	365,200
Pocket-books	3	22,300	61	28		31,890	95,840	150,599
Printing and publishing (see also Lithographing)	137	2,905,400	2,799	455	319	1,962,681	2,466,160	6,016,295
Printing materials	4	20,200	24		7	17,452	26,300	61,000
Pumps, not including steam pumps	1	50,000	22		3	9,300	40,000	65,000
Regalia and society banners and emblems	2	23,500	5	16	1	5,970	41,260	60,860
Roofing and roofing materials	15	192,521	221			82,331	422,827	593,431
Rubber and elastic goods	3	10,500	8	10		4,540	25,750	35,600
Saddlery and harness	94	225,475	334	100	62	181,100	410,445	763,497
Safes, doors, and vaults, fire-proof	1	20,000	20			7,500	10,150	20,250
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	30	1,243,038	1,812	16	192	810,253	1,656,655	2,977,208
Saws	6	40,300	26			18,283	12,300	43,500
Scales and balances	5	51,600	75			40,850	111,340	218,750
Screws	1	25,000	24		1	10,500	15,000	30,000
Sewing-machine cases	7	115,800	429		36	161,706	134,685	382,355
Sewing machines and attachments	14	1,171,800	575	4	6	328,256	371,834	1,371,511
Shipbuilding	21	355,000	347			181,675	358,820	659,153
Shirts	28	156,450	111	417	7	132,020	420,677	721,167
Shoddy (see also Mixed textiles)	1	10,000	10	5	3	8,300	62,000	75,000
Show-cases	11	55,100	107		8	59,976	111,500	227,000
Silk and silk goods (see also Mixed textiles)	5	82,000	67	135	57	72,195	125,895	244,150
Slaughtering and meat-packing, not including retail butchering establishments.	70	8,455,200	7,180		298	3,592,748	74,546,319	85,324,371
Soap and candles	16	1,230,800	402	33	79	199,292	3,135,047	3,627,310
Springs, steel, car, and carriage	5	45,500	64		1	36,740	151,600	222,500
Stamped ware (see also Tinware, copperware, and sheet-iron ware)	2	4,000	11		3	7,100	5,500	20,000
Stationery goods	3	7,600	6	4	3	4,100	17,050	25,500
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	11	98,700	220		5	115,590	411,780	580,530

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

ILLINOIS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
COOK—continued.								
Stencils and brands	1	$8, 000	12	....	3	$8, 750	$9, 500	$25, 000
Stereotpying and electrotyping (see also Type founding)	3	25, 000	45	....	12	23, 672	18, 300	65, 554
Straw goods	8	144, 000	85	335	19	119, 514	297, 744	484, 609
Surgical appliances	4	20, 500	16	12	....	10, 700	17, 200	48, 800
Terra-cotta ware (see also Brick and tile)	3	28, 000	81	....	13	26, 500	22, 576	68, 000
Tinware, copperware, and sheet-iron ware (see also Stamped ware)	122	677, 275	943	108	154	523, 104	1, 183, 581	2, 212, 486
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	4	287, 500	142	97	15	77, 060	1, 206, 187	1, 387, 598
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	300	545, 050	1, 512	135	101	709, 830	1, 074, 126	2, 347, 164
Tools (see also Cutlery and edge tools; Hardware)	6	25, 300	30	....	....	16, 200	14, 850	49, 224
Trunks and valises	12	155, 000	212	....	10	102, 170	295, 700	508, 300
Type founding (see also Stereotyping and electrotyping)	4	290, 000	127	95	96	109, 300	86, 000	314, 000
Upholstering (see also Furniture)	20	44, 200	111	21	9	51, 783	122, 891	228, 395
Varnish (see also Paints)	4	207, 000	32	....	1	24, 646	302, 600	389, 000
Vault lights and ventilators	2	10, 000	26	....	....	15, 919	33, 841	63, 179
Vinegar	14	197, 300	68	....	4	36, 665	184, 400	335, 838
Watch cases	1	50, 000	50	10	40	70, 000	16, 000	150, 000
Window blinds and shades	4	11, 500	12	8	9	6, 550	32, 600	51, 250
Wirework	24	311, 122	213	....	39	108, 294	753, 786	1, 065, 860
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds.)	14	86, 010	106	10	21	54, 767	79, 587	181, 840
CRAWFORD:								
Flouring- and grist-mill products	7	39, 700	21	....	....	5, 380	130, 485	155, 640
Lumber, sawed	10	42, 000	41	....	....	6, 325	21, 795	37, 770
CUMBERLAND:								
Flouring- and grist-mill products	5	28, 000	20	....	....	5, 145	82, 066	105, 677
Lumber, sawed	18	31, 600	78	....	....	13, 537	50, 352	85, 922
DE KALB:								
Agricultural implements	5	627, 500	431	....	16	204, 000	524, 500	858, 000
Bread and other bakery products	2	5, 400	6	4	....	4, 000	9, 600	20, 000
Cheese and butter (factory)	28	67, 850	31	2	....	9, 510	135, 954	189, 199
Flouring- and grist-mill products	12	68, 700	29	....	....	8, 369	234, 230	268, 538
Saddlery and harness	11	11, 325	19	....	....	7, 890	24, 300	42, 050
DE WITT:								
Brick and tile	14	25, 050	70	....	5	9, 075	13, 083	31, 150
Flouring- and grist-mill products	9	32, 500	10	....	....	2, 6 0	89, 100	109, 835
Foundery and machine-shop products	2	77, 500	36	....	1	23, 300	5, 350	42, 500
DOUGLAS:								
Flouring- and grist-mill products	8	50, 000	12	....	....	2, 061	121, 336	143, 922
DU PAGE:								
Cheese and butter (factory)	16	63, 000	40	....	....	17, 155	253, 900	331, 084
Flax, dressed	2	43, 000	34	19	11	18, 962	10, 980	33, 178
Flouring- and grist-mill products	12	88, 164	24	2	....	6, 691	158, 660	183, 529
Liquors, malt	1	25, 000	10	....	....	3, 041	13, 080	23, 183
Slaughtering and meat-packing, not including retail butchering establishments.	3	8, 580	5	....	....	1, 512	39, 000	43, 000
EDGAR:								
Brick and tile	13	16, 200	57	....	10	7, 870	8, 139	21, 820
Flouring- and grist-mill products	13	105, 200	42	....	....	9, 910	248, 055	286, 149
Foundery and machine-shop products	2	16, 000	23	....	....	11, 000	4, 200	21, 200
Lumber, sawed	18	43, 400	117	....	2	19, 239	54, 395	98, 260
Saddlery and harness	7	19, 600	14	....	....	5, 150	16, 900	33, 900
Slaughtering and meat-packing, not including retail butchering establishments.	1	20, 000	3	....	....	1, 500	39, 450	60, 000
EDWARDS:								
Flouring- and grist-mill products	2	15, 000	8	....	....	1, 250	26, 205	28, 813
Lumber, sawed	5	23, 500	17	....	2	2, 972	12, 507	24, 700
EFFINGHAM:								
Flouring- and grist-mill products	12	90, 750	37	....	....	12, 289	223, 195	265, 705
Lumber, sawed	12	34, 200	68	....	2	14, 698	42, 114	75, 300
Slaughtering and meat-packing, not including retail butchering establishments.	2	34, 000	3	....	....	960	33, 853	41, 000
Woolen goods	1	15, 000	10	6	10	7, 200	36, 035	50, 000
FAYETTE:								
Agricultural implements	2	34, 000	32	....	....	6, 000	9, 200	20, 440
Flouring- and grist-mill products	11	140, 000	44	....	....	14, 590	290, 055	338, 333
Lumber, sawed	24	45, 755	110	....	....	18, 198	50, 421	92, 627
FORD:								
Flouring- and grist-mill products	2	40, 000	16	....	....	2, 700	28, 000	32, 800
Saddlery and harness	5	5, 600	6	....	....	2, 200	15, 500	25, 800
FRANKLIN:								
Flouring- and grist-mill products	5	31, 000	18	....	....	5, 225	105, 522	134, 108
Lumber, sawed	7	18, 500	32	....	....	6, 750	21, 500	40, 350
Woolen goods	1	10, 000	9	1	4	5, 000	51, 000	61, 500
FULTON:								
Agricultural implements	3	254, 000	169	....	....	49, 300	166, 500	304, 700
Brick and tile	15	45, 200	85	....	29	13, 550	17, 920	43, 430
Carriages and wagons	5	9, 400	19	....	....	7, 150	9, 200	20, 550
Flouring- and grist-mill products	18	170, 100	59	....	....	19, 257	342, 979	389, 996
Liquors, distilled	1	75, 000	14	....	....	5, 700	52, 101	77, 504

Table V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

ILLINOIS—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
FULTON—continued.								
Lumber, sawed	24	$49, 400	98		8	$16, 580	$66, 945	$107, 684
Saddlery and harness	12	21, 150	21			7, 959	20, 832	38, 460
Slaughtering and meat-packing, not including retail butchering establishments.	1	35, 000	15			4, 300	61, 600	70, 000
Tobacco, cigars and cigarettes	8	35, 600	52	20	1	25, 075	43, 469	102, 479
Woolen goods	2	57, 000	29	14	2	9, 718	43, 135	60, 550
GALLATIN:								
Flouring- and grist-mill products	5	22, 500	25			2, 980	47, 225	55, 580
GREENE:								
Brick and tile	11	138, 140	110			25, 220	40, 662	91, 281
Flouring- and grist-mill products	12	116, 000	39			17, 778	369, 940	427, 500
Foundery and machine-shop products	2	30, 000	28			10, 000	18, 000	32, 000
Lumber, sawed	8	16, 900	32			3, 625	13, 860	26, 700
Stone- and earthen-ware	5	27, 500	58		2	25, 600	12, 802	47, 000
GRUNDY:								
Flouring- and grist-mill products	2	25, 000	10			2, 400	35, 000	40, 000
Furniture	2	100, 500	102		25	48, 600	30, 200	126, 500
Leather, curried	1	8, 167	5			2, 000	47, 000	50, 000
Leather, tanned	1	16, 333	10			4, 000	37, 250	45, 000
Liquors, malt	2	27, 500	8			2, 545	10, 875	20, 308
Tinware, copperware, and sheet-iron ware	5	5, 500	10			4, 850	13, 250	25, 100
Tobacco, cigars and cigarettes	3	2, 200	11		3	4, 760	9, 900	20, 300
HAMILTON:								
Flouring- and grist-mill products	6	87, 500	34			10, 824	178, 985	218, 765
Lumber, sawed	11	22, 200	54			11, 858	49, 605	81, 168
HANCOCK:								
Agricultural implements	3	26, 500	20	3		8, 250	11, 250	30, 425
Cooperage	15	25, 400	53			17, 040	28, 790	56, 720
Flouring- and grist-mill products	20	168, 550	80			22, 590	494, 190	542, 008
Lumber, planed	1	30, 000	15			4, 000	18, 000	25, 000
Lumber, sawed	7	11, 500	14			1, 755	14, 800	20, 730
Saddlery and harness	11	13, 065	11			2, 740	15, 044	23, 564
Woolen goods	1	155, 000	51	23	6	21, 562	113, 430	150, 000
HENDERSON:								
Flouring- and grist-mill products	4	29, 000	20			3, 700	65, 750	70, 730
Lumber, sawed	2	21, 000	29		4	5, 550	27, 300	40, 900
HENRY:								
Agricultural implements	1	38, 900	30		10	12, 000	30, 921	48, 135
Brick and tile	9	37, 100	69		5	12, 056	14, 046	36, 050
Carriages and wagons	3	10, 000	13			5, 500	14, 000	21, 900
Clothing, men's	4	20, 225	12	1		5, 700	26, 300	35, 000
Cooperage	3	16, 350	26			4, 950	36, 550	46, 200
Flouring- and grist-mill products	9	111, 200	29			8, 930	156, 975	177, 035
Foundery and machine-shop products	4	65, 700	79		20	41, 450	47, 600	118, 200
Furniture	4	25, 100	22			10, 250	16, 100	39, 000
Liquors, malt	2	46, 000	9			2, 953	18, 720	22, 575
Saddlery and harness	14	27, 150	30			11, 880	30, 067	59, 350
Windmills	2	21, 000	22	1	4	9, 140	11, 600	30, 200
IROQUOIS:								
Brick and tile	7	11, 600	53		4	8, 130	9, 612	24, 090
Cheese and butter (factory)	7	13, 850	10			3, 695	31, 566	45, 062
Flax, dressed	2	15, 000	42			17, 030	9, 000	32, 500
Flouring- and grist-mill products	9	36, 100	21			3, 620	56, 004	65, 969
Lumber, sawed	4	7, 300	22			3, 005	13, 722	20, 860
Oil, linseed	1	75, 000	13			6, 000	100, 000	115, 000
JACKSON:								
Flouring- and grist-mill products	12	95, 500	73		1	15, 258	350, 520	401, 499
Foundery and machine-shop products	1	6, 000	9			9, 000	5, 000	25, 000
Lumber, sawed	17	49, 350	86		2	24, 187	72, 532	122, 297
JASPER:								
Flouring- and grist-mill products	4	18, 300	13			3, 100	49, 420	55, 722
Lumber, sawed	15	30, 475	65		3	10, 110	18, 890	37, 440
JEFFERSON:								
Flouring- and grist-mill products	8	39, 400	35			7, 093	210, 566	241, 752
Hosiery and knit goods	1	27, 000	17	24	10	6, 635	25, 950	36, 650
Lumber, sawed	15	26, 700	66			11, 149	43, 900	72, 378
JERSEY:								
Agricultural implements	2	37, 000	32		4	17, 000	24, 000	93, 000
Bread and other bakery products	3	5, 950	10	3		3, 000	13, 400	23, 000
Flouring- and grist-mill products	7	101, 000	39			16, 243	317, 450	371, 330
JO DAVIESS:								
Agricultural implements	4	43, 300	41			16, 200	23, 968	47, 070
Bread and other bakery products	3	26, 400	15			7, 902	18, 900	30, 011
Clothing, men's	7	49, 175	37	22	7	22, 125	40, 235	72, 977
Cooperage	12	8, 850	32		1	7, 930	7, 150	21, 979
Flouring- and grist-mill products	9	104, 500	27			7, 077	120, 389	139, 657
Foundery and machine-shop products	2	27, 500	15			6, 552	10, 500	30, 392
Furniture, chairs	1	45, 000	30			11, 440	28, 600	42, 200
Liquors, malt	3	40, 000	8		2	4, 160	17, 948	31, 938
Lumber, sawed	3	93, 688	47			12, 864	33, 988	54, 280
Saddlery and harness	10	19, 600	21		1	10, 853	14, 865	81, 661

Table V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

ILLINOIS—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Jo Daviess—continued.								
Sash, doors, and blinds	1	$25,000	18	....	2	$8,000	$10,000	$22,000
Slaughtering and meat-packing, not including retail butchering establishments.	2	728,750	65	....	11	13,732	471,750	553,589
Soap and candles	1	28,000	6	....	....	2,512	18,000	24,212
Tinware, copperware, and sheet-iron ware	9	21,950	16	....	1	8,334	11,802	24,833
Tobacco, cigars and cigarettes	5	14,226	27	....	....	11,778	14,278	28,336
Wirework	1	50,000	10	....	....	2,500	30,000	90,000
Woolen goods	2	183,000	52	40	10	32,417	128,280	190,000
Johnson:								
Flouring- and grist-mill products	6	36,500	25	....	....	3,806	90,561	113,408
Lumber, sawed	7	43,900	65	....	1	12,136	71,310	97,400
Kane:								
Agricultural implements	6	46,500	50	....	1	18,717	34,182	62,329
Bread and other bakery products	5	8,200	24	5	3	11,100	32,075	53,500
Brick and tile	5	82,000	92	....	9	15,200	10,954	35,300
Carriages and wagons	12	161,000	141	....	2	63,811	114,943	211,866
Cheese and butter (factory)	33	162,550	136	32	1	74,264	812,958	1,157,213
Clothing, men's	7	19,550	22	6	....	10,784	39,600	61,000
Cooperage	6	16,010	39	....	12	13,200	36,230	59,650
Flouring- and grist-mill products	22	333,096	95	....	....	35,110	1,010,651	1,160,954
Foundery and machine-shop products	13	264,000	341	....	18	147,611	484,603	777,189
Fruits and vegetables, canned and preserved	1	32,000	1	50	160	20,500	55,000	92,000
Furniture	5	7,800	17	....	....	8,600	26,300	44,375
Hardware	2	125,000	135	....	5	66,500	182,000	278,060
Liquors, malt	3	37,000	10	1	....	3,361	14,524	25,532
Marble and stone work	3	20,000	20	....	....	10,100	10,500	30,600
Paper	2	170,000	87	12	....	38,000	174,000	240,000
Patent medicines and compounds	1	6,500	2	12	....	3,862	15,710	24,530
Plated and britannia ware	1	150,000	65	17	....	26,885	43,500	115,500
Printing and publishing	8	47,000	67	4	6	29,345	21,174	77,503
Saddlery and harness	15	19,150	23	....	2	9,756	32,723	50,950
Sash, doors, and blinds	4	43,100	43	....	3	13,490	20,161	42,450
Slaughtering and meat-packing, not including retail butchering establishments.	1	15,000	7	....	....	4,000	31,350	39,000
Tinware, copperware, and sheet-iron ware	17	43,050	42	....	1	22,166	67,700	119,550
Tobacco, cigars and cigarettes	11	33,300	39	3	16	19,317	31,854	69,609
Watches	1	1,443,827	615	406	....	519,444	143,216	898,711
Windmills	4	218,500	119	....	....	72,810	150,234	268,900
Woolen goods	2	10,000	15	12	3	7,000	15,600	23,000
Kankakee:								
Buttons	2	19,000	8	54	4	13,000	21,700	48,500
Cheese and butter (factory)	3	10,000	6	....	....	2,100	14,383	27,378
Clothing, men's	2	10,200	14	4	....	7,675	16,600	30,000
Flouring- and grist-mill products	4	51,000	18	....	....	7,070	138,700	154,807
Oil, linseed	1	100,000	15	....	....	6,000	125,000	140,000
Paper	2	45,000	37	5	4	19,190	36,115	75,360
Woolen goods	1	30,000	15	15	....	6,000	54,642	74,000
Kendall:								
Agricultural implements	2	103,000	423	7	15	181,000	241,100	504,000
Cheese and butter (factory)	5	31,240	14	....	....	4,747	64,191	100,487
Flouring- and grist-mill products	5	41,500	12	....	....	3,870	77,200	89,050
Paper	1	25,000	22	3	2	9,000	30,000	50,000
Knox:								
Agricultural implements	3	343,500	186	....	3	72,800	107,070	302,209
Brick and tile	13	35,780	68	....	8	11,805	12,395	33,080
Carriages and wagons	4	12,000	36	1	2	10,650	13,750	30,150
Cheese and butter (factory)	6	19,800	12	....	....	3,940	28,743	40,355
Flouring- and grist-mill products	11	75,800	35	....	....	14,334	249,740	301,409
Foundery and machine-shop products	3	120,000	88	....	7	32,615	66,000	132,000
Lumber, sawed	7	12,200	21	....	1	3,425	13,695	23,895
Mineral and soda waters	1	4,000	6	....	....	1,880	14,640	20,800
Printing and publishing	3	26,000	23	5	4	12,089	6,713	25,782
Saddlery and harness	14	11,325	29	....	....	8,008	21,389	40,546
Slaughtering and meat-packing, not including retail butchering establishments.	1	2,500	2	....	....	600	16,589	21,932
Tinware, copperware, and sheet-iron ware	13	17,100	26	....	....	9,449	17,889	36,624
Lake:								
Agricultural implements	4	18,300	20	....	....	6,875	29,300	42,600
Carriages and wagons	2	35,000	30	....	....	11,500	20,000	47,000
Cheese and butter (factory)	10	23,100	20	1	....	7,705	86,481	110,408
Flouring- and grist-mill products	9	105,000	25	....	....	4,080	153,180	163,180
Leather, curried	1	5,333	2	....	....	1,167	30,500	40,000
Leather, tanned	3	78,667	54	....	....	22,333	182,500	218,500
Liquors, malt	1	60,000	11	....	....	4,997	21,578	38,302
Lumber, planed (see also Sash, doors, and blinds)	1	6,000	6	....	....	3,600	14,000	20,000
Pumps, not including steam pumps	1	30,000	55	....	....	16,000	40,000	75,000
Sash, doors, and blinds (see also Lumber, planed)	1	4,000	15	....	....	4,500	10,000	20,000
La Salle:								
Agricultural implements	10	521,500	330	....	4	139,400	208,075	650,021
Bread and other bakery products	3	32,500	11	3	3	4,387	11,785	22,350
Brick and tile	17	62,500	130	....	35	23,330	31,004	73,140
Carriages and wagons	10	57,600	85	....	1	29,675	45,190	103,770
Cement	2	340,000	132	....	13	40,000	30,000	93,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

ILLINOIS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
LA SALLE—continued.								
Cheese and butter (factory)	2	$16, 000	6			$1, 950	$35, 905	$44, 321
Clothing, men's	11	38, 875	91	24		38, 897	63, 155	161, 000
Flouring- and grist-mill products	15	117, 500	37			21, 280	432, 505	495, 732
Foundery and machine-shop products	8	68, 500	82			41, 600	40, 300	123, 000
Glass	4	235, 000	337		50	195, 508	168, 755	523, 343
Liquors, malt	7	211, 000	69		4	32, 393	139, 390	248, 761
Lumber, planed (see also Sash, doors, and blinds)	3	8, 500	10		2	4, 250	21, 900	29, 500
Marble and stone work	6	7, 000	15			6, 500	6, 400	21, 800
Musical instruments, organs and materials	1	100, 000	60	1	19	50, 000	55, 000	120, 000
Oil, linseed	1	20, 000	8			1, 200	40, 000	42, 000
Paper	3	81, 000	65	14		29, 400	77, 500	202, 580
Printing and publishing	7	25, 900	34		3	11, 423	11, 058	30, 237
Saddlery and harness	15	41, 870	41		1	16, 600	32, 450	76, 817
Sash, doors, and blinds (see also Lumber, planed)	3	28, 500	31		2	15, 300	10, 300	31, 000
Soap and candles	3	6, 150	6			1, 575	21, 500	28, 800
Starch	1	141, 500	72	14	13	20, 000	45, 000	94, 500
Tinware, copperware, and sheet-iron ware	18	22, 600	38		1	16, 799	29, 350	65, 700
Tobacco, cigars and cigarettes	12	45, 100	88	[illegible]	12	35, 150	68, 059	133, 539
Woolen goods	1	10, 000	13	1	6	4, 000	25, 375	31, 600
Zinc	4	661, 000	846		4	407, 000	1, 233, 349	1, 772, 005
LAWRENCE:								
Flouring- and grist-mill products	5	52, 500	22			6, 100	213, 850	249, 280
Lumber, sawed	6	32, 500	64			14, 550	71, 500	97, 500
LEE:								
Agricultural implements	6	219, 675	151			88, 725	166, 662	362, 581
Bagging, flax, hemp, and jute	2	75, 000	45	25	10	22, 531	59, 000	95, 710
Carriages and wagons	4	22, 500	39			14, 650	21, 420	42, 320
Cheese and butter (factory)	5	12, 900	12	1		4, 900	53, 150	68, 264
Clothing, men's	6	5, 900	9	2		5, 750	11, 545	23, 400
Flouring- and grist-mill products	8	242, 000	89			37, 450	798, 272	936, 379
Patent medicines and compounds	1	2, 000	8			8, 000	5, 000	25, 000
LIVINGSTON:								
Boots and shoes	1	5, 000	20		35	3, 000	48, 000	57, 000
Brick and tile	6	15, 100	41			7, 018	7, 867	20, 412
Carriages and wagons	3	11, 700	11			5, 500	12, 000	21, 500
Flouring- and grist-mill products	6	93, 500	29			10, 440	166, 450	195, 140
Saddlery and harness	8	13, 900	20			7, 620	25, 300	42, 200
Tobacco, cigars and cigarettes	2	6, 600	24		5	11, 220	11, 200	29, 000
LOGAN:								
Brick and tile	11	36, 200	105		4	17, 769	28, 857	64, 995
Carriages and wagons	6	30, 000	38		1	16, 700	19, 800	49, 000
Flouring- and grist-mill products	8	64, 000	26			8, 250	147, 200	177, 245
McDONOUGH:								
Agricultural implements	1	100, 000	56		2	20, 000	43, 000	134, 180
Brick and tile	5	61, 000	64		9	15, 060	27, 025	59, 900
Carriages and wagons	5	20, 000	33			13, 420	16, 000	40, 450
Flouring- and grist-mill products	12	71, 800	29			9, 215	264, 143	296, 604
Lumber, sawed	9	11, 900	23			3, 317	12, 150	25, 084
Pumps, not including steam pumps	1	30, 000	13			6, 000	16, 000	25, 000
Saddlery and harness	9	16, 950	16			6, 080	25, 725	38, 250
Stone- and earthen-ware	4	20, 600	44			19, 900	16, 650	44, 800
Tobacco, cigars and cigarettes	4	43, 400	56	30		23, 470	51, 600	82, 500
McHENRY:								
Carriages and wagons	3	17, 500	17			6, 385	13, 200	26, 000
Cheese and butter (factory)	41	101, 600	72	5	1	23, 126	454, 060	584, 750
Clothing, men's	9	12, 300	16	9		7, 680	19, 784	34, 187
Cooperage	5	10, 900	16			5, 505	14, 600	22, 960
Flouring- and grist-mill products	20	147, 200	48			13, 614	300, 220	363, 502
Liquors, malt	2	44, 754	9			4, 250	18, 357	32, 635
Malt	1	20, 000	5			2, 691	30, 000	40, 000
Pickles, preserves, and sauces	3	55, 000	36	2	8	9, 490	104, 000	153, 000
Saddlery and harness	18	14, 000	19	60	100	9, 602	22, 724	45, 566
Tinware, copperware, and sheet-iron ware	9	7, 300	8			3, 300	10, 000	20, 450
McLEAN:								
Agricultural implements	3	45, 000	20			8, 000	19, 500	40, 500
Bread and other bakery products	4	31, 300	14	1	2	5, 480	23, 000	34, 750
Brick and tile	17	59, 650	148		31	30, 775	38, 297	97, 670
Carriages and wagons	8	35, 100	38			14, 800	21, 200	47, 000
Clothing, men's	3	3, 600	3	4		1, 500	16, 500	22, 550
Confectionery	3	10, 300	8	2	1	3, 378	24, 800	33, 087
Flouring- and grist-mill products	18	268, 050	100	3		46, 725	805, 613	937, 510
Foundery and machine-shop products	5	96, 000	73			27, 100	40, 500	113, 000
Furniture	8	89, 250	79	10	17	33, 661	59, 225	118, 500
Liquors, malt	1	50, 000	15			6, 396	27, 575	48, 995
Lumber, sawed	6	7, 700	23		1	5, 105	11, 790	21, 350
Marble and stone work	3	16, 000	26			11, 500	11, 665	37, 000
Oil, linseed	1	25, 000	8			2, 100	47, 000	54, 900
Patent medicines and compounds	2	123, 000	26	15	5	19, 200	43, 000	88, 000
Printing and publishing	1	20, 000	20			15, 000	20, 000	40, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

ILLINOIS—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
McLEAN—continued.								
Saddlery and harness	15	$19,900	31	1	...	$10,110	$34,400	$63,800
Sash, doors, and blinds	2	24,500	27	...	...	12,083	28,000	45,150
Slaughtering and meat-packing, not including retail butchering establishments.	1	75,000	40	...	...	6,000	170,000	185,000
Soap and candles	1	15,000	4	...	...	2,400	40,000	45,000
Tinware, copperware, and sheet-iron ware	10	43,400	32	...	...	13,575	26,200	53,500
Tobacco, cigars and cigarettes	4	7,300	24	...	...	8,700	10,200	26,736
MACON:								
Agricultural implements	3	138,000	73	...	10	42,500	114,500	303,000
Bagging, flax, hemp, and jute	1	100,000	50	15	30	25,000	50,000	120,000
Bread and other bakery products	6	12,450	6	...	...	1,700	8,700	21,300
Brick and tile	20	56,200	117	...	10	25,433	36,380	85,765
Carriages and wagons	3	14,000	28	...	...	12,500	11,600	48,000
Clothing, men's	3	50,640	11	24	...	12,630	65,400	85,810
Coffins, burial cases, and undertakers' goods	2	43,000	21	...	5	10,450	27,000	49,500
Flouring- and grist-mill products	3	137,000	29	...	2	15,800	470,600	526,000
Foundery and machine-shop products	4	125,000	91	...	2	44,025	44,000	124,000
Furniture	2	100,500	65	...	...	50,000	50,300	125,900
Liquors, malt	1	40,000	12	...	...	3,892	16,763	29,783
Lumber, planed	1	10,000	10	...	...	3,000	10,000	20,000
Lumber, sawed	6	22,200	23	...	...	3,296	11,535	21,375
Marble and stone work	4	12,700	25	...	...	17,774	11,300	43,900
Oil, linseed	1	60,000	13	...	...	5,750	77,880	113,900
Printing and publishing	3	20,500	22	...	...	7,600	7,800	24,900
Saddlery and harness	8	14,850	27	...	...	10,680	22,765	64,450
Slaughtering and meat-packing, not including retail butchering establishments.	4	35,000	19	...	1	7,400	74,384	129,134
Tinware, copperware, and sheet-iron ware	5	10,200	11	...	...	5,622	26,760	49,200
Tobacco, cigars and cigarettes	6	39,000	33	...	7	20,085	50,580	97,671
Woolen goods	1	10,000	21	12	4	2,000	27,907	31,000
MACOUPIN:								
Agricultural implements	11	31,800	32	...	...	9,990	15,240	35,100
Brick and tile	8	23,150	33	...	5	7,367	7,333	20,010
Carriages and wagons	3	28,000	27	...	...	15,260	19,000	45,550
Cooperage	6	12,300	47	...	...	18,124	21,000	48,600
Flouring- and grist-mill products	26	369,200	136	...	...	55,602	1,527,063	1,656,585
Saddlery and harness	9	21,800	14	...	1	4,865	14,600	27,250
MADISON:								
Agricultural implements	5	215,800	120	...	...	50,678	126,564	301,761
Boxes, wooden, packing	1	22,000	59	...	21	28,524	30,000	73,746
Bread and other bakery products	5	9,285	26	...	9	11,300	75,887	91,852
Brick and tile	16	58,550	95	...	10	22,381	16,715	52,524
Carriages and wagons	5	38,900	41	...	...	15,479	24,318	54,061
Clothing, men's	4	13,100	11	3	...	7,250	16,500	31,000
Cooperage	20	22,250	93	...	1	32,249	64,382	156,329
Flouring- and grist-mill products	20	570,200	242	...	...	128,768	3,059,263	3,428,618
Glass	1	140,000	230	4	50	101,519	92,707	285,000
Lime	4	60,000	66	...	...	24,400	37,662	77,165
Liquors, malt	3	122,000	24	...	...	10,390	44,767	79,850
Lumber, planed	2	77,000	33	...	...	14,570	38,774	64,078
Lumber, sawed	5	81,200	62	...	4	24,700	127,000	193,600
Oil, castor	1	30,000	8	...	...	2,800	19,000	28,800
Printing and publishing	4	25,200	32	...	3	16,016	10,508	57,650
Saddlery and harness	16	30,821	20	...	1	7,680	23,470	42,200
Slaughtering and meat-packing, not including retail butchering establishments.	4	29,000	16	...	...	2,425	69,344	82,479
Tinware, copperware, and sheet-iron ware	12	23,100	25	...	5	12,185	23,248	45,100
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	100,000	150	25	200	125,000	921,719	1,623,732
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking and snuff).	10	15,250	26	...	6	11,827	13,646	39,191
Woolen goods	1	100,000	26	40	10	30,000	112,000	150,000
Zinc	1	20,000	20	...	...	9,600	23,879	43,200
MARION:								
Agricultural implements	6	15,500	22	...	...	7,807	10,390	29,740
Flouring- and grist-mill products	15	97,700	57	...	...	10,750	237,964	286,765
Iron and steel	1	100,000	117	...	3	53,148	78,812	159,000
Lumber, sawed	13	21,900	37	...	...	5,540	23,413	44,260
MARSHALL:								
Carriages and wagons	4	46,500	42	...	...	20,100	51,800	107,200
Flouring- and grist-mill products	5	76,150	11	...	...	5,216	128,863	169,375
Woolen goods	1	61,500	29	35	...	19,112	51,150	99,000
MASON:								
Flouring- and grist-mill products	7	65,200	22	...	...	7,976	132,342	157,147
MASSAC:								
Carriages and wagons	1	60,000	66	...	3	25,000	32,000	60,000
Flouring- and grist-mill products	6	75,500	43	...	...	14,740	258,875	293,226
Lumber, sawed	12	102,200	234	...	25	47,450	123,050	209,080
Shipbuilding	1	38,000	42	...	...	26,350	59,000	99,500
MENARD:								
Flouring- and grist-mill products	7	76,000	26	...	...	8,030	149,542	200,693

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

ILLINOIS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
MERCER:								
Carriages and wagons	3	$11, 700	11			$6, 556	$14, 500	$37, 000
Flouring- and grist-mill products	8	38, 200	14			5, 391	144, 365	175, 286
Saddlery and harness	8	8, 375	13			3, 500	13, 285	25, 070
MONROE:								
Cooperage	1	5, 000	24			5, 456	13, 000	26, 940
Flouring- and grist-mill products	5	164, 492	94			45, 200	709, 966	793, 139
MONTGOMERY:								
Carriages and wagons	1	2, 000	9			6, 000	25, 000	35, 000
Cars, railroad, street, and repairs	1	300, 000	375		5	155, 000	1, 000, 000	1, 200, 000
Clothing, men's	2	8, 000	4	2		3, 800	9, 000	20, 000
Cooperage	5	13, 400	36			15, 625	18, 400	40, 000
Flouring- and grist-mill products	12	91, 100	56			16, 640	426, 480	488, 514
Lumber, sawed	9	15, 540	33			4, 175	12, 030	24, 173
Saddlery and harness	6	9, 100	14			7, 165	18, 500	37, 500
MORGAN:								
Bread and other bakery products	4	4, 400	8			2, 666	12, 046	21, 100
Brick and tile	11	37, 800	117		29	24, 450	18, 264	57, 352
Carriages and wagons	3	14, 650	21			11, 876	10, 312	31, 090
Cars, railroad, street, and repairs	1	50, 000	120		4	35, 000	200, 000	300, 000
Clothing, men's	6	25, 150	42	5		18, 500	28, 950	56, 900
Flouring- and grist-mill products	10	162, 000	44			16, 287	466, 766	505, 565
Lumber, sawed	5	11, 300	16		2	3, 143	14, 567	25, 040
Printing and publishing	4	32, 600	49	4	7	16, 300	5, 303	28, 843
Saddlery and harness	12	19, 450	27			9, 530	32, 650	54, 000
Slaughtering and meat-packing, not including retail butchering establishments.	3	35, 850	24			12, 870	202, 549	220, 655
Soap and candles	2	10, 000	7			2, 100	10, 000	21, 000
Tinware, copperware, and sheet-iron ware	7	30, 750	28			10, 600	26, 100	49, 650
Tobacco, cigars and cigarettes	6	22, 300	38		5	15, 849	27, 116	58, 870
Woolen goods	2	151, 500	30	27	28	33, 000	129, 225	182, 000
MOULTRIE:								
Flouring- and grist-mill products	6	25, 700	16			3, 780	72, 410	84, 395
Saddlery and harness	4	6, 000	5			1, 275	10, 600	22, 600
OGLE:								
Agricultural implements	4	46, 500	37	2		11, 500	15, 140	42, 450
Cheese and butter (factory)	10	34, 300	37		3	12, 733	142, 962	188, 320
Flouring- and grist-mill products	9	119, 700	45	2		19, 157	278, 770	338, 433
Saddlery and harness	11	14, 900	18		1	6, 965	26, 900	52, 200
PEORIA:								
Agricultural implements	5	250, 000	241		4	87, 500	217, 000	438, 000
Baking and yeast powders (see also Drugs and chemicals)	3	9, 200	9	7		5, 675	27, 150	43, 500
Bread and other bakery products	3	30, 600	31	1		9, 110	58, 594	87, 900
Brick and tile	20	86, 700	190		16	37, 962	25, 505	84, 625
Carriages and wagons	6	66, 000	52		10	26, 200	62, 000	110, 232
Coffee and spices, roasted and ground	2	28, 000	10			5, 500	47, 000	62, 000
Coffins, burial cases, and undertakers' goods	5	18, 500	4			1, 550	11, 000	23, 725
Clothing, men's	16	163, 250	101	183		66, 045	424, 353	607, 865
Confectionery	1	20, 000	15			7, 000	80, 000	120, 000
Cooperage	16	45, 300	222		4	98, 540	201, 391	345, 150
Drugs and chemicals (see also Baking and yeast powders)	1	8, 000	16	14	2	14, 320	41, 828	68, 866
Flouring- and grist-mill products	11	136, 300	53			22, 520	371, 092	440, 817
Foundery and machine-shop products	8	147, 100	217			100, 332	125, 300	273, 250
Furniture	10	50, 900	63			31, 421	45, 970	106, 455
Glucose	1	150, 000	217		3	42, 000	307, 400	450, 000
Housefurnishing goods	1	31, 000	8	10		6, 000	60, 000	80, 000
Liquors, distilled	14	1, 679, 000	1, 076			480, 000	5, 735, 000	8, 196, 000
Liquors, malt	4	154, 000	44			16, 695	81, 878	128, 267
Lumber, planed	4	109, 000	74		3	36, 615	56, 000	120, 500
Lumber, sawed	6	18, 300	40			9, 970	36, 850	59, 200
Marble and stone work	8	17, 300	32			16, 650	25, 500	57, 650
Paper	1	35, 000	31	4		12, 000	10, 000	35, 000
Printing and publishing	12	100, 750	121	21	37	82, 069	52, 575	186, 215
Pumps, not including steam pumps	1	40, 000	20			5, 000	80, 000	100, 000
Saddlery and harness	17	31, 495	46			19, 375	61, 912	117, 068
Saws	1	8, 000	6			2, 080	10, 000	30, 000
Show-cases	1	5, 000	6			3, 000	10, 000	30, 000
Slaughtering and meat-packing, not including retail butchering establishments.	3	205, 000	174		19	15, 900	713, 881	756, 033
Starch	1	250, 000	80	10		13, 000	96, 000	125, 000
Stone- and earthen-ware	1	75, 000	36	2	12	20, 000	14, 000	60, 000
Tinware, copperware, and sheet-iron ware	21	94, 525	69		1	34, 151	98, 200	165, 350
Tobacco, cigars and cigarettes	10	24, 525	53		21	30, 509	43, 092	95, 430
PERRY:								
Agricultural implements	5	30, 000	30			7, 775	19, 450	36, 535
Cooperage	4	5, 300	19			6, 200	24, 100	57, 500
Flouring- and grist-mill products	8	39, 700	39			12, 676	279, 450	335, 706
Foundery and machine-shop products	1	10, 000	26			9, 600	25, 000	46, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

ILLINOIS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
PIATT:								
Flouring- and grist-mill products	5	$57,500	17			$7,501	$99,010	$115,855
PIKE:								
Carriages and wagons	6	34,600	40			17,854	25,147	70,500
Flouring- and grist-mill products	19	221,900	90			30,142	844,694	948,894
Lumber, sawed	9	15,800	29			4,296	15,207	27,110
Saddlery and harness	10	10,400	16			5,391	19,687	42,064
Tinware, copperware, and sheet-iron ware	7	12,200	12			6,450	17,100	29,550
Woolen goods	2	35,000	18	7	7	10,000	34,816	51,502
POPE:								
Flouring- and grist-mill products	10	37,050	26			5,251	80,292	93,935
Lumber, sawed	6	9,600	21			3,225	12,325	22,770
PULASKI:								
Flouring- and grist-mill products	3	32,000	15			4,900	163,200	212,280
Lumber, sawed	15	295,400	185		16	50,388	142,829	245,582
Shipbuilding	1	55,000	53			31,000	54,000	103,000
RANDOLPH:								
Agricultural implements	2	28,000	20			6,400	8,400	25,000
Carriages and wagons	3	8,000	7			4,000	12,000	20,500
Cooperage	3	6,100	31			11,600	12,500	33,000
Flouring- and grist-mill products	15	481,000	144			63,969	1,574,794	1,757,696
Woolen goods	2	10,000	9	7	1	4,185	19,338	26,515
RICHLAND:								
Flouring- and grist-mill products	7	66,800	36			13,618	284,836	322,638
Lumber, planed	2	15,000	18			5,200	11,800	21,000
Lumber, sawed	9	10,500	30		2	3,214	14,090	25,370
Slaughtering and meat-packing, not including retail butchering establishments.	1	15,000	30		2	3,371	99,490	106,000
Tobacco, cigars and cigarettes	3	7,200	10	7		6,400	10,500	20,500
ROCK ISLAND:								
Agricultural implements	4	1,195,000	1,139		151	631,015	1,497,069	2,805,868
Brass castings	1	12,000	27		1	14,218	20,500	38,189
Bread and other bakery products	7	41,700	30	5	4	17,300	124,310	157,459
Brick and tile	8	128,800	86		24	24,470	24,375	66,160
Carriages and wagons	4	322,000	250		3	120,600	349,700	524,500
Cooperage	8	6,500	27			8,550	10,200	22,800
Fire-arms	1	(a)	64		16	39,000	76,800	115,800
Flouring- and grist mill products	4	147,000	34			19,275	357,687	393,974
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	10	477,000	339		20	175,658	220,465	545,489
Furniture (see also Upholstering)	5	7,700	19		1	8,250	7,300	20,400
Glass	1	50,000	65			45,000	36,380	93,000
Liquors, malt	3	1,230,000	53			25,030	107,692	192,329
Lumber, sawed	5	100,000	237		60	103,885	821,590	1,157,500
Malt	2	15,000	6			2,560	27,000	36,000
Marble and stone work	3	5,850	15			6,600	12,400	23,000
Musical instruments, organs and materials	2	10,000	19			10,200	8,500	25,000
Paper	8	280,000	120	14	4	50,877	126,148	265,675
Printing and publishing	8	92,500	61	19	15	29,975	25,060	75,850
Pumps, not including steam pumps	3	92,000	47			16,668	49,237	81,625
Saddlery and harness	12	18,375	8		1	2,845	12,075	20,910
Sash, doors, and blinds	2	41,000	32		8	23,280	53,500	82,000
Scales and balances	1	20,000	13			8,500	12,000	26,000
Slaughtering and meat-packing, not including retail butchering establishments.	2	55,000	22			7,840	146,431	160,082
Soap and candles	1	50,000	7			3,000	30,000	40,000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	8,000	13			8,060	30,000	42,000
Tinware, copperware, and sheet-iron ware	11	50,600	49			24,513	49,766	96,415
Upholstering (see also Furniture)	1	20,000	8	1		4,500	20,000	30,000
Wooden ware	1	50,000	80		4	30,066	100,060	150,000
SAINT CLAIR:								
Agricultural implements	6	410,800	249		11	104,050	122,940	282,500
Bone-, ivory-, and lamp-black	1	40,000	40			15,600	67,500	125,500
Bread and other bakery products	10	27,350	17			6,133	48,880	72,275
Brick and tile	21	38,650	105		25	27,139	16,194	57,715
Carriages and wagons	1	10,000	16		4	6,000	9,000	25,000
Clothing, men's	7	5,900	17			6,722	8,760	24,950
Cooperage	17	64,500	195			75,255	109,250	242,595
Flouring- and grist-mill products	29	1,192,000	383			184,128	3,680,281	4,057,102
Foundery and machine-shop products	7	80,300	136		10	62,210	119,100	212,700
Glucose	1	100,000	60			36,000	280,000	350,000
Iron and steel	3	450,000	555		70	231,200	739,325	1,207,400
Iron bolts, nuts, washers, and rivets	1	140,000	200			115,000	550,000	800,000
Iron nails and spikes, cut and wrought	1	150,000	175		50	100,000	131,000	300,000
Lard, refined	1	12,000	10			5,500	35,000	50,000
Liquors, distilled	2	5,500	12			4,000	49,228	72,000
Liquors, malt	8	457,231	154			62,297	268,078	479,067
Lumber, sawed	3	8,000	14			3,500	13,025	21,000
Mineral and soda waters	6	37,318	21		4	11,800	18,500	54,898
Oil, linseed	1	50,000	10			3,200	90,000	130,000
Saddlery and harness	19	24,200	18			5,571	28,809	51,904
Slaughtering and meat-packing, not including retail butchering establishments.	3	1,550,000	2,160		380	530,019	6,104,019	7,950,000
Tinware, copperware, and sheet-iron ware	18	29,450	35		1	12,110	64,850	105,650
Tobacco, cigars and cigarettes	22	31,400	56	9	6	26,069	31,782	91,740

a Capital not given, as the establishment is owned by the United States.

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.. 1880.

ILLINOIS—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
SALINE:								
Carriages and wagons	4	$6,300	15		1	$3,300	$8,000	$20,500
Flouring- and grist-mill products	7	53,000	37			11,507	141,740	164,885
Lumber, sawed	12	31,100	75		2	14,090	30,850	59,150
SANGAMON:								
Agricultural implements	3	28,500	21		1	10,165	15,775	33,170
Bookbinding and blank-book making	2	25,000	25	12	9	20,000	16,950	46,000
Bread and other bakery products	8	16,700	15	4	3	7,140	23,800	39,000
Brick and tile	15	27,400	95		28	23,900	19,837	59,520
Carriages and wagons	5	87,500	64	1		31,800	42,400	108,250
Cheese and butter (factory)	4	16,000	14			2,702	23,779	31,775
Coffee and spices, roasted and ground	1	8,000	1		3	1,000	18,000	23,000
Confectionery	3	14,500	12	3	6	7,000	24,500	38,000
Flouring- and grist-mill products	20	225,300	94			29,570	466,870	597,155
Foundery and machine-shop products	6	107,500	121			62,665	131,297	240,626
Iron and steel	2	845,620	670		130	309,642	2,222,360	2,441,974
Liquors, distilled	2	105,616	68			28,200	325,100	475,000
Liquors, malt	1	40,000	34			15,165	65,290	116,508
Lumber, sawed	12	17,650	37			6,647	18,425	35,856
Paper	2	78,000	34	5	8	16,720	36,750	90,600
Printing and publishing	6	50,300	123	3	44	49,050	22,150	105,300
Saddlery and harness	17	27,150	48	2		17,725	33,350	80,506
Shoddy	1	12,000	6	7		4,000	12,500	25,000
Slaughtering and meat-packing, not including retail butchering establishments.	7	269,700	133		10	21,050	482,059	552,709
Tinware, copperware, and sheet-iron ware	8	13,250	21		1	10,640	19,425	39,490
Tobacco, cigars and cigarettes	9	17,400	30		11	10,216	13,808	36,650
Watches	1	275,000	267	135		147,014	50,000	220,712
Woolen goods	1	180,000	50	34	11	33,522	118,500	178,000
SCHUYLER:								
Carriages and wagons	2	11,600	15			5,900	13,000	23,000
Flouring- and grist-mill products	7	43,400	16			3,710	81,725	91,625
Lumber, sawed	9	15,700	26			4,075	23,690	36,025
Woolen goods	1	50,000	23	17	5	25,000	100,000	164,000
SCOTT:								
Flouring- and grist-mill products	3	18,000	10			2,600	76,790	86,379
SHELBY:								
Flouring- and grist-mill products	13	120,425	65			24,253	417,838	489,555
Lumber, sawed	14	19,250	63		1	13,450	29,990	55,705
Slaughtering and meat-packing, not including retail butchering establishments.	1	5,000	20			1,500	19,750	24,450
Saddlery and harness	6	6,300	5			1,480	12,536	23,061
STARK:								
Flouring- and grist-mill products	6	21,000	16			4,360	38,750	47,252
Saddlery and harness	6	7,600	11			4,007	12,576	20,925
STEPHENSON:								
Agricultural implements	5	198,000	162		5	63,440	78,810	197,525
Bread and other bakery products	8	17,600	12	3		6,034	29,120	45,058
Carriages and wagons	6	63,000	71			32,637	74,196	127,983
Cheese and butter (factory)	3	8,200	10			3,360	33,510	42,300
Clothing, men's	4	11,850	9	12		7,000	23,700	38,600
Cooperage	4	17,100	37			15,661	23,825	44,991
Flouring- and grist mill products	15	192,813	33			9,226	238,978	277,206
Foundery and machine-shop products	3	10,200	15			6,016	8,500	30,147
Glucose	1	200,000	90			38,700	438,020	650,400
Hardware	2	8,800	6			2,185	8,570	21,870
Leather, tanned	1	20,000	9			3,825	21,100	28,200
Liquors, malt	2	40,000	9			3,850	16,675	30,384
Lumber, planed	1	15,000	11			5,500	10,000	20,000
Printing and publishing	6	36,100	30	4	3	14,357	9,635	34,598
Saddlery and harness	10	29,900	26			11,694	22,700	46,845
Tinware, copperware, and sheet-iron ware	5	18,000	14			7,021	15,269	32,838
TAZEWELL:								
Agricultural implements	5	318,000	221			77,600	213,100	363,400
Bread and other bakery products	5	7,500	7		1	1,855	11,700	21,450
Brick and tile	18	51,050	98		5	17,765	19,115	50,856
Carriages and wagons	3	311,000	142			75,800	167,000	313,700
Cooperage	3	5,700	22			9,105	36,000	54,700
Flouring- and grist-mill products	15	124,800	36			14,060	335,810	389,275
Foundery and machine-shop products	2	9,000	31			11,000	47,000	67,000
Liquors, distilled	3	145,000	105			50,176	470,000	704,361
Lumber, sawed	8	11,300	35			5,458	14,725	27,361
Malt	2	16,000	10			3,350	57,150	68,300
Saddlery and harness	12	20,795	16			5,766	20,425	39,500
Sash, doors, and blinds	1	15,000	25			9,000	10,000	26,000
Slaughtering and meat-packing, not including retail butchering establishments.	3	67,900	51		5	3,950	69,722	80,330
Tinware, copperware, and sheet-iron ware	12	26,350	19			7,096	17,700	37,175
Woolen goods	1	16,000	7	8		4,000	22,000	28,380
UNION:								
Flouring- and grist-mill products	10	77,000	61			19,700	367,018	413,570
Lumber, sawed	8	19,500	110		1	22,612	87,650	124,650
Sash, doors, and blinds	1	4,000	8		2	3,000	15,000	21,000
Slaughtering and meat-packing not including retail butchering establishments.	1	10,000				2,900	23,265	30,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

ILLINOIS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
VERMILION:								
Brick and tile	15	$39, 430	78		3	$11, 050	$17, 056	$38, 860
Carriages and wagons	2	33, 000	27			13, 382	19, 500	37, 500
Flouring- and grist-mill products	14	237, 980	55			23, 149	530, 768	626, 273
Foundery and machine-shop products	3	8, 650	23		1	10, 308	11, 340	25, 185
Lumber, sawed	12	18, 400	42			6, 550	29, 431	46, 190
Printing and publishing	4	46, 000	41	2	19	26, 339	15, 425	67, 370
Saddlery and harness	10	23, 600	27			9, 828	31, 335	51, 892
Tobacco, cigars and cigarettes	6	4, 050	17		3	7, 855	7, 030	24, 275
Woolen goods	1	16, 000	6	1	3	3, 000	17, 200	20, 000
WABASH:								
Flouring- and grist-mill products	5	31, 000	10			2, 300	198, 220	224, 102
Lumber, sawed	2	16, 000	21		3	6, 600	9, 900	22, 000
WARREN:								
Agricultural implements	3	520, 000	478			174, 430	253, 270	494, 500
Brick and tile	8	93, 648	43		3	10, 668	21, 578	45, 600
Flouring- and grist-mill products	6	45, 000	16			4, 461	201, 165	228, 798
Slaughtering and meat-packing, not including retail butchering establishments.	1	5, 000	2			1, 000	24, 000	35, 000
WASHINGTON:								
Cooperage	3	2, 500	18			6, 700	13, 300	30, 900
Flouring- and grist-mill products	14	369, 000	144			60, 283	1, 148, 720	1, 455, 809
Foundery and machine-shop products	1	12, 500	10			6, 000	17, 000	42, 000
WAYNE:								
Flouring- and grist-mill products	8	54, 500	30			6, 566	106, 055	124, 015
Lumber, sawed	15	24, 150	59			6, 690	24, 815	44, 240
Mixed textiles (see also Woolen goods)	1	34, 000	23	35	14	18, 000	96, 357	115, 500
Woolen goods (see also Mixed textiles)	1	34, 000	23	35	14	18, 000	96, 357	115, 500
WHITE:								
Flouring- and grist-mill products	14	137, 400	75			19, 427	534, 405	588, 416
Lumber, sawed	13	94, 800	185		17	41, 470	106, 100	183, 952
Saddlery and harness	4	5, 000	10			3, 261	13, 600	24, 960
WHITESIDE:								
Agricultural implements	5	410, 000	212	15	1	107, 500	143, 000	379, 000
Bookbinding and blank-book making	1	18, 500	13	2		8, 000	7, 000	22, 000
Carriages and wagons	5	78, 700	59		2	25, 632	59, 200	108, 120
Cheese and butter (factory)	11	20, 846	15	2	2	2, 728	16, 963	24, 906
Clothing, men's	9	11, 850	12	24		13, 820	25, 000	49, 400
Coffins, burial cases, and undertakers' goods	1	18, 000	20	1		10, 000	20, 000	40, 000
Cooperage	10	6, 175	15	1		5, 390	11, 990	24, 330
Flouring- and grist-mill products	17	282, 000	48			22, 610	730, 090	787, 916
Foundery and machine-shop products	3	111, 300	29			16, 300	22, 000	52, 500
Furniture	6	105, 500	63			28, 290	58, 150	107, 700
Liquors, distilled	1	140, 000	76			34, 000	450, 500	651, 000
Lumber, sawed	3	120, 000	72		5	21, 500	83, 300	139, 700
Pumps, not including steam pumps	2	25, 600	11			5, 950	14, 000	28, 704
Saddlery and harness	12	17, 100	24			10, 043	27, 000	49, 950
Slaughtering and meat-packing, not including retail butchering establishments.	3	35, 000	23			3, 400	47, 925	61, 500
Tinware, copperware, and sheet-iron ware	10	14, 400	18			8, 750	23, 885	44, 900
Wirework	2	16, 000	24			9, 200	51, 000	85, 000
WILL:								
Agricultural implements	5	68, 500	34			17, 000	19, 700	65, 550
Boots and shoes	1	800, 000	514			101, 750	500, 000	905, 000
Brick and tile	6	113, 600	101			32, 800	51, 310	116, 680
Carriages and wagons	3	6, 500	18			9, 300	14, 800	31, 500
Cheese and butter (factory)	16	43, 400	38	1		9, 619	115, 172	166, 422
Clothing, men's	4	19, 100	10	99		8, 420	69, 100	83, 400
Cooperage	2	105, 000	100			39, 360	160, 000	211, 000
Flouring- and grist-mill products	15	377, 000	91			40, 060	1, 450, 710	1, 597, 583
Foundery and machine-shop products	4	65, 000	67			53, 400	31, 500	102, 000
Hosiery and knit goods	2	11, 000	3	25	3	13, 000	60, 825	111, 940
Iron and steel	2	1, 000, 000	674		38	437, 165	3, 929, 678	6, 295, 024
Leather, curried	1	26, 667	10			5, 617	81, 864	96, 000
Leather, tanned	2	79, 333	21			11, 512	61, 320	95, 520
Liquors, malt	4	170, 000	63			25, 970	111, 716	199, 283
Lumber, planed (see also Sash, doors, and blinds)	2	14, 000	21			12, 600	28, 000	50, 000
Marble and stone work	7	32, 925	131		1	29, 970	40, 543	89, 639
Paper	3	170, 000	91	2	20	47, 000	226, 000	312, 500
Printing and publishing	5	32, 000	32	1	28	17, 320	12, 300	48, 500
Saddlery and harness	14	36, 750	27			9, 979	33, 450	64, 900
Sash, doors, and blinds (see also Lumber, planed)	4	29, 900	48		2	21, 200	17, 500	64, 000
Tobacco, cigars and cigarettes	10	23, 300	27	2	4	22, 834	36, 393	98, 171
Wirework	8	191, 300	308		2	120, 990	1, 049, 950	1, 415, 650
WILLIAMSON:								
Coke	1	30, 000	14		2	8, 437	15, 420	24, 700
Flouring- and grist-mill products	8	30, 400	26			5, 899	91, 225	106, 554
WINNEBAGO:								
Agricultural implements	12	1, 131, 500	542		1	244, 030	381, 341	1, 022, 044
Blacking	1	10, 000	5			2, 400	6, 000	20, 000
Boots and shoes	1	16, 000	30	3		15, 000	60, 500	79, 400
Bread and other bakery products	8	38, 700	40	6	3	22, 324	101, 945	152, 140
Carriages and wagons	4	8, 900	15		2	7, 711	14, 769	30, 682

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

ILLINOIS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
WINNEBAGO—continued.								
Cheese and butter (factory)	8	$35, 450	18			$4, 940	$42, 348	$62, 056
Clothing, men's	3	27, 800	39	2		27, 800	49, 200	93, 000
Cooperage	6	5, 500	20			11, 151	13, 788	28, 551
Cotton goods	2	158, 000	38	85	34	27, 033	66, 100	108, 594
Flouring- and grist-mill products	13	295, 000	70			23, 367	709, 649	789, 012
Foundery and machine-shop products	11	93, 042	95		1	44, 102	66, 753	144, 800
Furniture	10	168, 400	237	2		98, 650	114, 500	281, 300
Gloves and mittens (see also Woolen goods)	2	75, 500	57	75		30, 000	95, 250	145, 500
Iron bolts, nuts, washers, and rivets	1	20, 000	30		10	18, 000	26, 000	50, 000
Iron nails and spikes, cut and wrought	1	50, 000	28	12		14, 000	45, 000	75, 000
Leather, curried	1	5, 000	1			1, 360	21, 500	30, 200
Leather, tanned	2	85, 000	32			13, 720	53, 400	78, 200
Marble and stone work	5	8, 500	26			11, 086	19, 800	36, 642
Paper	4	247, 000	104	16		46, 399	117, 175	295, 390
Printing and publishing	6	50, 300	47	7	14	25, 400	17, 600	56, 300
Pumps, not including steam pumps	3	37, 700	28			16, 300	16, 850	57, 200
Saddlery and harness	15	28, 225	26			9, 387	32, 670	57, 540
Sash, doors, and blinds	3	24, 000	24	1	1	11, 500	19, 200	45, 960
Slaughtering and meat-packing, not including retail butchering establishments.	1	10, 000	5			3, 650	36, 600	44, 770
Soap and candles	2	12, 500	8		1	5, 000	29, 730	46, 400
Tinware, copperware, and sheet-iron ware	13	20, 600	25			11, 653	29, 300	56, 550
Tobacco, cigars and cigarettes	3	4, 500	6			4, 450	13, 400	29, 200
Tools	1	10, 000	40			16, 000	25, 000	50, 000
Watches	1	240, 000	91	30		64, 656	28, 711	106, 698
Windmills	2	19, 000	9			4, 157	8, 500	20, 767
Wire	2	43, 000	54	1	22	20, 500	36, 000	79, 500
Wooden ware	2	8, 000	8	1		2, 880	9, 700	23, 200
Woolen goods (see also Gloves and mittens)	1	25, 000	11	2	4	2, 000	17, 700	30, 000
WOODFORD:								
Brick and tile	8	24, 500	41		1	6, 853	8, 848	22, 150
Flouring- and grist-mill products	9	127, 000	28			5, 765	139, 335	161, 734

INDIANA.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ADAMS:								
Flouring- and grist-mill products	5	$34, 000	4			$2, 000	$76, 112	$92, 065
Lumber, sawed	24	63, 300	89		8	15, 580	78, 028	126, 465
ALLEN:								
Agricultural implements	3	33, 000	12		2	4, 820	11, 465	27, 200
Bread and other bakery products	5	34, 200	27	2		11, 232	84, 306	109, 985
Brick and tile	16	26, 700	115		3	17, 195	16, 380	45, 975
Carriage and wagon materials	4	430, 600	594			206, 200	324, 500	680, 760
Carriages and wagons	5	35, 000	67			24, 260	41, 000	86, 600
Clothing, men's	3	46, 300	22	137	2	31, 400	133, 900	180, 400
Coffee and spices, roasted and ground	2	29, 500	14			6, 000	70, 000	85, 000
Confectionery	1	1, 500	3			2, 000	12, 500	20, 000
Cooperage	6	15, 950	25		4	9, 800	10, 050	29, 861
Flouring- and grist-mill products	18	243, 000	76			30, 248	855, 636	947, 233
Foundery and machine-shop products	5	785, 000	900		45	387, 000	1, 941, 400	2, 529, 000
Furniture	5	71, 000	35		1	17, 515	33, 100	70, 300
Leather, curried	2	6, 767	4			1, 666	31, 255	36, 300
Leather, tanned	2	13, 534	7			3, 490	21, 850	31, 415
Liquors, malt	3	95, 000	23			10, 710	46, 240	85, 438
Lumber, planed (see also Sash, doors, and blinds)	2	11, 000	26		1	8, 300	15, 500	28, 000
Lumber, sawed	58	506, 240	565		95	129, 177	461, 108	723, 972
Marble and stone work	3	15, 000	17			10, 550	9, 500	29, 500
Musical instruments, organs and materials	1	24, 000	58		8	36, 000	40, 000	90, 000
Oil, linseed	1	30, 000	6			3, 000	60, 000	70, 000
Patent medicines and compounds	1	8, 000	12	6		11, 000	12, 000	35, 000
Printing and publishing	5	68, 500	88	1	43	45, 780	70, 700	157, 000
Saddlery and harness	13	30, 400	40			17, 525	54, 900	94, 000
Sash, doors, and blinds (see also Lumber, planed)	2	85, 000	66		4	27, 300	124, 500	184, 600
Slaughtering and meat-packing, not including retail butchering establishments.	1	87, 000	20			10, 500	310, 036	343, 198
Tinware, copperware, and sheet-iron ware	6	12, 300	16			7, 850	15, 100	29, 300
Woolen goods	1	50, 000	21	7	6	8, 000	22, 124	32, 236
BARTHOLOMEW:								
Brick and tile	6	20, 700	36		10	7, 400	10, 525	24, 150
Carriages and wagons	5	17, 500	32		2	14, 656	21, 350	48, 250
Clothing, men's	4	28, 300	17	17		11, 500	58, 000	85, 500
Flouring- and grist-mill products	9	181, 000	47			22, 067	434, 475	517, 936
Leather, curried	2	43, 966	10			3, 533	97, 100	107, 600
Leather, tanned	2	88, 034	19			7, 292	101, 300	121, 900
Lumber, sawed	24	73, 200	177			24, 627	145, 699	202, 834
Mixed textiles (see also Woolen goods)	1	50, 000	22	33	10	20, 000	81, 950	67, 500
Saddlery and harness	9	7, 775	14			4, 325	10, 650	20, 866
Slaughtering and meat-packing, not including retail butchering establishments.	1	180, 000	12			6, 500	166, 650	177, 625
Tinware, copperware, and sheet-iron ware	7	11, 750	11			3, 518	10, 900	20, 186
Woolen goods (see also Mixed textiles)	1	50, 000	25	33	10	20, 000	81, 950	97, 500

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

INDIANA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
BLACKFORD:								
Carriage and wagon materials	1	$25,000	32			$11,000	$35,000	$50,000
Flouring- and grist-mill products	3	38,000	7			3,150	138,675	150,227
Lumber, sawed	9	35,000	46		3	9,625	72,275	102,650
BOONE:								
Brick and tile	16	21,700	69		11	9,955	11,395	28,935
Carriages and wagons	4	16,000	29			10,275	11,375	28,175
Flouring- and grist-mill products	15	66,000	25			8,971	253,995	300,809
Lumber, sawed	29	55,300	154		11	26,011	161,003	224,823
Saddlery and harness	5	9,700	11		1	4,200	13,800	21,800
BROWN:								
Lumber, sawed	7	110,200	226			22,000	82,055	129,500
CARROLL:								
Carriage and wagon materials	1	8,000	21			7,000	35,000	60,000
Clothing, men's	3	5,000	10	1		3,500	8,450	21,500
Flouring- and grist-mill products	19	128,500	26			9,212	245,831	284,710
Lumber, planed	2	21,500	26			5,064	13,000	23,000
Lumber, sawed	34	68,100	113			18,100	127,415	189,335
Paper	2	115,000	33	6	4	16,000	36,700	61,000
CASS:								
Agricultural implements	1	70,000	80			32,600	90,000	144,000
Bread and other bakery products	8	16,750	30	1	3	10,700	57,750	90,750
Brick and tile	16	30,000	74		14	10,120	11,177	30,300
Bridges	1	10,000	25			15,000	10,000	30,000
Carriage and wagon materials	2	95,500	86			30,175	111,800	153,000
Carriages and wagons	5	56,500	89			31,500	47,500	100,500
Clothing, men's	9	63,900	40	18		19,472	33,542	74,245
Cooperage	14	62,500	136			48,620	76,550	154,620
Flouring- and grist-mill products	16	326,500	47			13,320	466,634	540,185
Foundery and machine-shop products	2	15,000	48			30,500	24,000	69,000
Furniture	6	31,000	40	1		13,950	21,880	61,200
Lumber, planed	3	20,100	39		10	18,500	50,000	86,000
Lumber, sawed	34	75,900	172			23,824	133,160	193,600
Oil, linseed	1	180,000	15			5,500	250,000	275,000
Paper	1	35,000	12			4,000	11,750	27,000
Printing and publishing	4	35,000	29		18	19,312	19,500	54,229
Saddlery and harness	6	26,625	13			6,720	20,900	37,050
Tobacco, cigars and cigarettes	7	11,300	19	5	5	6,040	19,000	37,448
Woolen goods	2	21,000	10	2	3	5,000	24,175	33,300
CLARK:								
Boots and shoes	1	100,000	115			18,000	125,000	153,784
Bread and other bakery products	7	2,900	11			4,006	14,050	23,700
Cars, railroad, street, and repairs	1	100,000	1,250			381,667	1,000,000	1,528,000
Cheese and butter (factory)	5	11,800	11			2,370	19,838	27,042
Clothing, men's	5	12,200	17	11		15,632	25,500	52,000
Cooperage	12	39,700	158		3	40,137	52,881	137,885
Flouring- and grist-mill products	17	143,000	43			16,003	354,571	410,902
Foundery and machine-shop products	2	34,600	66			27,800	64,150	113,000
Glass	1	142,000	131	13	19	56,850	70,133	140,400
Hones and whetstones	1	14,000	4	3	3	3,000	3,500	20,000
Leather, curried	2	7,500	3			1,279	28,100	37,570
Leather, tanned	4	18,300	9			3,412	27,550	41,000
Lime and cement	4	135,000	148		5	28,682	61,464	107,000
Lumber, sawed	21	31,270	62		10	8,890	48,330	72,962
Oil, lard	1	10,000	2			760	30,000	36,000
Saddlery and harness	5	9,900	29			5,948	15,400	26,100
Shipbuilding	3	126,500	182			134,781	346,800	509,200
Slaughtering and meat-packing, not including retail butchering establishments.	1	45,000	130			15,240	290,000	275,000
Tinware, copperware, and sheet-iron ware	10	9,000	15		3	6,659	12,100	25,738
CLAY:								
Flouring- and grist-mill products	12	94,464	38			15,871	234,689	263,495
Iron and steel	1	230,000	50			16,610	99,981	150,535
Lumber, sawed	25	80,950	132		10	16,857	80,580	126,262
CLINTON:								
Bread and other bakery products	3	5,900	10		1	3,200	8,500	25,000
Brick and tile	21	44,400	94		2	12,912	20,963	46,717
Carriages and wagons	3	24,500	19		3	11,100	15,000	33,000
Cooperage	5	5,550	27		3	10,750	68,000	96,300
Flax, dressed	1	10,000	25			9,300	5,000	20,000
Flouring- and grist-mill products	10	79,525	28			6,772	184,778	207,597
Lumber, sawed	34	69,150	128			20,603	103,390	157,217
Saddlery and harness	8	20,850	19			5,633	19,400	40,800
CRAWFORD:								
Flouring- and grist-mill products	7	37,950	14			2,030	36,442	41,470
Lumber, sawed	23	56,880	101			10,280	73,195	107,076
DAVIESS:								
Cooperage	1	3,000	12			4,000	8,000	20,000
Flouring- and grist-mill products	6	89,750	33			10,286	302,606	333,501
Lumber, sawed	12	18,100	44			4,700	31,020	44,740

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

INDIANA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
DEARBORN:								
Carriage and wagon materials	1	$7,000	14			$3,380	$13,500	$25,000
Carriages and wagons	4	23,300	16			9,100	6,250	21,300
Coffins, burial cases, and undertakers' goods	3	40,200	40			22,000	18,490	76,200
Cooperage	7	49,350	164		4	83,550	169,180	273,770
Flouring- and grist-mill products	16	206,300	79			23,984	567,212	632,970
Foundery and machine-shop products	3	249,000	149			73,050	101,850	195,850
Furniture	5	200,000	255		4	100,350	119,067	292,142
Furniture, chairs	3	55,000	102	18	21	54,000	57,000	160,000
Iron and steel	1	350,000	225		45	100,851	328,435	558,300
Liquors, distilled	5	1,750,000	218			92,500	1,050,000	1,547,125
Liquors, malt	5	273,774	108			47,543	197,121	365,022
Lumber, planed	1	30,000	8			4,680	25,000	31,000
Lumber, sawed	18	38,400	60		1	7,805	54,630	79,470
DECATUR:								
Brick and tile	15	27,945	56		6	6,770	10,470	24,400
Clothing, men's	4	4,500	7	12		4,200	13,150	26,250
Flouring- and grist-mill products	12	80,450	23			5,670	118,575	133,372
Furniture	1	4,500	16			9,360	14,000	35,000
Lumber, sawed	22	42,500	64			8,700	62,600	93,965
Marble and stone work	2	7,000	13			6,400	11,600	26,400
Woolen goods	2	35,000	33	3		12,230	53,860	86,600
DE KALB:								
Flouring- and grist-mill products	10	63,500	23			4,213	98,122	111,811
Lumber, sawed	32	80,070	93		1	10,807	83,413	123,048
Saddlery and harness	8	8,200	12			3,310	9,200	20,042
DELAWARE:								
Bread and other bakery products	4	6,650	9		1	2,500	14,000	21,300
Brick and tile	13	19,825	58		23	11,185	9,817	28,115
Carriage and wagon materials	1	15,000	14			3,000	10,000	20,000
Carriages and wagons	5	33,000	45		1	24,000	23,000	63,000
Clothing, men's	3	19,000	9	7		9,640	17,000	32,200
Cooperage	3	8,900	32			13,500	31,260	57,820
Flax, dressed	3	54,700	21	30	40	26,000	105,000	160,000
Flouring- and grist-mill products	12	101,600	29			8,530	193,926	223,999
Foundery and machine-shop products	1	35,000	25			10,400	12,000	35,000
Furniture	2	21,000	7			3,500	14,500	25,000
Handles, wooden	1	12,000	12			5,000	8,000	20,000
Lumber, sawed	33	74,850	161		4	15,025	139,867	193,472
Marble and stone work	3	9,400	12			5,820	22,800	38,800
Saddlery and harness	3	17,100	8			3,400	12,000	21,500
Slaughtering and meat-packing, not including retail butchering establishments.	1	150,000	30			2,000	120,000	130,000
Woolen goods	2	26,000	14	3	7	2,900	17,350	26,000
DUBOIS:								
Flouring- and grist-mill products	9	48,500	21			4,871	132,950	153,770
Liquors, malt	3	12,500	9			2,964	12,743	23,430
Lumber, sawed	21	63,900	91		5	11,893	72,150	108,869
ELKHART:								
Brick and tile	11	15,950	66		3	10,705	8,432	25,625
Carriages and wagons	9	78,200	106			37,850	54,900	113,700
Clothing, men's	4	6,100	14	15		12,300	17,700	37,700
Cooperage	6	20,300	27			10,000	22,275	40,600
Flouring- and grist-mill products	13	196,000	44			17,760	522,280	568,164
Furniture	5	110,600	128			53,600	105,200	220,500
Hosiery and knit goods	1	30,000	22	110	49	18,000	73,120	115,000
Lumber, planed	4	66,000	24		5	9,800	22,120	40,850
Lumber, sawed	40	101,900	128		2	19,261	116,470	175,562
Musical instruments and materials (not specified)	1	30,000	72			30,000	10,000	50,000
Oil, linseed	1	25,000	7			3,000	75,000	84,560
Paper	5	325,000	90	90	20	65,600	248,300	405,500
Printing and publishing	5	54,500	24	2		13,300	11,900	35,207
Pumps, not including steam pumps	3	99,000	92			43,000	105,000	210,000
Saddlery and harness	4	10,900	17			6,940	9,700	24,200
Starch	2	125,000	74	7	9	34,000	212,000	300,000
Washing-machines and clothes-wringers	1	12,000	20	5		10,000	25,400	60,000
Woolen goods	3	43,130	22	24	2	11,485	55,595	71,645
FAYETTE:								
Carriages and wagons	1	30,000	20			8,000	25,000	45,000
Coffins, burial cases, and undertakers' goods	1	70,000	30	20	10	22,500	25,000	50,527
Flouring- and grist-mill products	3	83,000	28			21,280	263,264	296,170
Foundery and machine-shop products	1	40,000	35			14,000	11,000	26,000
Furniture	3	193,500	198		40	84,175	130,000	261,897
Hosiery and knit goods	1	10,000	4	50	3	5,000	17,010	27,000
Lumber, sawed	9	27,700	42		1	9,700	65,640	97,100
Tobacco, cigars and cigarettes	2	14,500	26			15,300	16,250	45,000
FLOYD:								
Bread and other bakery products	14	10,865	23	1	1	10,898	32,838	58,601
Brick and tile	5	11,200	64		14	15,750	8,535	31,715
Carriage and wagon materials	1	20,208	65		15	20,000	42,500	76,681
Clothing, men's	9	40,700	26	22		17,315	37,375	77,456
Cooperage	5	5,810	33			10,165	12,463	33,100

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

INDIANA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
FLOYD—continued.								
Cotton goods (see also Mixed textiles)	1	$150,000	26	28	....	$26,000	$109,522	$278,400
Flouring- and grist-mill products	9	130,000	38	....	....	14,925	319,939	399,137
Foundery and machine-shop products	4	151,000	243	....	....	110,900	157,600	318,000
Furniture	5	67,850	68	....	....	24,510	27,370	84,150
Glass	3	1,300,000	564	40	95	227,357	363,600	650,381
Glue	1	20,000	15	....	....	4,320	28,500	39,000
Hones and whetstones	1	20,000	10	....	....	6,240	40,000	52,000
Iron and steel	2	458,000	470	....	30	180,000	1,184,860	1,472,600
Leather, curried	8	65,932	31	....	....	11,614	262,614	311,665
Leather, tanned	8	133,868	61	....	....	23,458	212,049	263,442
Liquors, malt	3	61,000	22	....	....	10,465	44,682	81,125
Lumber, sawed	6	32,900	25	....	3	5,360	22,990	36,200
Marble and stone work	5	6,500	14	....	....	5,916	12,900	27,050
Mixed textiles (see also Cotton goods; Woolen goods)	1	400,000	120	80	110	150,000	269,600	539,000
Printing and publishing	4	49,800	33	3	2	13,940	13,490	35,700
Shipbuilding	3	9,000	29	....	....	17,850	41,300	65,700
Slaughtering and meat-packing, not including retail butchering establishments.	1	25,000	30	....	10	1,500	112,000	125,000
Tinware, copperware, and sheet-iron ware	6	27,873	20	....	1	8,558	20,753	38,000
Tobacco, cigars and cigarettes	14	7,279	28	....	7	11,116	14,663	42,916
Woolen goods (see also Mixed textiles)	1	400,000	149	80	105	150,000	263,000	539,000
FOUNTAIN:								
Brick and tile	9	13,600	53	....	1	10,305	8,130	25,120
Carriages and wagons	5	17,000	37	....	....	11,388	10,000	29,063
Clothing, men's	4	4,800	16	....	....	8,100	13,600	28,700
Flouring- and grist-mill products	13	92,350	18	....	12	8,347	251,878	278,933
Lumber, sawed	23	58,825	82	....	2	10,814	98,590	139,225
Saddlery and harness	8	9,500	13	....	....	4,900	12,400	24,000
FRANKLIN:								
Flouring- and grist-mill products	8	54,000	21	....	....	5,157	122,255	137,537
Liquors, distilled	2	29,000	70	....	....	30,000	275,625	437,500
Lumber, sawed	18	37,750	42	....	....	5,240	36,640	53,550
Paper	1	60,000	33	5	....	18,000	64,000	100,000
FULTON:								
Carriages and wagons	2	9,500	19	....	....	7,000	7,500	22,500
Clothing, men's	3	8,800	12	10	....	8,300	18,000	30,500
Flouring- and grist-mill products	8	62,000	16	....	....	3,570	119,360	128,932
Lumber, sawed	26	55,920	80	....	4	10,979	85,785	123,965
GIBSON:								
Flouring- and grist-mill products	11	53,800	23	....	....	4,942	138,675	158,672
Liquors, distilled	1	15,000	6	....	....	2,500	19,000	28,500
Lumber, sawed	13	102,500	108	....	....	18,900	146,850	212,320
Saddlery and harness	8	7,225	16	....	....	4,530	11,300	23,800
GRANT:								
Brick and tile	24	30,200	90	....	6	14,135	14,417	38,440
Carriages and wagons	2	19,000	18	....	....	8,700	19,000	33,500
Flax, dressed	3	19,800	38	....	5	16,000	69,500	107,500
Flouring- and grist-mill products	15	93,500	35	....	....	5,740	221,685	248,101
Furniture, chairs	1	15,000	20	....	....	13,000	15,000	35,000
Lumber, sawed	25	176,500	154	....	10	29,332	145,088	225,450
Oil, linseed	1	25,000	10	....	....	4,000	100,000	120,000
Saddlery and harness	4	13,675	16	....	....	7,880	13,700	30,590
Slaughtering and meat-packing, not including retail butchering establishments.	1	150,000	30	....	....	7,000	128,500	136,500
GREENE:								
Flouring- and grist-mill products	16	69,600	45	....	....	10,876	193,943	218,372
Lumber, sawed	19	82,500	103	....	9	20,065	108,685	165,635
HAMILTON:								
Brick and tile	19	41,019	68	....	3	9,443	13,335	31,620
Carriages and wagons	2	30,000	31	....	....	14,000	20,000	45,000
Flouring- and grist-mill products	18	134,800	71	....	....	18,729	549,348	598,878
Lumber, sawed	38	118,450	153	....	18	16,848	132,038	192,948
Saddlery and harness	8	6,240	12	....	....	3,675	12,700	23,300
HANCOCK:								
Flouring- and grist-mill products	6	48,000	18	....	....	6,763	138,340	162,708
Furniture	5	36,850	25	....	....	7,609	14,731	32,070
Lumber, sawed	19	52,200	90	....	1	9,967	71,310	103,075
HARRISON:								
Flouring- and grist-mill products	11	61,900	27	....	....	4,352	174,783	192,779
Lumber, sawed	30	43,750	129	....	....	10,125	80,678	118,120
HENDRICKS:								
Brick and tile	18	20,150	53	....	1	11,855	11,580	32,050
Carriages and wagons	3	15,600	19	....	....	6,000	11,000	24,500
Flouring- and grist-mill products	18	87,400	55	....	....	10,368	198,004	229,713
Lumber, sawed	29	65,950	129	....	6	26,615	212,410	306,850
HENRY:								
Bagging, flax, hemp, and jute	1	30,000	26	10	15	14,000	15,500	40,000
Brick and tile	16	29,885	65	....	11	9,310	17,140	36,300
Flouring- and grist-mill products	18	107,800	38	....	....	8,390	327,975	373,459
Furniture	9	32,200	27	....	....	8,200	9,116	24,394
Lumber, sawed	27	68,850	103	....	2	11,999	91,446	134,550

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

INDIANA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
HENRY—continued.								
Saddlery and harness	12	$10, 500	18			$3, 565	$12, 179	$23, 140
Slaughtering and meat-packing, not including retail butchering establishments.	1	325, 000	150			10, 000	332, 321	376, 573
Tinware, copperware, and sheet-iron ware	4	10, 500	11			4, 575	16, 300	26, 175
Tobacco, cigars and cigarettes	2	12, 350	19		7	10, 650	19, 475	36, 200
HOWARD:								
Brick and tile	23	32, 475	92		2	12, 586	20, 087	41, 565
Carriages and wagons	3	16, 000	27			9, 580	15, 590	31, 380
Clothing, men's	4	2, 875	13	5		8, 975	10, 515	23, 515
Flouring- and grist-mill products	11	66, 000	41			8, 722	135, 423	170, 994
Lumber, sawed	34	71, 130	153			17, 645	125, 293	178, 780
Saddlery and harness	6	13, 575	17			9, 535	17, 324	31, 600
Sash, doors, and blinds	2	40, 000	31		2	9, 075	23, 600	37, 000
HUNTINGTON:								
Bagging, flax, hemp, and jute	1	17, 000	12	12	21	5, 000	14, 000	24, 000
Brick and tile	16	26, 000	55		2	6, 230	10, 930	23, 056
Carriage and wagon materials	1	25, 000	16			6, 500	18, 000	30, 000
Clothing, men's	5	7, 700	17	15		7, 000	12, 600	25, 500
Cooperage	5	18, 025	38		20	10, 325	18, 650	34, 800
Flouring- and grist-mill products	13	93, 400	30			11, 250	381, 305	427, 048
Lime	7	23, 200	59			17, 000	14, 500	53, 680
Lumber, sawed	37	163, 200	214		12	34, 001	164, 618	254, 500
Saddlery and harness	4	7, 600	19		2	6, 000	15, 000	25, 000
JACKSON:								
Agricultural implements	1	21, 094	70		12	20, 000	36, 320	75, 000
Cooperage	4	7, 000	29			10, 075	11, 100	27, 500
Flouring- and grist-mill products	9	50, 300	27			4, 122	101, 240	124, 723
Leather, curried	6	7, 349	5			1, 617	24, 460	31, 570
Leather, tanned	7	17, 701	10			3, 183	17, 621	28, 345
Lumber, planed (see also Sash, doors, and blinds)	1	1, 500	2			1, 100	25, 000	36, 000
Lumber, sawed	37	143, 300	240		13	34, 770	201, 690	303, 215
Marble and stone work	3	6, 500	12			5, 400	11, 000	22, 800
Sash, doors, and blinds (see also Lumber, planed)	1	800	6			2, 000	18, 000	22, 000
Woolen goods	1	66, 375	22	20	12	12, 769	65, 742	77, 800
JAY:								
Flouring- and grist-mill products	7	43, 200	25			2, 800	131, 665	153, 970
Lumber, sawed	29	78, 150	92		1	13, 400	93, 880	138, 425
JEFFERSON:								
Carriage and wagon materials	2	90, 000	80			27, 000	64, 000	125, 000
Carriages and wagons	2	18, 000	19			8, 120	13, 100	25, 400
Cooperage	4	17, 150	86		6	33, 120	49, 250	93, 400
Flouring- and grist-mill products	14	216, 000	61			20, 105	548, 704	678, 525
Foundery and machine-shop products	2	16, 500	37			11, 000	10, 000	28, 000
Furniture	1	45, 000	50			19, 250	24, 500	54, 600
Leather, curried	6	20, 502	8			3, 699	135, 792	163, 075
Leather, tanned	6	40, 998	19			7, 158	112, 105	133, 887
Liquors, malt	2	52, 000	16			6, 778	28, 818	52, 211
Lumber, sawed	11	31, 100	39		1	6, 155	39, 330	58, 980
Printing and publishing	3	26, 000	28		5	14, 744	11, 000	30, 000
Saddlery and harness	10	42, 900	130			42, 925	78, 150	123, 040
Sash, doors, and blinds	2	17, 000	30			10, 974	34, 600	60, 900
Shipbuilding	2	35, 000	63			37, 300	84, 000	150, 900
Starch	2	240, 000	124		3	59, 880	472, 740	597, 880
Tinware, copperware, and sheet-iron ware	4	7, 600	13			5, 910	16, 300	25, 000
Woolen goods	2	43, 000	35	26	11	12, 108	56, 482	71, 525
JENNINGS:								
Agricultural implements	3	39, 000	46			18, 248	25, 985	49, 600
Flouring- and grist-mill products	8	32, 800	17			3, 903	75, 355	93, 971
Lumber, sawed	19	49, 980	68		5	10, 025	71, 810	105, 167
JOHNSON:								
Brick and tile	13	27, 000	64		2	7, 325	12, 025	27, 134
Carriages and wagons	2	15, 000	25			11, 760	15, 000	34, 700
Clothing, men's	4	28, 275	5	31		20, 756	31, 285	62, 695
Cooperage	5	9, 600	22		1	8, 375	10, 400	23, 800
Flouring- and grist-mill products	13	193, 650	57		1	22, 283	375, 769	437, 250
Fruits and vegetables, canned and preserved	2	35, 650	65	65	77	12, 500	53, 500	91, 000
Lumber, planed	2	11, 000	13			3, 000	16, 500	22, 400
Lumber, sawed	20	47, 500	86		6	13, 943	97, 730	142, 430
Saddlery and harness	9	9, 600	15		2	5, 450	13, 050	27, 750
Slaughtering and meat-packing, not including retail butchering establishments.	1	200, 000	90		10	20, 000	180, 000	207, 000
Starch	1	80, 000	45			17, 000	80, 000	140, 000
KNOX:								
Brick and tile	6	18, 650	55		10	8, 100	8, 420	24, 160
Flouring- and grist-mill products	11	167, 400	80			26, 685	596, 569	659, 048
Foundery and machine-shop products	1	12, 000	24			8, 860	18, 000	31, 000
Furniture	1	17, 000	15		5	6, 000	10, 000	22, 000
Liquors, malt	1	50, 000	18			8, 264	34, 988	64, 203
Lumber, planed	1	10, 000	8			2, 800	35, 000	40, 000
Lumber, sawed	18	77, 240	103		14	16, 395	125, 495	180, 950
Saddlery and harness	7	20, 020	18			7, 610	15, 200	33, 000
Slaughtering and meat-packing, not including retail butchering establishments.	1	150, 000	15			6, 000	128, 000	150, 000
Tinware, copperware, and sheet-iron ware	5	15, 850	12			5, 110	11, 700	24, 600

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

INDIANA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
KOSCIUSKO:								
Brick and tile	11	$14, 650	58	2	1	$10, 765	$8, 490	$26, 600
Carriage and wagon materials	2	39, 000	24			7, 920	18, 250	34, 000
Carriages and wagons	8	50, 800	52			23, 180	36, 100	81, 500
Cooperage	5	9, 200	18		7	6, 184	6, 862	20, 343
Flouring and grist-mill products	13	71, 700	26			8, 365	191, 017	211, 581
Foundery and machine-shop products	2	8, 000	14			4, 122	19, 419	28, 225
Furniture	7	20, 900	29		1	11, 608	11, 500	33, 704
Lumber, sawed	65	163, 638	258		3	29, 612	217, 285	318, 745
Saddlery and harness	8	4, 250	11			4, 601	10, 405	24, 000
LAGRANGE:								
Flouring- and grist-mill products	9	96, 500	18			5, 065	140, 673	162, 068
Lumber, sawed	24	65, 785	75		1	8, 470	64, 519	93, 020
Saddlery and harness	4	11, 500	15			5, 100	10, 100	26, 500
LAKE:								
Brick and tile	7	12, 700	47		6	20, 320	8, 223	39, 100
Fertilizers	1	50, 000	60			20, 000	5, 000	50, 000
Flouring- and grist-mill products	5	22, 000	12			2, 150	19, 130	21, 735
Lumber, sawed	2	28, 500	13			3, 660	22, 300	32, 800
Sash, doors, and blinds	1	15, 000	6			2, 500	20, 000	30, 000
Slaughtering and meat-packing, not including retail butchering establishments.	1	500, 000	86		5	30, 000	3, 053, 500	3, 237, 075
LA PORTE:								
Agricultural implements	5	188, 350	130		10	66, 300	68, 010	211, 000
Brick and tile	4	45, 000	55		2	15, 280	6, 525	29, 850
Carriages and wagons	5	39, 000	41			15, 900	19, 000	66, 500
Cars, railroad, street, and repairs	1	100, 000	475		25	180, 000	1, 200, 000	1, 500, 000
Cooperage	8	76, 100	140			43, 128	103, 000	160, 750
Flouring- and grist-mill products	21	150, 150	41			13, 492	331, 759	374, 944
Furniture	5	24, 600	39			16, 700	19, 800	44, 800
Furniture, chairs	1	80, 000	160			60, 000	70, 000	150, 000
Leather, curried	1	6, 667	2			936	29, 600	35, 000
Leather, tanned	2	16, 333	6			2, 372	21, 370	31, 000
Liquors, malt	2	57, 000	12			5, 429	23, 312	42, 248
Lumber, sawed	23	54, 650	85			7, 215	51, 175	75, 876
Patent medicines and compounds	2	7, 000	5			3, 900	10, 000	31, 000
Refrigerators	1	16, 000	58			15, 000	30, 000	50, 000
Sash, doors, and blinds	1	15, 000	16			6, 000	12, 000	24, 000
Tobacco, cigars and cigarettes	9	24, 350	96		2	16, 840	76, 670	139, 750
Woolen goods	2	210, 000	32	46	7	28, 000	154, 000	225, 000
LAWRENCE:								
Carriage and wagon materials	3	9, 600	21			5, 325	10, 400	21, 600
Flouring- and grist-mill products	14	56, 400	32			3, 437	105, 465	125, 043
Lumber, sawed	23	63, 750	118		7	11, 542	78, 965	118, 500
MADISON:								
Brick and tile	15	20, 800	63		3	10, 380	10, 550	30, 770
Carriage and wagon materials	1	10, 000	16		4	7, 500	20, 000	35, 000
Carriages and wagons	2	14, 500	17			11, 700	13, 000	31, 000
Clothing, men's	5	6, 300	13	5		6, 800	11, 950	22, 600
Flax, dressed	3	29, 000	22			6, 300	20, 900	37, 500
Flouring- and grist-mill products	15	132, 500	33			12, 475	314, 715	359, 140
Foundery and machine-shop products	1	40, 000	25			16, 800	16, 800	40, 000
Lumber, sawed	42	142, 000	250		21	53, 598	266, 310	406, 415
Sash, doors, and blinds	2	20, 000	15			5, 300	14, 000	27, 000
MARION:								
Agricultural implements	3	41, 000	55			11, 400	31, 200	55, 500
Baking and yeast powders (see also Drugs and chemicals)	3	5, 500	16	2		6, 620	35, 000	56, 500
Belting and hose, leather	2	25, 000	9			3, 600	40, 693	47, 759
Boxes, wooden, packing	3	37, 300	52			20, 020	43, 200	118, 200
Brass castings	1	10, 000	14			7, 069	30, 000	40, 000
Bread and other bakery products	25	95, 900	142	27	6	75, 821	234, 110	423, 071
Brick and tile	31	119, 900	239		18	62, 336	54, 616	159, 677
Brooms and brushes	6	14, 050	39	8	17	11, 042	28, 604	56, 850
Carpets, rag	7	6, 550	5	7	2	4, 347	12, 350	21, 850
Carriage and wagon materials	1	250, 000	450			155, 000	229, 000	500, 000
Carriages and wagons	14	248, 500	260		3	78, 400	115, 620	250, 420
Cheese and butter (factory)	3	10, 500	33	1		5, 464	60, 305	81, 275
Clothing, men's	27	172, 410	219	127	1	165, 235	375, 410	658, 960
Clothing, women's	2	37, 000	3	87		20, 500	65, 000	109, 000
Coffee and spices, roasted and ground	4	63, 000	24	4		10, 130	197, 450	230, 100
Coffins, burial cases, and undertakers' goods	5	67, 000	61			28, 464	43, 800	99, 140
Confectionery	12	90, 750	54	24	6	29, 568	181, 835	273, 200
Cooperage	15	278, 400	523		75	154, 150	813, 225	1, 110, 032
Cotton goods	1	140, 000	19	21	12	10, 529	39, 668	64, 738
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds)	6	62, 700	35	26		22, 450	56, 000	113, 000
Dyeing and finishing textiles	5	4, 400	15	24		12, 100	9, 850	32, 000
Fertilizers	5	103, 000	94			41, 424	714, 000	920, 000
Flouring- and grist-mill products	23	524, 700	134			64, 234	1, 759, 310	1, 938, 843
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	15	1, 188, 000	1, 275	4	34	534, 090	742, 000	1, 736, 000
Fruits and vegetables, canned and preserved	1	15, 000	50	25		15, 000	100, 000	150, 000
Furniture (see also Mattresses and spring beds; Upholstering)	17	357, 900	488	7	57	197, 083	582, 212	917, 600
Furniture, chairs	2	59, 000	40		2	13, 165	7, 320	32, 000
Glue	2	27, 000	15		9	6, 000	32, 500	45, 500
Grease and tallow	2	6, 000	21		1	6, 100	34, 400	43, 590
Iron and steel	2	640, 000	320			123, 305	769, 382	885, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

INDIANA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
MARION—continued.								
Iron bolts, nuts, washers, and rivets	1	$26,000	14			$13,000	$60,000	$85,600
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	3	103,000	126			41,600	79,191	136,592
Liquors, distilled	1	200,000	15			6,005	60,378	90,500
Liquors, malt	3	400,000	148			66,036	280,558	508,740
Lightning rods	1	45,000	32			9,000	6,000	30,000
Looking-glass and picture frames	8	36,050	37	1	6	21,830	51,800	90,500
Lumber, sawed	15	267,150	147		10	48,269	374,285	535,270
Malt	1	9,000	4			1,715	22,000	27,000
Marble and stone work	11	46,050	91		5	47,700	112,985	237,265
Mattresses and spring beds (see also Furniture)	4	10,700	25	1	1	11,300	26,440	53,900
Millinery and lace goods	6	37,000		69		12,100	78,000	132,000
Oil, lard	1	30,000	8			3,500	100,000	110,000
Oil, linseed	1	75,000	28	1	2	14,515	300,000	332,240
Paints (see also Varnish)	1	8,000	1		3	1,200	18,000	35,000
Paper	1	50,000	35	25		18,000	72,800	105,000
Patent medicines and compounds (see also Drugs and chemicals)	2	10,000	12	4		10,900	15,000	55,000
Printing and publishing	24	446,320	541	75	21	322,302	301,652	811,377
Pumps, not including steam pumps	4	20,650	44		1	17,289	35,000	71,500
Roofing and roofing materials	4	13,200	13			5,288	41,500	71,500
Saddlery and harness	20	43,500	85		3	39,509	105,700	194,800
Sash, doors, and blinds (see also Wood, turned and carved)	9	306,900	180	1	24	88,245	261,300	442,900
Saws	3	112,000	64			56,050	161,000	291,000
Sewing-machine cases	1	14,000	18			6,000	52,000	71,000
Shirts	4	12,300	11	45	6	21,260	24,800	59,600
Slaughtering and meat-packing, not including retail butchering establishments.	7	1,618,000	892			345,236	7,890,208	9,014,422
Soap and candles	3	12,500	21			6,600	33,000	47,500
Starch	1	180,000	67	9	9	35,000	195,000	239,000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	15,000	10			4,000	48,000	60,000
Surgical appliances	1	500,000	40	10		86,000	25,000	150,000
Telegraph and telephone apparatus	1	80,000	77	6	30	44,000	90,000	180,000
Tinware, copperware, and sheet-iron ware	28	62,760	117	2	13	50,562	124,305	240,467
Tobacco, cigars and cigarettes	43	52,025	189	9	34	83,776	121,482	298,950
Trunks and valises	6	20,600	47		1	18,012	26,600	60,500
Upholstering (see also Furniture)	6	13,425	24	2	1	12,800	46,000	72,500
Varnish (see also Paints)	2	85,000	13			7,716	95,000	112,000
Vinegar	1	10,000	5			1,200	15,000	37,500
Window blinds and shades	3	22,000	28	1		10,900	32,000	59,000
Wood, turned and carved (see also Sash, doors, and blinds)	3	15,000	44		1	20,127	43,155	93,500
Wooden ware	3	124,000	107	32	37	55,250	59,000	158,000
Woolen goods	2	175,000	35	30	15	18,700	91,550	103,300
MARSHALL:								
Carriages and wagons	3	23,500	27			9,565	26,200	47,440
Flouring- and grist-mill products	13	90,300	36			11,351	369,375	416,274
Foundery and machine-shop products	2	7,500	17			11,000	27,000	44,800
Lumber, sawed	53	283,500	287		10	52,585	330,607	493,035
MARTIN:								
Flouring- and grist-mill products	4	61,190	9			3,475	98,665	112,070
Lumber, sawed	14	34,950	60			5,583	31,325	48,435
MIAMI:								
Bagging, flax, hemp, and jute	1	50,000	50	50	25	50,000	30,000	125,000
Brick and tile	15	21,740	48	1	5	7,457	11,255	26,250
Carriages and wagons	3	37,000	53			21,700	34,500	70,000
Flouring- and grist-mill products	18	95,300	42			8,653	223,430	256,509
Furniture	3	24,200	19		3	7,200	7,200	20,100
Liquors, malt	1	50,000	15			5,467	23,257	42,130
Lumber, sawed	29	175,985	163		3	22,788	286,850	390,200
Saddlery and harness	8	6,225	14			5,440	15,565	26,900
Sewing-machine cases	1	500,000	275		25	95,243	70,000	175,000
Woolen goods	1	200,000	28	30	15	18,500	74,625	112,200
MONROE:								
Carriage and wagon materials	2	42,000	44		15	15,600	37,800	62,200
Flouring- and grist-mill products	9	52,700	33			4,620	72,790	84,890
Furniture	2	16,500	29		5	9,300	20,250	37,000
Leather, curried	2	13,834	7			2,334	41,640	47,200
Leather, tanned	4	33,666	17		1	5,246	37,411	50,628
Lumber, sawed	17	36,600	95		1	10,979	66,832	102,290
Tinware, copperware, and sheet-iron ware	3	7,500	13			4,400	16,500	25,200
MONTGOMERY:								
Brick and tile	13	24,400	62		4	9,915	10,471	27,450
Carriages and wagons	6	53,500	41		2	16,800	23,300	52,300
Clothing, men's	7	12,550	20	11		11,600	23,300	50,000
Coffins, burial cases, and undertakers' goods	1	60,000	38	5		18,000	15,000	65,000
Flouring- and grist-mill products	19	160,794	51			12,859	350,442	403,217
Lumber, sawed	34	103,450	188		4	40,421	152,302	246,750
Saddlery and harness	4	8,000	7			2,960	13,150	21,000
Woolen goods	4	77,000	38	16	17	12,080	51,010	72,492
MORGAN:								
Brick and tile	10	25,900	115		2	35,435	18,930	73,800
Flouring- and grist-mill products	11	76,100	46			9,591	221,721	248,662
Lumber, sawed	23	55,000	91		2	11,725	96,770	143,885
Slaughtering and meat-packing, not including retail butchering establishments.	1	10,000	36			8,540	194,480	228,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

INDIANA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
NOBLE:								
Brick and tile	10	$15,725	57		3	$9,666	$10,865	$27,025
Carriages and wagons	6	33,700	31			15,500	28,000	60,250
Clothing, men's	6	10,500	19	1	1	10,400	20,100	34,300
Flouring- and grist-mill products	11	93,000	28			11,807	280,140	305,472
Foundery and machine-shop products	1	43,000	19			7,200	17,000	45,000
Furniture	10	45,300	27			8,925	15,900	37,500
Lumber, sawed	30	97,450	121			17,812	147,021	211,580
Saddlery and harness	9	23,200	20			8,345	18,300	32,310
Sash, doors, and blinds	2	41,050	13			5,680	39,000	56,000
OHIO:								
Flouring- and grist-mill products	3	53,000	22			5,700	87,500	105,030
Lumber, sawed	4	10,850	14			1,750	15,130	21,500
ORANGE:								
Flouring- and grist-mill products	9	33,650	19			4,902	93,100	112,314
Lumber, sawed	21	31,400	102			7,655	50,660	74,850
OWEN:								
Flouring- and grist-mill products	10	54,100	26			3,457	109,588	123,524
Lumber, sawed	18	42,150	87			7,929	74,185	109,655
PARKE:								
Flouring- and grist-mill products	14	209,200	21			5,551	113,165	133,075
Lumber, sawed	27	78,130	159			22,157	127,724	191,550
PERRY:								
Cotton goods	1	300,000	69	194	38	58,300	205,532	320,500
Flouring- and grist-mill products	7	34,300	27			4,674	62,350	77,424
Liquors, malt	5	31,000	12			5,408	23,057	41,776
Lumber, sawed	13	29,600	62		1	5,450	29,240	44,480
Woolen goods	1	6,000	12	6		4,344	14,235	20,341
PIKE:								
Flouring- and grist-mill products	5	37,500	19			5,142	96,020	112,470
Lumber, sawed	9	22,700	34			3,027	25,275	36,290
PORTER:								
Brick and tile	9	24,950	134		18	32,470	17,810	68,050
Cheese and butter (factory)	6	8,200	12	3		4,839	35,023	51,586
Flouring- and grist-mill products	9	82,600	20			5,200	93,080	108,952
Lumber, sawed	14	31,600	39		1	4,433	42,536	59,460
Musical instruments, organs and materials	1	22,000	25	2	13	19,000	20,000	50,000
Paper	1	40,000	14	4		6,000	15,000	35,000
Woolen goods	1	100,000	44	24	22	26,000	210,000	270,000
POSEY:								
Clothing, men's	5	8,500	11	4		5,700	17,000	28,500
Cooperage	7	9,175	52			19,580	28,150	53,250
Flouring- and grist-mill products	12	191,800	84			32,060	933,114	1,033,412
Lumber, sawed	14	41,000	81		2	9,340	52,755	78,440
Saddlery and harness	7	15,500	11		1	3,250	12,150	21,000
PULASKI:								
Flouring- and grist-mill products	4	59,500	13			3,350	88,366	103,762
PUTNAM:								
Carriage and wagon materials	1	6,000	20			7,500	10,000	20,000
Carriages and wagons	1	25,000	15			9,360	9,000	25,000
Clothing, men's	5	21,980	10	10		7,824	11,700	24,325
Flouring- and grist-mill products	8	47,200	22			6,960	133,915	161,382
Iron and steel	1	100,000	125		25	100,000	123,900	253,000
Lime	4	24,500	39			9,478	6,900	21,000
Lumber, sawed	16	45,890	107		3	13,639	89,605	132,662
Pumps, not including steam pumps	1	3,500	25			5,600	20,000	40,000
Saddlery and harness	4	6,800	11			4,325	15,500	24,200
Tinware, copperware, and sheet-iron ware	4	4,800	6			4,124	15,100	23,824
RANDOLPH:								
Brick and tile	17	22,600	72		17	8,635	13,535	30,740
Carriages and wagons	4	24,200	46			17,155	20,100	41,570
Clothing, men's	6	12,300	23	27	11	19,000	30,000	54,000
Flouring and grist-mill products	16	85,300	46			8,129	214,404	245,259
Lumber, sawed	26	39,150	66		1	6,870	65,165	93,164
Saddlery and harness	4	9,600	12			4,839	16,100	23,500
Sash, doors, and blinds	2	55,000	80		10	31,000	242,000	300,000
RIPLEY:								
Clothing, men's	4	4,850	5	11		3,400	13,800	22,000
Cooperage	3	8,200	28		3	9,750	9,100	26,275
Flouring- and grist-mill products	14	97,000	35			6,605	210,740	241,729
Furniture	6	60,800	73		6	31,372	63,690	119,000
Lumber, sawed	40	59,650	135			14,535	100,320	148,710
Wood, turned and carved	2	12,200	19		6	8,700	11,500	24,300
RUSH:								
Brick and tile	11	14,160	52		7	7,405	8,000	21,285
Carriages and wagons	4	9,500	18			7,000	12,350	26,000
Clothing, men's	5	16,600	17	1		6,299	10,575	20,700
Flouring- and grist-mill products	11	51,900	14			4,770	131,425	156,062
Foundery and machine-shop products	1	18,000	20			6,000	5,000	20,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

INDIANA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
RUSH—continued.								
Lumber, planed	3	$10,500	28	....	1	$12,400	$14,000	$29,500
Lumber, sawed	22	46,850	82	....	....	12,342	125,020	176,558
Tinware, copperware, and sheet-iron ware	4	4,100	8	....	....	2,344	12,300	20,000
Woolen goods	1	20,000	9	1	2	2,400	9,200	25,000
SAINT JOSEPH:								
Agricultural implements	5	1,357,250	847	1	62	377,500	838,770	1,583,000
Bread and other bakery products	6	6,175	14	....	....	5,532	30,208	55,304
Brick and tile	9	25,800	108	....	3	27,805	18,655	62,400
Carriages and wagons	5	1,251,000	926	5	72	406,559	522,214	1,632,500
Clothing, men's	4	11,750	13	4	....	6,500	13,600	25,575
Cooperage	7	18,200	42	....	....	11,759	29,970	54,600
Flouring- and grist-mill products	9	119,300	30	....	....	14,581	333,850	368,802
Foundery and machine-shop products	4	19,000	41	....	1	14,090	18,642	47,625
Furniture	10	105,700	216	....	....	63,990	227,291	342,000
Furniture, chairs	3	9,000	25	18	9	12,000	8,300	26,550
Hardware	1	50,000	50	....	....	15,000	40,000	60,000
Liquors, malt	2	30,000	16	....	....	7,482	32,123	57,908
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	1	35,000	22	....	3	5,972	61,623	83,000
Lumber, sawed	30	104,400	170	....	5	22,449	107,416	166,866
Marble and stone work	3	17,500	27	....	....	10,100	16,710	35,289
Paper	3	175,000	25	37	....	22,000	247,200	301,600
Printing and publishing	6	30,300	34	5	....	15,300	10,225	51,575
Refrigerators	1	20,000	33	....	....	10,000	22,000	40,000
Saddlery and harness	9	31,375	21	....	1	8,095	16,470	35,546
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	4	57,000	38	4	....	13,430	47,136	108,500
Sewing-machine cases	1	(*a*)	475	....	200	290,000	818,625	1,108,625
Tinware, copperware, and sheet-iron ware	7	21,000	26	....	....	10,699	19,560	37,725
Toys and games	1	15,000	18	....	....	5,500	15,000	25,000
Windmills	1	38,000	28	....	....	10,300	43,500	64,000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	1	5,000	20	1	3	10,400	8,000	23,000
Woolen goods	3	127,000	41	35	8	21,550	89,600	124,750
SCOTT:								
Flouring- and grist-mill products	4	14,500	12	....	....	943	22,315	25,853
Lumber, sawed	14	26,100	59	....	....	4,840	32,080	48,360
SHELBY:								
Brick and tile	17	23,710	100	....	1	10,290	16,460	36,772
Carriages and wagons	2	13,500	24	....	....	10,000	20,000	39,000
Clothing, men's	2	6,500	13	....	....	5,800	13,000	22,000
Flouring- and grist-mill products	15	149,100	38	....	....	9,726	303,000	346,226
Furniture	1	75,000	50	....	....	25,000	50,000	100,000
Lumber, planed	2	16,500	26	....	....	11,000	22,000	46,000
Lumber, sawed	25	63,350	122	....	3	16,828	148,717	210,653
Saddlery and harness	4	4,800	11	....	....	4,825	9,300	20,800
Tinware, copperware, and sheet-iron ware	5	6,300	14	....	....	5,550	13,800	26,500
Tobacco, cigars and cigarettes	2	11,000	6	....	....	3,210	16,200	28,200
SPENCER:								
Carriages and wagons	1	10,000	5	....	....	3,000	12,000	20,000
Clothing, men's	3	5,450	12	3	....	12,000	7,650	27,000
Cooperage	4	9,350	33	....	....	11,050	17,300	33,300
Flouring- and grist-mill products	16	97,500	55	....	....	12,157	280,125	304,001
Lumber, planed	3	24,500	13	....	....	6,170	11,300	24,500
Lumber, sawed	18	25,250	66	....	1	5,312	31,905	48,150
STARKE:								
Flouring- and grist-mill products	3	21,000	6	....	....	2,450	59,000	67,595
STEUBEN:								
Carriages and wagons	3	7,200	17	....	....	6,400	11,000	21,500
Flouring- and grist-mill products	11	86,100	25	....	....	6,730	205,496	234,019
Lumber, sawed	16	29,960	34	....	....	5,450	39,792	58,000
Saddlery and harness	7	6,200	14	1	....	5,050	19,350	32,500
SULLIVAN:								
Flouring- and grist-mill products	10	75,000	43	....	....	13,630	377,145	424,855
Lumber, sawed	17	17,050	63	....	....	5,250	29,342	45,092
Saddlery and harness	4	17,000	11	....	....	4,200	12,275	21,200
SWITZERLAND:								
Flouring- and grist-mill products	8	48,800	17	....	....	3,450	102,132	115,841
Furniture	1	21,000	66	....	....	16,777	23,730	52,569
Lumber, sawed	8	16,750	26	....	....	3,055	26,525	37,700
TIPPECANOE:								
Boots and shoes	4	98,000	128	17	3	61,500	112,664	212,800
Bread and other bakery products	6	68,150	55	3	3	28,650	93,140	153,700
Carriages and wagons	5	15,300	48	....	....	23,755	19,700	59,000
Cars, railroad, street, and repairs	1	100,000	226	....	....	28,800	167,600	214,900
Clothing, men's	10	38,400	64	63	....	36,377	70,800	132,750
Coffee and spices, roasted and ground	1	12,000	8	3	1	3,728	22,000	33,000
Cooperage	3	68,050	136	....	....	70,480	60,500	150,084
Flouring- and grist-mill products	14	123,500	46	....	....	18,659	436,910	490,139
Foundery and machine-shop products	4	48,000	53	....	....	16,900	29,800	58,000
Furniture	3	11,500	12	2	....	6,554	9,384	20,650

a Capital reported in New Jersey.

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

INDIANA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
TIPPECANOE—continued.								
Liquors, distilled	1	$85, 000	20			$7, 500	$82, 000	$122, 000
Liquors, malt	2	97, 500	36			17, 196	73, 248	132, 840
Lumber, planed	2	31, 000	24			10, 000	24, 500	40, 000
Lumber, sawed	10	25, 250	47			4, 900	30, 300	46, 500
Marble and stone work	7	17, 700	22		1	7, 887	6, 275	21, 800
Printing and publishing	9	129, 000	108		16	70, 300	153, 280	266, 500
Pumps, not including steam pumps	2	45, 000	35			15, 600	33, 750	74, 856
Saddlery and harness	6	20, 100	22			11, 630	28, 000	50, 500
Tinware, copperware, and sheet-iron ware	11	14, 260	27		3	12, 380	29, 050	55, 274
Tobacco, cigars and cigarettes	6	11, 278	15		1	7, 218	25, 775	42, 450
TIPTON:								
Brick and tile	14	23, 900	46		1	5, 990	12, 825	26, 320
Flouring- and grist-mill products	6	22, 600	15			4, 275	155, 760	208, 825
Lumber, sawed	21	39, 680	84		4	12, 512	89, 765	132, 771
UNION:								
Agricultural implements	1	42, 000	20		8	14, 000	38, 060	69, 700
Flouring- and grist-mill products	6	25, 200	4			1, 250	59, 990	72, 530
Lumber, sawed	13	28, 575	41			4, 452	32, 530	47, 475
VANDERBURGH:								
Agricultural implements	6	271, 414	119		7	59, 216	106, 481	243, 929
Bags, other than paper	1	5, 000	1	2		700	55, 000	60, 000
Boots and shoes	2	17, 000	32	10	1	21, 329	37, 060	71, 000
Bread and other bakery products	16	30, 300	26	1	6	10, 107	58, 056	86, 731
Brick and tile	18	77, 600	112		18	33, 900	21, 860	76, 475
Brooms and brushes	3	7, 000	21	2	5	7, 670	18, 900	37, 000
Carriages and wagons	6	67, 500	46		1	20, 900	35, 550	79, 300
Clothing, men's	2	54, 000	26	64	1	21, 430	55, 000	97, 414
Confectionery	4	6, 150	5	3	5	4, 052	25, 850	33, 680
Cooperage	12	102, 500	167		7	69, 421	76, 150	198, 310
Cotton goods (see also Mixed textiles)	1	500, 000	76	148	74	68, 000	296, 712	482, 391
Flouring- and grist-mill products	16	374, 800	117			56, 217	1, 390, 900	1, 625, 365
Foundery and machine-shop products	12	823, 253	330		8	166, 440	349, 418	734, 458
Furniture	5	303, 000	292	1	99	151, 714	223, 609	467, 000
Furniture, chairs	4	119, 200	117	24	42	46, 120	38, 952	113, 496
Leather, curried	5	83, 835	34			13, 561	178, 205	224, 050
Leather, tanned	5	67, 665	29			12, 488	142, 372	174, 550
Liquors, malt	2	145, 000	60			31, 156	132, 125	239, 729
Liquors, vinous	1	3, 000	3		3	2, 500	10, 000	30, 000
Lumber, planed	5	104, 521	127		3	60, 774	190, 520	338, 178
Lumber, sawed	12	584, 850	385		25	134, 698	635, 810	962, 905
Malt	3	74, 000	13			6, 500	70, 400	92, 000
Marble and stone work	8	36, 597	57		4	27, 817	36, 803	86, 573
Mixed textiles (see also Cotton goods; Woolen goods)	1	60, 000	30	30		9, 000	80, 000	150, 000
Patent medicines and compounds	3	11, 560	3	1	1	1, 700	11, 500	25, 000
Printing and publishing	6	125, 500	127	5	21	75, 290	32, 901	146, 735
Saddlery and harness	17	134, 400	122		16	55, 028	178, 400	287, 260
Shipbuilding	8	16, 650	28			15, 770	40, 070	60, 955
Slaughtering and meat-packing, not including retail butchering establishments.	4	199, 000	75			11, 600	324, 623	346, 278
Tinware, copperware, and sheet-iron ware	16	120, 550	128		12	62, 224	105, 766	254, 131
Tobacco, cigars and cigarettes	18	26, 610	60		9	24, 253	30, 957	81, 577
Wooden ware	1	4, 500	6		1	2, 500	6, 000	30, 000
Woolen goods (see also Mixed textiles)	2	75, 000	40	35		12, 000	90, 400	167, 500
VERMILLION:								
Flouring- and grist-mill products	6	65, 000	17			4, 860	115, 554	125, 966
Lumber, sawed	11	20, 700	39			4, 105	32, 480	47, 875
VIGO:								
Brick and tile	13	44, 500	153		6	26, 640	28, 395	69, 225
Carriage and wagon materials	2	93, 000	138			56, 500	250, 000	318, 000
Carriages and wagons	5	130, 000	195		21	90, 250	118, 500	255, 000
Cars, railroad, street, and repairs	1	50, 000	282			110, 000	575, 000	740, 000
Clothing, men's	2	30, 000	4	93		22, 600	93, 400	130, 000
Coffee and spices, roasted and ground	2	70, 000	16	4	2	6, 750	150, 000	181, 000
Confectionery	3	14, 000	26		6	9, 400	36, 950	52, 700
Cooperage	10	36, 600	199		2	66, 485	146, 950	232, 400
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	1	5, 000	8			2, 500	16, 000	20, 000
Flouring- and grist-mill products	17	656, 500	200			80, 392	2, 947, 400	3, 204, 776
Foundery and machine-shop products	6	122, 000	141		14	66, 863	109, 100	210, 500
Iron and steel	3	355, 000	495		50	337, 925	788, 390	1, 221, 968
Iron nails and spikes, cut and wrought	1	150, 000	300			170, 710	251, 332	426, 968
Liquors, distilled	1	200, 000	75			37, 987	503, 151	755, 433
Liquors, malt	2	78, 000	34			15, 114	64, 287	116, 458
Lumber, planed	2	40, 000	78		1	27, 500	100, 200	140, 000
Lumber, sawed	20	198, 000	180		13	56, 790	203, 985	331, 885
Marble and stone work	6	19, 500	42			12, 584	21, 775	52, 570
Printing and publishing	8	37, 000	75	6	21	42, 380	23, 620	86, 700
Saddlery and harness	8	30, 900	40		1	17, 052	40, 541	69, 340

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

INDIANA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
VIGO—continued.								
Shirts	1	$3, 100	1	11		$6, 250	$12, 000	$22, 500
Slaughtering and meat-packing, not including retail butchering establishments.	1	65, 000	60			5, 500	62, 500	71, 500
Tinware, copperware, and sheet-iron ware (see also Coppersmithing).	10	66, 100	65			24, 300	108, 000	171, 700
Tobacco, cigars and cigarettes	14	29, 000	103		5	40, 500	38, 640	106, 397
Woolen goods	2	85, 000	36	26	7	21, 060	112, 800	152, 980
WABASH:								
Brick and tile	23	40, 765	99			14, 285	21, 299	49, 475
Carriage and wagon materials	2	12, 300	23			7, 218	21, 000	36, 860
Carriages and wagons	4	27, 400	19			7, 520	26, 380	42, 388
Flouring- and grist-mill products	16	150, 000	36			11, 649	310, 888	364, 138
Foundery and machine-shop products	3	26, 000	30			12, 050	15, 000	41, 500
Furniture	3	43, 000	62			20, 500	32, 469	68, 000
Lumber, sawed	44	105, 675	168		3	17, 448	114, 278	170, 855
Saddlery and harness	7	13, 950	15			5, 340	18, 053	29, 950
Sash, doors, and blinds	1	25, 000	15			6, 000	20, 000	30, 000
Slaughtering and meat-packing, not including retail butchering establishments.	1	120, 000	70			5, 000	120, 000	145, 453
Woolen goods	1	35, 000	7	12	6	5, 000	36, 350	58, 000
WARREN:								
Brick and tile	8	19, 350	49			6, 150	9, 970	22, 100
Flouring- and grist-mill products	9	61, 000	19			4, 978	121, 249	137, 987
Lumber, sawed	8	17, 000	26			3, 800	21, 192	32, 819
WASHINGTON:								
Carriages and wagons	1	10, 000	20			2, 000	12, 000	20, 000
Flouring- and grist-mill products	14	51, 400	23			4, 635	187, 300	214, 814
Leather, curried	5	6, 401	8			1, 618	38, 754	47, 610
Leather, tanned	5	12, 799	11		1	2, 982	27, 642	35, 574
Lumber, sawed	30	44, 150	117		3	15, 278	99, 497	142, 930
Mixed textiles (see also Woolen goods)	1	150, 000	30	60	10	26, 000	60, 000	112, 500
Woolen goods (see also Mixed textiles)	2	150, 700	35	60	10	26, 000	60, 200	112, 750
WARRICK:								
Flouring- and grist-mill products	9	70, 000	33			6, 441	204, 450	232, 097
Leather, curried	1	13, 333	13			5, 333	40, 000	57, 500
Leather, tanned	1	6, 667	7			2, 667	28, 000	38, 000
Lumber, sawed	7	13, 300	29			3, 100	14, 080	22, 600
WAYNE:								
Agricultural implements	13	984, 260	783		12	350, 441	857, 270	1, 787, 727
Bread and other bakery products	7	33, 300	27	2	3	14, 750	64, 700	94, 500
Brick and tile	17	24, 275	70		18	19, 320	14, 860	46, 225
Carriages and wagons	8	46, 250	75		3	24, 800	33, 600	71, 750
Cars, railroad, street, and repairs	1	100, 000	250			90, 800	850, 000	978, 500
Clothing, men's	8	46, 650	52	23	1	30, 300	79, 900	149, 000
Coffins, burial cases, and undertakers' goods	3	271, 000	140	5	4	64, 342	90, 775	228, 670
Flax, dressed	3	9, 000	17		2	5, 000	9, 700	21, 500
Flouring- and grist-mill products	28	268, 200	62			19, 795	622, 975	712, 092
Foundery and machine-shop products	6	127, 300	134		25	69, 565	143, 200	260, 900
Furniture	6	64, 750	129			52, 934	61, 880	159, 050
Furniture, chairs	3	18, 000	57	21	17	16, 200	12, 300	34, 900
Hardware, saddlery	1	25, 000	30		10	12, 000	30, 500	45, 000
Leather, curried	2	53, 334	21			7, 667	139, 000	170, 000
Leather, tanned	2	106, 666	39			15, 333	101, 000	130, 000
Lumber, sawed	28	68, 750	106		5	14, 425	123, 028	170, 125
Malt	1	40, 000	5			1, 500	50, 000	63, 000
Marble and stone work	6	14, 500	23		1	10, 800	13, 300	35, 300
Musical instruments, pianos and materials	2	77, 000	90			42, 500	43, 000	109, 000
Oil, linseed	3	100, 000	37			14, 700	340, 000	395, 000
Paper	1	12, 000	13			6, 378	24, 618	38, 860
Printing and publishing	5	38, 800	64	3	4	27, 760	30, 200	72, 500
Saddlery and harness	14	31, 750	33	2	1	12, 220	62, 300	85, 450
Sash, doors, and blinds	4	17, 000	43			15, 500	30, 000	66, 000
Slaughtering and meat-packing, not including retail butchering establishments.	1	150, 000	64			10, 000	233, 109	250, 000
Tinware, copperware, and sheet-iron ware	13	39, 300	57	1		22, 765	43, 100	88, 400
Tobacco, cigars and cigarettes	10	13, 225	40		1	16, 920	43, 464	77, 275
Wirework	1	7, 000	3		4	1, 800	15, 000	25, 000
Woolen goods	4	38, 500	14	7	8	6, 275	28, 275	35, 990
WELLS:								
Carriage and wagon materials	1	11, 500	15		5	10, 400	20, 600	34, 682
Clothing, men's	2	5, 000	7	15		6, 500	13, 000	25, 000
Flouring- and grist-mill products	6	40, 200	15			4, 689	106, 673	121, 666
Lumber, sawed	29	155, 100	173		22	42, 793	297, 066	433, 060
WHITE:								
Flouring- and grist-mill products	5	62, 000	16			4, 375	164, 602	181, 605
Woolen goods	1	14, 000	11	3		2, 588	17, 500	23, 000
WHITLEY:								
Brick and tile	13	11, 180	47		1	8, 715	7, 020	21, 465
Flouring- and grist-mill products	6	51, 500	16			4, 230	89, 975	99, 100
Lumber, sawed	41	156, 415	192			21, 516	166, 665	242, 180

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

IOWA.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ADAMS:								
Flouring- and grist-mill products	6	$27, 000	17	....	....	$6, 952	$153, 500	$175, 384
ALLAMAKEE:								
Carriages and wagons	5	70, 500	45	....	....	19, 550	28, 700	62, 500
Flouring- and grist-mill products	22	163, 000	34	....	....	8, 734	199, 036	238, 356
Lumber, sawed	5	67, 900	33	....	....	8, 360	46, 325	78, 625
Saddlery and harness	7	14, 950	9	....	....	3, 408	13, 200	23, 100
APPANOOSE:								
Flouring- and grist-mill products	5	36, 000	19	....	....	6, 650	131, 900	150, 717
Foundery and machine-shop products	1	12, 000	15	....	....	6, 000	15, 000	25, 000
Lumber, sawed	7	7, 250	18	....	....	2, 450	17, 775	31, 750
BENTON:								
Cheese and butter (factory)	3	6, 300	11	1	....	2, 130	20, 580	27, 281
Flouring- and grist-mill products	9	90, 000	85	....	....	9, 292	132, 899	155, 613
Saddlery and harness	8	9, 550	13	....	....	4, 165	15, 685	27, 200
BLACK HAWK:								
Bread and other bakery products	5	19, 100	16	3	2	6, 935	34, 250	47, 650
Carriages and wagons	5	23, 400	22	....	....	8, 400	16, 050	36, 550
Cheese and butter (factory)	8	23, 500	32	3	2	4, 875	38, 917	53, 463
Clothing, men's	7	13, 538	20	1	....	11, 500	24, 725	41, 426
Cooperage	5	4, 300	22	....	....	8, 000	13, 200	26, 300
Flouring- and grist-mill products	12	237, 200	81	....	....	31, 377	773, 702	860, 420
Foundery and machine-shop products	5	28, 300	37	....	....	15, 600	17, 840	45, 225
Furniture	5	21, 600	19	....	....	9, 100	26, 310	49, 000
Saddlery and harness	6	13, 000	11	....	....	4, 385	18, 000	27, 990
Soap and candles	1	10, 000	5	....	....	2, 000	20, 000	24, 000
Tinware, copperware, and sheet-iron ware	9	17, 900	14	....	....	6, 162	12, 661	24, 450
BOONE:								
Flouring- and grist-mill products	5	86, 000	22	....	....	10, 550	175, 350	236, 160
Furniture	2	8, 500	3	....	....	1, 350	13, 000	20, 000
Gloves and mittens	1	12, 000	7	12	....	11, 040	31, 040	55, 696
Liquors, malt	2	22, 100	15	....	....	5, 981	25, 725	45, 520
Lumber, sawed	6	8, 800	18	....	1	2, 461	13, 790	23, 520
Saddlery and harness	2	13, 000	9	....	1	6, 000	23, 300	33, 055
BREMER:								
Cheese and butter (factory)	2	4, 700	8	....	1	2, 100	32, 550	41, 775
Flouring- and grist-mill products	5	82, 000	23	....	1	10, 080	84, 050	102, 545
BUCHANAN:								
Carriages and wagons	9	11, 500	19	....	....	6, 650	9, 575	22, 600
Cheese and butter (factory)	19	30, 140	44	11	3	8, 024	60, 616	87, 543
Flouring- and grist-mill products	7	182, 900	17	....	....	7, 190	123, 274	163, 912
Saddlery and harness	3	5, 500	14	....	....	6, 372	13, 000	24, 000
Tobacco, cigars and cigarettes	3	3, 800	12	5	3	4, 750	13, 000	22, 500
BUENA VISTA:								
Flouring- and grist-mill products	5	33, 600	12	....	....	2, 915	116, 734	135, 434
BUTLER:								
Cheese and butter (factory)	6	17, 950	18	1	1	4, 205	35, 877	49, 139
Flouring- and grist-mill products	8	94, 200	35	....	....	8, 530	195, 235	242, 299
CARROLL:								
Flouring- and grist-mill products	2	27, 200	7	....	....	2, 734	57, 324	74, 346
CASS:								
Carriages and wagons	2	12, 000	21	....	....	6, 140	7, 300	20, 000
Flouring- and grist-mill products	7	48, 100	16	....	....	6, 700	165, 170	188, 178
Saddlery and harness	2	7, 000	20	....	....	6, 000	13, 000	24, 800
Slaughtering and meat-packing, not including retail butchering establishments.	1	20, 000	35	....	....	7, 000	245, 226	270, 500
CEDAR:								
Flouring- and grist-mill products	8	65, 300	10	....	....	2, 900	77, 910	88, 532
Saddlery and harness	7	10, 550	9	....	....	2, 800	16, 800	27, 100
CERRO GORDO:								
Flouring- and grist-mill products	9	160, 500	25	....	....	8, 730	261, 600	298, 031
CHEROKEE:								
Cheese and butter (factory)	1	2, 000	8	....	....	2, 400	21, 250	30, 025
Flouring- and grist-mill products	5	33, 600	9	....	....	3, 300	78, 920	82, 514
CHICKASAW:								
Flouring- and grist-mill products	3	38, 000	11	....	....	3, 200	129, 000	150, 500
CLARK:								
Cheese and butter (factory)	1	8, 000	4	....	....	1, 900	40, 000	49, 500
Flouring- and grist-mill products	4	29, 000	16	....	....	5, 351	109, 730	126, 499
CLAY:								
Flouring- and grist-mill products	2	17, 800	4	....	....	1, 200	74, 400	81, 510
CLAYTON:								
Carriages and wagons	15	30, 200	43	....	....	15, 285	20, 485	48, 510
Cheese and butter (factory)	11	15, 950	19	3	....	3, 876	37, 001	51, 915
Cooperage	7	9, 875	35	....	....	8, 960	7. 125	23, 975
Flouring- and grist-mill products	20	253, 545	37	....	....	11, 687	325, 804	357, 359
Liquors, malt	10	117, 000	16	....	....	6, 876	29, 576	52, 825

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

IOWA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
CLAYTON—continued.								
Lumber, sawed	14	$198, 500	122	....	26	$41, 490	$197, 525	$284, 701
Printing and publishing	8	16, 200	19	1	2	6, 403	7, 370	20, 254
Saddlery and harness	15	13, 300	19	....	....	5, 716	15, 467	28, 960
Tinware, copperware, and sheet-iron ware	9	11, 100	16	....	....	4, 572	11, 993	23, 250
Tobacco, cigars and cigarettes	3	17, 040	31	....	....	13, 840	7, 250	31, 000
CLINTON:								
Bridges	1	25, 000	75	....	....	62, 700	195, 535	258, 235
Carriages and wagons	9	43, 900	58	....	1	24, 205	33, 350	80, 225
Cheese and butter (factory)	5	17, 000	24	1	....	8, 890	58, 289	83, 704
Clothing, men's	4	11, 600	10	11	....	6, 460	26, 000	44, 250
Flouring- and grist-mill products	21	154, 200	49	....	....	16, 372	369, 765	425, 983
Foundery and machine-shop products	3	56, 000	79	....	1	27, 850	52, 500	110, 000
Fruits and vegetables, canned and preserved	1	5, 000	3	10	2	4, 000	10, 000	25, 000
Liquors, distilled	1	25, 000	25	....	....	8, 000	108, 250	165, 000
Liquors, malt	5	52, 000	23	....	....	9, 000	38, 710	69, 223
Lumber, sawed	8	1, 766, 000	570	....	143	215, 793	1, 371, 224	1, 979, 127
Marble and stone work	4	4, 100	11	....	....	3, 868	16, 895	25, 300
Paper	2	160, 000	75	25	5	39, 635	44, 825	111, 675
Printing and publishing	5	19, 750	17	8	1	10, 495	12, 050	34, 400
Saddlery and harness	10	20, 600	19	1	....	6, 150	22, 225	40, 200
Sash, doors, and blinds	4	253, 000	185	....	50	71, 750	231, 800	366, 000
Tinware, copperware, and sheet-iron ware	8	12, 100	13	....	....	6, 055	17, 670	32, 900
Tobacco, cigars and cigarettes	6	9, 850	23	2	4	8, 175	9, 140	26, 250
CRAWFORD:								
Flouring- and grist-mill products	6	49, 000	16	....	....	8, 265	145, 552	169, 749
DALLAS:								
Flouring- and grist-mill products	14	105, 700	27	....	....	7, 725	169, 160	197, 337
DAVIS:								
Flouring- and grist-mill products	6	30, 000	18	....	....	4, 725	70, 274	87, 362
Lumber, sawed	12	19, 570	36	....	....	6, 030	44, 077	66, 113
DECATUR:								
Flouring- and grist-mill products	7	54, 500	13	....	....	2, 265	85, 537	100, 491
Lumber, sawed	16	22, 750	31	....	2	4, 040	24, 589	42, 735
Saddlery and harness	6	4, 025	11	....	....	3, 631	13, 600	21, 760
DELAWARE:								
Cheese and butter (factory)	37	57, 945	65	13	11	10, 935	122, 041	171, 320
Cooperage	6	4, 400	17	....	....	10, 060	15, 200	35, 250
Flouring- and grist-mill products	11	91, 900	15	....	....	4, 798	101, 224	114, 860
Saddlery and harness	10	10, 750	15	....	....	3, 876	18, 055	30, 127
Tinware, copperware, and sheet-iron ware	9	12, 600	20	....	1	7, 342	22, 113	42, 054
Woolen goods	1	75, 000	15	7	4	11, 000	26, 700	50, 000
DES MOINES:								
Bookbinding and blank-book making	1	50, 000	20	1	3	13, 265	10, 916	27, 976
Bread and other bakery products	7	36, 873	20	1	4	9, 750	43, 800	70, 500
Brick and tile	6	22, 500	92	....	1	31, 950	26, 711	97, 720
Carriage and wagon materials	1	24, 000	25	....	....	10, 375	21, 500	35, 500
Carriages and wagons	7	203, 000	188	....	6	83, 100	152, 500	308, 060
Clothing, men's	4	18, 200	26	....	....	13, 250	33, 800	59, 500
Coffee and spices, roasted and ground	1	7, 000	7	....	....	3, 000	17, 000	30, 000
Flouring- and grist-mill products	3	20, 000	9	....	....	3, 595	75, 250	86, 044
Foundery and machine-shop products	5	62, 300	159	....	13	67, 850	72, 377	175, 202
Furniture (see also Mattresses and spring beds)	8	110, 250	124	5	7	64, 915	146, 925	310, 075
Liquors, malt	5	150, 000	28	....	....	11, 340	48, 778	86, 410
Lumber, sawed	6	168, 000	135	....	20	44, 956	253, 330	340, 305
Mattresses and spring beds (see also Furniture)	1	6, 000	10	....	....	2, 000	23, 000	34, 000
Oil, lard	1	8, 000	5	....	....	2, 000	20, 000	30, 600
Oil, linseed	1	75, 000	12	....	....	7, 000	111, 000	175, 000
Paints	1	50, 000	20	1	1	8, 000	50, 000	100, 000
Printing and publishing	2	56, 000	62	....	11	39, 500	22, 000	80, 000
Saddlery and harness	10	38, 900	45	2	5	16, 575	61, 800	116, 500
Sash, doors, and blinds	2	115, 000	58	....	4	26, 281	63, 575	108, 272
Shirts	1	3, 000	5	27	....	8, 000	9, 500	20, 000
Slaughtering and meat-packing, not including retail butchering establishments.	3	66, 000	30	....	....	10, 276	227, 388	268, 057
Tinware, copperware, and sheet-iron ware	3	12, 000	17	....	....	6, 800	11, 200	23, 000
Tobacco, cigars and cigarettes	3	25, 500	36	....	4	16, 444	35, 243	59, 496
Trunks and valises	1	6, 000	7	....	....	3, 500	10, 000	20, 000
Woolen goods	1	12, 000	11	4	4	3, 460	16, 590	25, 000
DUBUQUE:								
Agricultural implements	2	79, 000	57	....	5	15, 100	50, 350	76, 065
Bags, paper	1	12, 000	2	1	....	1, 700	40, 000	49, 000
Bookbinding and blank-book making	4	17, 750	15	3	6	9, 100	8, 600	24, 300
Boots and shoes	1	30, 000	27	4	....	14, 000	42, 000	60, 000
Brass ware	1	10, 000	10	....	....	2, 500	20, 000	28, 000
Bread and other bakery products	15	55, 135	51	9	3	26, 558	92, 107	149, 664
Brick and tile	9	12, 800	86	....	....	17, 670	10, 142	37, 100
Bridges	2	650, 000	19	....	....	10, 000	13, 000	33, 600
Carriages and wagons	11	536, 400	290	....	....	152, 910	330, 250	637, 460
Cheese and butter (factory)	4	8, 800	8	2	....	2, 600	39, 559	49, 893

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

IOWA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
DUBUQUE—continued.								
Clothing, men's	22	$242, 700	75	188	1	$68, 268	$256, 675	$408, 568
Coffee and spices, roasted and ground	2	7, 000	6			3, 000	14, 000	20, 000
Confectionery	1	10, 000	9	6		6, 000	30, 000	45, 000
Cooperage	14	59, 800	116		3	58, 210	71, 845	174, 306
Flouring- and grist-mill products	23	187, 920	51			15, 838	346, 504	407, 748
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	4	157, 500	109			57, 500	86, 960	181, 320
Furniture (see also Mattresses and spring beds)	8	90, 600	163		1	72, 150	101, 800	224, 550
Lead, bar, pipe, sheet, and shot	1	2, 800	5	1		2, 500	35, 000	52, 000
Liquors, malt	9	312, 000	71			30, 825	132, 560	237, 010
Liquors, vinous	1	10, 000	8			3, 450	15, 892	30, 080
Lumber, sawed	7	303, 000	165		23	53, 875	217, 410	352, 540
Marble and stone work	9	8, 750	30			16, 650	15, 100	42, 558
Mattresses and spring beds (see also Furniture)	1	8, 000	10	2		5, 400	25, 000	36, 000
Printing and publishing	9	112, 800	76	8	9	56, 564	38, 600	139, 975
Saddlery and harness	14	73, 000	46			21, 754	47, 150	92, 427
Sash, doors, and blinds	3	114, 000	71		15	50, 000	191, 000	284, 000
Shipbuilding	1	25, 000	75			37, 000	62, 000	112, 000
Slaughtering and meat-packing, not including retail butchering establishments.	5	183, 000	133		1	86, 500	1, 237, 400	1, 379, 000
Soap and candles	2	55, 000	9	4		5, 100	52, 400	73, 000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	3	50, 400	61			37, 000	36, 000	90, 800
Tinware, copperware, and sheet-iron ware	21	29, 050	48			24, 200	30, 700	81,459
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	25, 000	6	8		8, 000	82, 670	96, 485
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	12	10, 500	35		1	14, 972	18, 775	48, 150
Vinegar	3	53, 000	24			12, 350	35, 535	89, 650
Wirework	2	4, 000	11		4	5, 500	11, 500	21, 500
Wooden ware	2	20, 500	8	1	9	7, 200	28, 000	44, 500
FAYETTE:								
Cheese and butter (factory)	12	20, 431	43	5		11, 681	88, 328	118, 554
Flouring- and grist-mill products	20	157, 000	41			10, 836	294, 242	333, 881
Lumber, sawed	12	26, 680	34		3	7, 510	29, 605	49, 170
FLOYD:								
Flouring- and grist-mill products	7	173, 500	26			10, 622	245, 410	286, 882
Furniture	1	18, 000	13			6, 500	15, 000	30, 000
Liquors, malt	3	20, 000	7			3, 075	13, 528	23, 545
Saddlery and harness	6	7, 650	8		1	3, 390	18, 700	25, 860
Sash, doors, and blinds	1	12, 000	14			4, 350	13, 000	23, 000
FRANKLIN:								
Flouring- and grist-mill products	1	35, 000	4			2, 400	47, 075	52, 000
FREMONT:								
Brick and tile	7	9, 500	42		12	11, 925	6, 749	25, 000
Bridges	1	2, 500	15			6, 750	12, 000	20, 000
Flouring- and grist-mill products	10	76, 073	16			5, 465	148, 235	168, 479
Saddlery and harness	7	11, 500	13			5, 220	12, 300	30, 200
Slaughtering and meat-packing, not including retail butchering establishments.	1	35, 000	5			2, 800	24, 850	44, 750
GREENE:								
Flouring- and grist-mill products	6	78, 650	21			3, 903	88, 926	102, 235
GRUNDY:								
Cheese and butter (factory)	5	43, 500	11	2	1	2, 750	17, 477	28, 048
Flouring- and grist-mill products	2	30, 000	10			3, 458	36, 830	44, 317
GUTHRIE:								
Flouring- and grist-mill products	9	80, 200	18			5, 900	118, 841	148, 134
HAMILTON:								
Flouring- and grist-mill products	7	45, 700	13			2, 460	67, 555	82, 340
HARDIN:								
Carriages and wagons	5	49, 500	47			18, 280	38, 700	71, 400
Flouring- and grist-mill products	10	139, 500	25			10, 978	186, 150	219, 182
Saddlery and harness	8	18, 000	15		1	4, 992	16, 551	27, 701
Woolen goods	1	10, 000	7	8		4, 500	15, 300	25, 000
HARRISON:								
Flouring- and grist-mill products	7	66, 500	22			4, 745	119, 950	139, 035
Lumber, sawed	8	9, 300	32			5, 531	20, 428	33, 725
Saddlery and harness	8	10, 200	13			4, 980	18, 800	31, 975
HENRY:								
Carriages and wagons	5	13, 000	19		1	7, 700	22, 800	37, 500
Flouring- and grist-mill products	11	126, 000	38			9, 510	312, 685	340, 224
Foundery and machine-shop products	4	41, 400	32			13, 600	45, 736	69, 900
Saddlery and harness	8	7, 600	12			3, 820	11, 550	21, 482
Tinware, copperware, and sheet-iron ware	5	6, 100	8		1	2, 325	12, 800	21, 000
HOWARD:								
Cheese and butter (factory)	1	3, 000	9			3, 500	24, 000	32, 200
Flouring- and grist-mill products	7	60, 000	12			4, 040	84, 074	103, 865
Slaughtering and meat-packing, not including retail butchering establishments.	1	5, 000	1			725	42, 550	50, 000
IOWA:								
Flouring- and grist-mill products	7	78, 500	27			10, 830	153, 675	180, 747
Woolen goods	2	107, 500	87	4	18	35, 585	126, 913	213, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

IOWA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
JACKSON:								
Carriages and wagons	7	$24,600	31			$15,700	$17,300	$41,900
Cheese and butter (factory)	1	2,300	3			950	15,750	21,350
Flouring- and grist-mill products	20	169,000	40			14,900	430,140	496,999
Leather, curried	1	2,000	2			900	14,800	20,400
Liquors, malt	2	20,000	9			4,000	17,210	23,840
Lumber, planed	2	7,000	8		1	2,883	44,075	60,700
Lumber, sawed	17	88,400	109		8	15,116	60,140	99,062
Slaughtering and meat-packing, not including retail butchering establishments.	2	140,000	99		6	32,900	759,192	818,560
Woolen goods	3	62,000	24	24	6	11,000	48,780	70,432
JASPER:								
Carriages and wagons	3	11,200	23			7,800	15,000	28,000
Flouring- and grist-mill products	10	82,000	25			7,240	213,303	242,244
JEFFERSON:								
Flouring- and grist-mill products	8	68,500	25			7,100	211,225	261,550
Lumber, sawed	6	37,900	32		2	4,673	30,367	43,380
JOHNSON:								
Bridges	2	7,000	19		2	6,120	15,423	28,203
Flouring- and grist-mill products	8	140,500	56			18,562	305,265	348,967
Liquors, distilled	1	43,200	30			7,000	51,600	71,600
Liquors, malt	3	60,000	23			9,485	40,790	72,900
Oil, linseed	1	50,000	22	1		9,000	105,000	143,000
Paper	1	125,000	30	4		13,000	32,810	62,600
Printing and publishing	7	50,400	50	1	6	16,371	18,169	43,786
Saddlery and harness	9	27,300	17			4,277	25,274	40,414
Slaughtering and meat-packing, not including retail butchering establishments.	1	24,000	8			2,440	75,650	85,980
Tinware, copperware, and sheet-iron ware	5	16,900	20			8,009	22,100	38,650
JONES:								
Brooms and brushes	1	3,000	17	26		7,000	13,000	22,000
Carriages and wagons	4	16,200	23			5,200	11,900	24,500
Cheese and butter (factory)	17	45,190	56	1		17,260	240,935	306,866
Flouring- and grist-mill products	8	95,300	14			5,165	195,815	232,920
Saddlery and harness	8	13,150	8			1,985	12,100	20,450
Tinware, copperware, and sheet-iron ware	6	11,200	15			4,650	12,300	26,000
KEOKUK:								
Carriages and wagons	6	11,000	14			3,758	14,500	28,800
Flouring- and grist-mill products	11	113,500	25			8,701	225,539	260,608
Lumber, sawed	11	21,300	24		1	2,495	12,975	22,530
Saddlery and harness	13	10,000	15			3,920	13,850	27,950
Woolen goods	1	15,000	10	3	4	3,609	14,050	21,992
KOSSUTH:								
Cheese and butter (factory)	9	9,600	27	1		2,820	14,964	23,611
Flouring- and grist-mill products	2	30,000	7			4,050	50,600	66,315
LEE:								
Agricultural implements	2	230,000	195			41,500	150,726	299,097
Boots and shoes	1	30,000	103			18,000	122,000	180,000
Bread and other bakery products	5	22,200	11	2	8	8,786	30,706	44,575
Carriages and wagons	6	30,900	24			11,021	17,400	38,700
Clothing, men's	3	10,000	12			5,575	15,000	24,000
Cooperage	10	20,300	49			20,480	25,970	58,661
Flouring- and grist-mill products	10	126,029	42			16,208	383,113	432,157
Foundery and machine-shop products	5	128,600	131			66,284	87,168	168,766
Furniture	9	12,150	10			4,162	8,081	20,118
Furniture, chairs	1	50,000	120	30	20	25,570	37,000	75,000
Liquors, malt	7	85,500	17			7,625	32,795	58,540
Liquors, vinous	1	150,000	20	20	80	8,097	16,000	30,000
Lumber, sawed	16	735,500	255		67	120,217	383,235	641,840
Patent medicines and compounds	4	16,700	36			16,000	26,665	56,300
Printing and publishing	8	44,000	55	1	7	35,070	29,044	78,256
Saddlery and harness	12	47,125	42		1	17,932	57,800	92,968
Slaughtering and meat-packing, not including retail butchering establishments.	5	162,500	101			19,462	288,951	328,780
Soap and candles	1	6,000	3			1,600	21,100	25,000
Tinware, copperware, and sheet-iron ware	12	30,900	31			13,670	35,530	64,890
Tobacco, cigars and cigarettes	16	28,550	42	1	12	24,653	34,203	78,478
LINN:								
Agricultural implements	3	102,000	47		6	8,255	27,950	52,800
Bread and other bakery products	4	13,000	24	2	6	17,000	62,800	102,000
Brick and tile	10	31,325	80		17	15,100	9,314	32,700
Carriages and wagons	6	15,500	22		1	9,800	18,400	37,200
Cheese and butter (factory)	23	44,010	76	3		16,635	191,270	252,426
Clothing, men's	7	65,700	32	68		30,037	73,750	151,500
Flouring- and grist-mill products	21	393,000	121			52,722	951,805	1,060,471
Foundery and machine-shop products	5	36,100	41		1	14,630	23,653	60,563
Furniture	7	19,400	21			5,300	13,070	24,950
Liquors, malt	3	160,000	52			21,963	94,448	168,795
Marble and stone work	3	13,500	17			4,700	7,100	25,472
Oil, linseed	1	70,000	7			1,200	42,512	52,000
Printing and publishing	9	28,550	33	5	2	15,211	21,855	58,200
Saddlery and harness	10	26,100	39			23,873	33,981	71,101
Slaughtering and meat-packing, not including retail butchering establishments.	1	400,000	377		11	160,000	2,498,173	2,700,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

IOWA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
LINN—continued.								
Soap and candles	1	$25,000	11	....	3	$5,000	$30,000	$36,500
Tinware, copperware, and sheet-iron ware	11	23,750	26	....	....	11,200	27,050	50,400
LOUISA:								
Flouring- and grist-mill products	4	42,000	13	....	....	5,150	118,656	147,895
Lumber, sawed	5	6,900	20	....	....	4,755	40,750	53,130
LUCAS:								
Agricultural implements	2	23,500	11	....	....	4,253	27,314	48,732
Flouring- and grist-mill products	4	29,500	11	....	....	2,800	59,932	67,752
Saddlery and harness	4	4,500	10	....	....	4,150	21,200	29,000
MADISON:								
Flouring- and grist-mill products	7	44,200	16	....	....	3,764	95,543	119,376
MAHASKA:								
Clothing, men's	2	7,200	7	4	....	4,780	12,200	20,700
Flouring- and grist-mill products	15	130,600	29	....	....	7,962	179,132	208,677
Foundery and machine-shop products	3	26,000	31	....	1	12,808	29,240	61,300
Marble and stone work	3	5,850	16	....	....	6,600	7,050	21,000
Printing and publishing	3	23,500	13	3	....	7,160	5,000	22,500
Saddlery and harness	4	18,466	48	....	....	17,521	32,400	60,800
Tinware, copperware, and sheet-iron ware	4	25,000	21	....	....	8,465	9,000	28,000
MARION:								
Agricultural implements	1	30,000	35	....	7	11,347	28,500	41,710
Flouring- and grist-mill products	10	93,800	29	....	....	10,084	166,900	199,770
Lumber, sawed	15	16,200	37	....	1	4,467	29,944	45,125
Saddlery and harness	8	5,650	8	....	1	2,350	11,475	22,635
MARSHALL:								
Carriages and wagons	3	11,500	15	....	....	6,800	8,500	21,900
Clothing, men's	3	3,800	17	....	....	7,300	13,000	23,000
Cooperage	3	4,700	13	....	....	7,300	12,800	23,750
Flouring- and grist-mill products	8	125,200	33	....	....	10,715	232,353	284,336
Foundery and machine-shop products	2	26,200	20	....	....	8,600	18,000	43,500
Fruits and vegetables, canned and preserved	1	20,000	15	....	....	9,200	18,800	35,000
Furniture	3	37,850	38	....	....	12,900	51,000	81,300
Liquors, malt	1	40,000	6	....	....	2,997	12,895	23,020
Mineral and soda waters	1	10,000	6	....	....	2,800	25,000	32,000
Oil, linseed	1	125,000	18	....	....	10,000	136,000	175,000
Printing and publishing	5	41,500	32	....	....	15,605	12,620	44,500
Saddlery and harness	8	38,400	17	....	....	7,330	40,172	54,374
Wire	1	125,000	38	....	....	32,000	303,000	425,000
Wirework	6	4,000	11	....	....	2,150	23,200	32,750
MILLS:								
Flouring- and grist-mill products	7	63,500	15	....	....	6,450	177,805	209,705
MITCHELL:								
Agricultural implements	1	58,000	21	....	....	9,200	12,200	29,600
Flouring- and grist-mill products	11	177,000	42	....	....	18,850	367,806	398,315
Tinware, copperware, and sheet-iron ware	4	2,350	8	....	....	3,700	15,500	24,500
MONONA:								
Flouring- and grist-mill products	4	53,000	13	....	....	3,750	87,460	98,881
Lumber, sawed	6	19,200	36	....	1	4,702	25,980	39,015
MONROE:								
Flouring- and grist-mill products	6	29,600	9	....	....	2,000	93,350	104,460
Saddlery and harness	4	6,700	9	....	....	3,300	13,500	26,000
MONTGOMERY:								
Flouring- and grist-mill products	8	86,400	16	....	....	6,115	105,280	117,590
Slaughtering and meat-packing, not including retail butchering establishments.	1	15,000	4	....	....	2,400	27,500	42,075
MUSCATINE:								
Boxes, wooden, packing	1	10,500	30	3	10	5,000	6,000	20,000
Brick and tile	6	21,500	43	....	....	11,433	7,078	23,960
Carriages and wagons	5	23,500	38	....	....	14,400	19,700	50,000
Clothing, men's	9	19,750	22	9	....	11,425	33,600	56,100
Flouring- and grist-mill products	10	131,500	29	....	....	11,035	298,531	331,799
Foundery and machine-shop products	4	27,000	26	....	1	13,200	32,500	53,000
Furniture	5	14,950	22	....	....	10,600	22,700	46,350
Liquors, malt	4	45,000	13	....	....	6,058	26,054	46,478
Lumber, planed (see also Sash, doors, and blinds)	1	8,000	18	....	....	4,000	20,000	30,000
Lumber, sawed	5	501,700	172	....	92	116,500	406,500	612,400
Marble and stone work	3	57,500	38	....	....	18,500	26,000	65,000
Saddlery and harness	14	20,350	30	....	....	8,106	25,500	46,331
Sash, doors, and blinds (see also Lumber, planed)	2	21,000	21	....	....	10,072	50,300	65,512
Slaughtering and meat-packing, not including retail butchering establishments.	2	3,000	9	....	1	2,475	54,085	56,219
Stone- and earthen-ware	7	9,900	44	....	1	15,581	8,537	32,005
Tinware, copperware, and sheet-iron ware	11	7,150	19	....	....	7,511	13,400	26,550
Tobacco, cigars and cigarettes	4	9,600	20	....	3	6,500	11,000	23,300
PAGE:								
Flouring- and grist-mill products	8	62,000	21	....	....	6,138	91,030	110,284
PLYMOUTH:								
Flouring- and grist-mill products	4	113,800	24	....	....	14,786	272,312	342,150

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

IOWA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
POLK:								
Agricultural implements	4	$56,000	19	1		$8,400	$14,550	$48,200
Bookbinding and blank-book making	2	14,000	17	11	1	14,523	18,500	43,000
Bread and other bakery products	6	14,050	31	1		13,995	41,000	64,362
Brick and tile	12	43,700	213	1	20	54,340	38,010	116,660
Carriages and wagons	5	24,300	36			16,550	30,000	59,000
Clothing, men's	13	60,700	43	13		39,050	70,300	154,600
Coffee and spices, roasted and ground	1	12,000	5	1		3,500	40,000	50,000
Cooperage	3	3,000	17			9,100	21,100	32,300
Flouring- and grist-mill products	12	176,725	50			16,405	303,007	352,504
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	8	94,000	75		4	46,702	50,823	151,848
Furniture	5	47,850	29		8	17,600	45,700	80,500
Glucose	1	55,000	25			4,102	19,030	25,812
Lithographing (see also Printing and publishing)	2	11,500	15			10,850	9,000	27,000
Liquors, distilled	1	50,000	20			5,000	32,488	51,400
Liquors, malt	5	84,000	25			10,605	35,610	81,295
Lumber, planed	2	53,000	40		5	25,200	51,000	95,000
Lumber, sawed	8	11,140	25			5,342	24,541	39,090
Marble and stone work	5	43,000	36	1		20,100	21,600	68,700
Oil, linseed	1	35,000	16		2	10,000	75,000	95,000
Printing and publishing (see also Lithographing)	13	320,500	148	21	14	136,102	174,850	399,438
Saddlery and harness	8	6,400	16		1	6,200	26,200	43,100
Slaughtering and meat-packing, not including retail butchering establishments.	2	95,000	175		20	66,000	1,438,600	1,693,000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	7,000	14			12,000	27,000	40,000
Stone- and earthen-ware	2	10,500	37		10	18,000	7,200	31,800
Tinware, copperware, and sheet-iron ware	9	32,500	35			18,442	48,000	111,000
Tobacco, cigars and cigarettes	5	17,700	32	4	4	20,700	36,050	74,500
Wirework	1	50,000	18		6	10,500	50,000	70,000
POTTAWATTAMIE:								
Baking and yeast powders	1	4,000	8			3,960	30,000	40,000
Brick and tile	6	26,400	112			31,900	13,894	60,900
Carriages and wagons	2	6,000	15			8,000	8,000	20,000
Flouring- and grist-mill products	13	153,279	59			27,758	624,795	712,026
Foundery and machine-shop products	2	41,400	63		1	18,800	61,500	98,000
Grease and tallow	2	7,000	6			1,600	15,000	20,500
Liquors, malt	2	95,000	22			8,784	37,780	67,291
Printing and publishing	2	28,000	36	1		21,700	23,000	50,800
Saddlery and harness	11	12,487	33			13,192	29,600	57,190
Shirts	1	2,500	1	20		6,000	23,000	35,000
Slaughtering and meat-packing, not including retail butchering establishments.	5	66,000	113			40,800	724,610	899,750
Surgical appliances	1	7,000	3	5		6,000	5,000	25,000
Tinware, copperware, and sheet-iron ware	8	6,200	10			3,994	10,800	20,874
Tobacco, cigars and cigarettes	13	12,150	34	1	4	14,216	32,850	60,854
Wirework	3	4,000	16			4,900	27,000	38,800
POWESHIEK:								
Agricultural implements	1	150,000	80		3	40,000	60,000	175,000
Carriages and wagons	4	25,500	18			8,600	13,850	29,700
Flouring- and grist-mill products	5	31,600	9			3,800	85,174	95,970
Wire	1	2,000	7			2,800	15,000	20,000
SAC:								
Flouring- and grist-mill products	4	27,500	11			4,400	72,925	80,140
SCOTT:								
Agricultural implements	5	331,000	191			69,676	171,075	350,510
Boxes, wooden, packing	1	26,000	20			9,200	19,000	53,000
Bread and other bakery products	7	97,700	39	2	1	17,105	95,610	132,015
Brick and tile	8	32,050	59	1	9	13,729	6,847	27,650
Carriages and wagons	4	35,870	35		1	23,400	26,383	65,500
Clothing, men's	13	110,900	82	30	1	62,068	109,759	209,378
Confectionery	3	19,650	7	5	1	4,320	55,800	78,000
Cooperage	4	16,700	33			12,060	29,590	47,642
Cordage and twine	1	5,800	9		4	4,980	17,204	24,314
Flouring- and grist-mill products	10	179,000	49			23,632	673,599	756,393
Foundery and machine-shop products	3	76,500	51		3	26,950	50,300	99,250
Furniture	5	110,500	91	1	2	40,212	61,732	124,650
Liquors, malt	6	218,000	65			25,018	107,590	185,370
Lumber, sawed	7	664,000	259		65	103,750	586,750	843,980
Malt	1	80,000	16			7,450	67,550	88,750
Marble and stone work	4	20,500	19		1	9,865	13,816	31,931
Printing and publishing	4	79,500	45	9	3	29,213	53,986	108,123
Roofing and roofing materials	1	8,000	6			2,700	29,200	42,200
Saddlery and harness	11	17,700	22		2	8,770	21,117	41,085
Sash, doors, and blinds	3	135,000	83		25	40,240	252,182	333,475
Slaughtering and meat-packing, not including retail butchering establishments.	3	285,000	49			7,310	266,559	273,634
Soap and candles	1	9,000	4			1,500	35,800	45,000
Tinware, copperware, and sheet-iron ware	16	49,800	36			15,907	30,265	65,502
Tobacco, cigars and cigarettes	15	70,380	73	22	7	45,178	82,162	184,609
Vinegar	1	15,000	5			2,000	20,000	16,000
SHELBY:								
Flouring- and grist-mill products	2	35,000	10			3,991	61,456	67,638

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

IOWA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Average number of hands employed. Females above 15 years.	Average number of hands employed. Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
TAMA:								
Agricultural implements	1	$25,000	20	....	....	$8,000	$14,700	$25,000
Flouring- and grist-mill products	12	118,200	31	....	....	8,169	242,546	287,904
Saddlery and harness	7	8,150	11	....	....	5,333	27,342	40,700
TAYLOR:								
Flouring- and grist-mill products	4	40,800	16	....	....	5,810	109,120	138,726
UNION:								
Clothing, men's	3	9,500	15	....	....	9,303	21,000	39,500
Flouring- and grist-mill products	5	62,000	21	....	....	9,288	166,837	184,508
Saddlery and harness	4	5,850	8	....	....	3,950	14,830	25,520
VAN BUREN:								
Carriages and wagons	6	40,000	45	....	2	19,750	31,500	69,000
Flouring- and grist-mill products	9	108,500	40	....	....	11,416	247,281	292,461
Lumber, sawed	6	27,000	29	....	....	5,950	45,362	59,100
Stone- and earthen-ware	2	10,000	17	....	....	8,620	3,452	20,100
Woolen goods	1	50,000	39	40	6	18,500	79,700	108,025
WAPELLO:								
Bread and other bakery products	5	9,925	13	1	....	5,350	23,100	34,800
Brick and tile	6	16,650	53	2	4	10,925	5,655	22,005
Carriages and wagons	4	10,500	24	....	....	10,050	11,500	27,500
Clothing, men's	2	7,500	14	5	....	9,600	11,000	25,300
Confectionery	2	28,000	12	3	2	5,239	25,000	52,000
Cooperage	3	15,200	28	....	....	13,450	35,000	59,000
Cutlery and edge tools	1	5,000	14	....	3	6,000	6,000	20,000
Flouring- and grist-mill products	11	101,945	36	....	....	12,481	286,673	326,520
Foundery and machine-shop products	2	6,500	14	....	....	7,800	9,600	20,000
Furniture	4	32,350	33	....	....	16,550	10,180	33,000
Liquors, malt	2	105,000	26	....	....	10,840	46,621	83,106
Lumber, planed	1	10,000	12	....	....	6,000	40,000	55,000
Lumber, sawed	10	22,700	33	....	1	8,175	25,775	43,165
Oil, linseed	1	75,000	18	....	....	9,000	96,000	120,000
Printing and publishing	4	8,000	20	3	1	9,490	6,550	20,600
Saddlery and harness	7	210,800	73	....	....	36,917	81,500	145,000
Sewing machines and attachments	1	44,000	60	50	3	36,000	74,000	122,000
Slaughtering and meat-packing, not including retail butchering establishments.	2	150,000	255	....	5	60,000	1,684,500	1,875,000
Starch	1	90,000	25	15	....	16,500	60,000	85,000
Tinware, copperware, and sheet-iron ware	4	19,000	20	....	....	10,905	23,270	48,000
Tobacco, cigars and cigarettes	5	4,350	18	1	3	5,990	11,490	22,300
WARREN:								
Flouring- and grist-mill products	9	79,500	34	....	....	8,785	179,891	229,968
Lumber, sawed	11	10,800	29	....	....	3,449	21,971	35,600
WASHINGTON:								
Clothing, men's	4	2,625	9	10	....	8,688	11,500	25,800
Flouring- and grist-mill products	9	100,000	21	....	....	7,586	286,552	320,384
Saddlery and harness	8	8,450	7	....	....	2,000	17,360	22,857
Slaughtering and meat-packing, not including retail butchering establishments.	1	3,000	3	....	....	600	18,543	26,180
WAYNE:								
Flouring- and grist-mill products	5	33,300	17	....	....	3,105	94,750	116,572
WEBSTER:								
Clothing, men's	4	8,800	15	....	....	7,596	20,300	35,895
Fertilizers	1	20,000	20	....	....	6,750	6,000	20,000
Flouring- and grist-mill products	5	63,000	17	....	....	4,900	98,273	120,480
WINNESHIEK:								
Bread and other bakery products	2	8,600	10	....	....	2,950	19,150	27,000
Flouring- and grist-mill products	18	174,593	47	....	....	14,761	395,676	454,517
Liquors, malt	5	45,743	9	....	....	3,796	16,329	28,995
Printing and publishing	5	54,900	41	9	3	16,400	12,500	43,250
Saddlery and harness	6	16,300	14	....	....	5,085	14,480	24,750
WOODBURY:								
Bread and other bakery products	1	8,000	5	....	5	3,000	30,000	40,000
Brick and tile	6	13,000	63	....	2	13,500	7,750	28,800
Carriages and wagons	2	18,000	20	....	....	13,800	18,000	40,000
Clothing, men's	5	13,000	20	7	....	18,420	15,920	41,350
Flouring- and grist-mill products	7	105,500	25	....	....	14,470	164,200	179,410
Foundery and machine-shop products	1	25,000	20	....	....	7,500	20,000	32,000
Grease and tallow	2	5,500	7	....	....	2,800	17,600	24,780
Liquors, malt	2	55,000	16	....	....	6,751	29,035	51,657
Lumber, sawed	5	23,200	18	....	1	2,350	17,300	23,140
Printing and publishing	3	62,500	39	4	....	24,560	18,000	56,700
Saddlery and harness	6	8,450	12	....	....	4,625	11,700	22,600
Slaughtering and meat-packing, not including retail butchering establishments.	2	303,000	91	....	....	28,500	383,068	473,547
Tinware, copperware, and sheet-iron ware	5	6,450	13	....	....	7,100	13,800	28,500
Tobacco, cigars and cigarettes	3	8,500	12	....	....	7,900	13,400	28,000
WORTH:								
Carriages and wagons	2	17,000	15	....	....	8,500	10,200	24,000
Flouring- and grist-mill products	2	40,000	10	....	....	2,700	62,300	71,500

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

KANSAS.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
ALLEN:								
Carriages and wagons	2	$9,000	25			$9,500	$12,500	$25,000
Flouring- and grist-mill products	4	35,500	26			6,124	110,163	122,950
Saddlery and harness	4	8,600	9			4,630	16,700	30,100
ANDERSON:								
Flouring, and grist-mill products	2	29,000	12			4,400	98,475	115,618
ATCHISON:								
Bread and other bakery products	5	9,200	18			10,525	26,236	46,175
Brick and tile	5	7,300	32			10,250	7,585	24,175
Carriages and wagons	5	38,000	37			22,147	37,320	99,000
Clothing, men's	7	19,100	36	2		23,400	29,200	71,480
Confectionery	3	15,000	21	1		13,163	41,000	105,000
Flouring- and grist-mill products	7	171,000	48			32,352	492,950	602,404
Foundery and machine-shop products	2	51,200	73			41,800	101,000	154,000
Fruits and vegetables, canned and preserved	2	40,000	16	104	23	17,000	22,000	50,000
Furniture	4	29,500	43			25,005	51,300	90,900
Liquors, malt	2	43,000	8			3,923	14,825	26,822
Lumber, sawed	2	11,000	28			1,725	15,757	22,000
Marble and stone work	3	6,200	27			15,025	14,300	36,500
Oil, linseed	2	24,000	27			8,400	90,000	108,000
Saddlery and harness	6	13,000	18			9,814	9,050	27,800
Sash, doors, and blinds	2	8,500	14			8,500	14,000	27,000
Slaughtering and meat-packing, not including retail butchering establishments.	2	36,000	22			9,000	119,835	152,895
Tinware, copperware, and sheet-iron ware	8	25,900	32			16,500	28,400	54,500
Tobacco, cigars and cigarettes	5	27,000	32			23,500	57,500	102,500
BOURBON:								
Flouring- and grist-mill products	7	67,200	49			18,905	449,407	538,746
Foundery and machine-shop products	2	16,800	39			22,850	36,600	67,000
Furniture	3	44,000	18		1	10,000	14,000	32,300
Printing and publishing	1	5,000	24			10,780	10,000	22,000
Saddlery and harness	3	8,100	9			2,400	17,000	26,600
Tobacco, cigars and cigarettes	2	6,000	13		3	8,400	9,000	20,000
BROWN:								
Flouring- and grist-mill products	2	17,000	8			3,902	57,170	64,238
BUTLER:								
Flouring- and grist-mill products	8	62,500	24			12,306	129,940	151,597
CHAUTAUQUA:								
Flouring- and grist-mill products	6	30,116	9			2,395	68,510	77,997
CHEROKEE:								
Flouring- and grist-mill products	5	32,000	10			2,550	79,123	101,891
Lumber, sawed	4	8,000	11			2,750	12,950	20,500
Zinc	1	60,000	80			45,000	5,000	74,000
CLAY:								
Flouring- and grist-mill products	3	77,000	16			11,430	201,800	223,000
CLOUD:								
Flouring- and grist-mill products	2	18,000	12			4,300	123,650	134,495
COFFEY:								
Flouring- and grist-mill products	3	71,000	17			6,300	257,400	280,000
COWLEY:								
Flouring- and grist-mill products	4	58,000	16			6,710	141,980	155,900
CRAWFORD:								
Flouring- and grist-mill products	8	38,150	21			5,644	110,727	126,225
Zinc	1	50,000	100			65,000	85,000	180,000
DAVIS:								
Flouring- and grist-mill products	3	41,000	13			5,630	135,100	162,550
DICKINSON:								
Flouring- and grist-mill products	8	76,000	30			8,427	253,437	273,453
DONIPHAN:								
Flouring- and grist-mill products	9	103,500	38			14,100	243,130	292,482
Slaughtering and meat-packing, not including retail butchering establishments.	1	20,000	25			2,500	35,000	40,800
DOUGLAS:								
Clothing, men's	3	7,900	18	8		12,500	25,000	51,600
Cooperage	1	3,000	13			8,000	16,468	28,000
Drugs and chemicals	1	30,000	8	3	5	1,200	15,000	22,500
Flouring- and grist-mill products	8	171,000	62			26,718	292,860	329,877
Liquors, malt	2	55,500	19	1		5,224	19,320	34,945
Printing and publishing	6	26,500	56	7	21	24,916	19,043	58,758
Saddlery and harness	12	19,850	21			9,590	40,100	66,017
Slaughtering and meat-packing, not including retail butchering establishments.	2	45,000	9			5,500	73,316	89,000
Soap and candles	1	10,000	3			1,200	69,000	75,000
Tinware, copperware, and sheet-iron ware	8	13,500	13			5,335	18,620	31,300

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

KANSAS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
DOUGLAS—continued.								
Wire	1	$10,000	8			$1,450	$16,400	$23,100
Wirework	1	3,500	12			5,616	33,082	47,708
ELK:								
Flouring- and grist-mill products	6	30,100	18			3,260	61,110	71,546
FRANKLIN:								
Flouring- and grist-mill products	3	75,000	19			9,846	107,260	137,610
Furniture	2	2,600	21		2	11,150	8,300	25,200
Lumber, sawed	6	10,950	24			3,705	22,520	34,895
Saddlery and harness	3	13,300	12			4,600	13,500	24,500
GREENWOOD:								
Flouring- and grist-mill products	5	43,850	13			5,004	100,874	116,509
Lumber, sawed	4	6,700	15			4,825	57,042	74,120
HARVEY:								
Flouring- and grist-mill products	8	41,100	34			7,700	260,778	295,758
JEFFERSON:								
Flouring- and grist-mill products	5	67,000	19			9,626	221,407	253,779
Lumber, sawed	4	8,800	15			2,025	14,760	20,450
JOHNSON:								
Flouring- and grist-mill products	7	73,500	32			10,506	159,012	183,454
LABETTE:								
Brick and tile	8	11,750	104	5	5	13,575	7,799	28,365
Flouring- and grist-mill products	10	139,400	44			23,797	351,805	411,800
Lumber, sawed	3	20,300	19			4,205	32,161	45,565
Saddlery and harness	5	9,150	10			2,600	12,700	22,100
Slaughtering and meat-packing, not including retail butchering establishments.	4	12,460	27			7,100	88,270	121,030
Tinware, copperware, and sheet-iron ware	5	4,300	12			4,560	10,000	20,500
LEAVENWORTH:								
Bags, other than paper	1	18,000	10	10	8	5,000	82,500	100,000
Bookbinding and blank-book making	2	10,270	12	4		7,027	10,328	21,440
Boots and shoes	1	10,000	40			9,000	26,000	40,000
Boxes, cigar	1	7,000	8			4,000	12,000	25,000
Bread and other bakery products	7	13,200	15		3	5,410	13,770	23,391
Brick and tile	3	11,000	51			13,188	7,238	27,980
Bridges	1	25,000	20			10,000	40,000	60,000
Brooms and brushes	3	9,300	18			6,601	12,113	23,342
Carriages and wagons	5	151,000	440			152,179	250,100	500,000
Clothing, men's	6	18,700	33	8		17,816	23,400	45,747
Flouring- and grist-mill products	7	279,200	71			42,084	1,037,930	1,210,503
Foundery and machine-shop products	6	286,000	318		6	176,119	187,368	488,250
Furniture (see also Mattresses and spring beds)	6	102,000	180	2	7	63,888	71,600	168,855
Liquors, malt	4	131,000	26			12,268	45,150	81,910
Lumber, planed	1	45,000	31		2	11,700	30,000	50,000
Lumber, sawed	5	9,700	24			3,725	20,610	31,525
Marble and stone work	3	16,500	70			21,000	12,000	45,000
Mattresses and spring beds (see also Furniture)	2	21,500	8	4		2,425	32,000	46,000
Patent medicines and compounds	2	40,300	18	13	1	9,666	15,200	51,000
Perfumery and cosmetics	1	15,000	22			9,185	15,000	50,000
Printing and publishing	8	79,500	83	17	20	44,850	50,616	120,260
Saddlery and harness	10	33,200	51		2	25,868	76,790	118,666
Shipbuilding	1	1,000	8		3	1,900	23,000	26,000
Slaughtering and meat-packing, not including retail butchering establishments.	1	20,000	10			7,200	77,690	93,753
Soap and candles	2	6,500	9	1		2,850	16,600	22,458
Tinware, copperware, and sheet-iron ware	11	59,500	36		3	20,884	61,350	100,817
Tobacco, cigars and cigarettes	12	85,000	116		15	41,117	96,356	155,189
Woolen goods	1	50,000	18	12		5,000	16,000	29,000
LINN:								
Flouring- and grist-mill products	9	37,400	26		3	6,296	126,502	142,327
Lumber, sawed	6	6,900	21			4,750	32,350	50,750
LYON:								
Carriages and wagons	2	6,000	24			7,800	9,500	20,000
Clothing, men's	2	8,000	14	3		7,500	9,200	20,500
Flouring- and grist-mill products	6	117,000	16			6,760	169,100	179,286
Furniture	2	13,500	8			3,600	20,000	28,300
Lumber, sawed	9	19,800	20			2,220	15,350	25,370
Saddlery and harness	4	15,100	21			6,250	17,000	32,000
McPHERSON:								
Flouring- and grist-mill products	5	39,800	9			2,782	51,078	57,554
MARION:								
Flouring- and grist-mill products	5	52,000	24			5,780	142,036	170,271
MARSHALL:								
Flouring- and grist-mill products	8	159,612	40			18,381	342,372	374,456
Woolen goods	1	50,000	38	25	10	16,300	73,300	156,000
MIAMI:								
Carriages and wagons	2	17,000	29			6,838	11,500	24,800
Flouring- and grist-mill products	5	33,000	23			8,604	147,044	173,204

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

KANSAS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
MITCHELL:								
Flouring- and grist-mill products	7	$88,000	34	....	....	$13,805	$204,752	$241,454
MONTGOMERY:								
Flouring- and grist-mill products	12	71,500	39	....	....	7,756	187,747	204,412
MORRIS:								
Flouring- and grist-mill products	3	38,500	8	....	....	3,012	68,130	78,265
NEMAHA:								
Flouring- and grist-mill products	2	33,000	7	....	....	2,915	46,447	54,298
Saddlery and harness	8	7,400	9	....	1	4,100	16,700	29,400
NEOSHO:								
Flouring- and grist-mill products	9	64,800	25	....	....	5,441	140,725	158,001
OSAGE:								
Flouring- and grist-mill products	5	43,000	12	....	....	3,700	56,665	70,919
Tinware, copperware, and sheet-iron ware	3	7,000	8	....	....	4,650	22,500	32,800
PHILLIPS:								
Flouring- and grist-mill products	4	31,000	12	....	....	3,950	88,343	96,734
POTTAWATOMIE:								
Flouring- and grist-mill products	6	92,000	11	....	....	3,561	34,917	42,599
RENO:								
Flouring- and grist-mill products	4	57,000	20	....	....	8,290	176,925	201,831
RUSSELL:								
Flouring- and grist-mill products	3	40,000	15	....	....	4,049	167,990	189,247
SALINE:								
Flouring- and grist-mill products	5	145,000	38	....	....	12,972	254,470	335,216
SEDGWICK:								
Flouring- and grist-mill products	7	133,800	39	....	....	17,650	546,800	587,295
Saddlery and harness	5	15,400	18	....	....	10,500	34,500	65,000
Tinware, copperware, and sheet-iron ware	3	34,000	9	....	....	5,400	16,700	31,200
Tobacco, cigars and cigarettes	3	9,500	20	....	8	11,220	23,250	43,000
SHAWNEE:								
Bread and other bakery products	5	18,500	11	....	....	6,520	19,300	31,500
Brick and tile	4	8,000	48	....	15	12,550	6,125	25,400
Carriages and wagons	1	5,000	8	....	....	5,000	10,000	20,000
Flouring- and grist-mill products	6	163,000	52	....	....	29,500	679,500	762,010
Foundery and machine shop products	3	45,000	63	....	....	37,000	37,000	105,000
Iron and steel	1	150,000	190	....	10	6,500	52,750	64,900
Liquors, distilled	1	25,000	4	....	....	1,350	14,750	22,000
Marble and stone work	1	5,500	8	....	....	4,500	6,000	20,000
Printing and publishing	12	137,185	137	44	31	96,039	110,762	253,979
Saddlery and harness	4	36,000	20	....	....	7,900	19,800	32,900
Tinware copperware, and sheet-iron ware	11	42,550	35	....	....	17,200	27,100	54,000
Tobacco, cigars and cigarettes	6	11,000	18	1	4	9,700	10,200	33,750
SUMNER:								
Flouring- and grist-mill products	6	78,300	19	....	....	3,517	92,688	107,486
WASHINGTON:								
Flouring- and grist-mill products	4	30,000	11	....	....	2,650	47,750	55,227
WILSON:								
Flouring- and grist-mill products	8	54,000	33	....	....	7,132	114,140	135,540
Lumber, sawed	13	21,950	45	....	....	5,618	36,380	54,750
WYANDOTTE:								
Brick and tile	3	14,625	114	....	10	28,850	12,870	55,400
Cooperage	5	18,300	83	....	....	11,740	41,247	71,900
Flouring- and grist-mill products	4	63,000	25	....	....	13,404	210,001	235,176
Iron and steel	1	300,000	380	....	50	160,000	681,495	939,200
Soap and candles	2	19,500	7	....	....	3,200	28,500	46,000
Slaughtering and meat-packing, not including retail butchering establishments.	2	1,520,000	910	....	50	231,000	3,902,200	5,092,000
Wirework	1	5,000	25	....	20	10,000	20,000	40,000

KENTUCKY.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ALLEN:								
Flouring- and grist-mill products	8	$21,100	8	....	....	$1,752	$42,045	$45,615
Handles, wooden	4	7,300	25	....	....	8,575	18,206	31,500
Lumber, sawed	12	16,850	52	....	2	8,144	36,425	57,760
ANDERSON:								
Cooperage	3	29,000	35	....	2	9,350	18,130	43,800
Flouring- and grist-mill products	4	39,500	14	....	....	2,550	94,500	105,250
Liquors, distilled	14	192,000	80	....	....	30,125	283,575	425,000
BARREN:								
Flouring- and grist-mill products	15	52,700	20	....	....	3,320	115,430	132,378
Lumber, sawed	16	33,017	61	....	2	12,150	42,375	73,067
BATH:								
Flouring- and grist-mill products	5	20,500	9	....	....	1,900	28,195	32,245
Woolen goods.	1	10,000	11	10	....	2,000	11,006	22,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

KENTUCKY—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
BOONE:								
Flouring- and grist-mill products	4	$7,300	3	....	....	$630	$35,275	$39,658
Liquors, distilled	1	250,000	45	....	3	17,000	240,201	365,125
Lumber, sawed	7	10,400	14	....	....	1,906	14,870	26,420
BOURBON:								
Carriages and wagons	5	23,000	41	....	....	14,950	21,000	53,000
Clothing, men's	1	6,000	11	....	....	6,600	9,000	20,000
Cooperage	3	14,500	31	....	....	7,500	17,000	32,500
Flouring- and grist-mill products	8	122,500	23	....	....	11,200	137,000	169,160
Liquors, distilled	9	238,500	48	3	....	20,325	192,500	288,900
Lumber, sawed	2	12,800	16	....	....	4,300	10,100	22,400
Tinware, copperware, and sheet-iron ware	3	5,200	11	....	....	4,400	18,000	29,000
BOYD:								
Flouring- and grist-mill products	4	34,500	17	....	....	4,940	125,400	141,254
Iron and steel	4	1,415,000	450	....	150	255,350	597,884	1,074,600
Leather, curried	2	2,250	4	....	....	1,500	23,530	27,780
Leather, tanned	2	2,250	4	....	....	1,500	15,350	21,520
Lumber, sawed	8	56,900	56	....	1	12,870	42,780	67,780
Shipbuilding	2	8,450	15	....	....	6,550	13,900	24,000
Tinware, copperware, and sheet-iron ware	3	14,000	7	....	....	4,190	8,600	24,000
BOYLE:								
Carriages and wagons	2	4,500	19	....	....	8,000	10,000	24,000
Clothing, men's	2	3,500	12	....	....	4,600	11,500	21,000
Flouring- and grist-mill products	7	61,000	16	....	....	5,088	62,079	72,110
Lumber, sawed	4	17,280	18	....	....	4,075	10,480	20,855
BRACKEN:								
Flouring- and grist-mill products	7	25,000	18	....	....	3,415	142,358	164,731
Lumber, sawed	2	10,500	12	....	....	4,800	12,600	21,500
BRECKINRIDGE:								
Flouring- and grist-mill products	7	35,000	21	....	1	3,150	69,882	83,157
Lumber, sawed	11	18,400	38	....	1	4,736	17,050	31,570
BULLITT:								
Flouring- and grist-mill products	2	20,000	21	....	....	1,800	28,237	32,640
Liquors, distilled	3	33,000	13	....	....	4,650	44,650	67,000
Lumber, sawed	18	31,150	66	....	....	14,940	46,613	80,000
CALDWELL:								
Flouring- and grist-mill products	5	29,700	17	....	....	4,067	71,468	84,965
CALLOWAY:								
Flouring- and grist-mill products	6	12,800	13	....	....	1,220	92,040	96,525
Lumber, sawed	7	12,200	14	....	1	3,100	13,650	21,950
CAMPBELL:								
Agricultural implements	1	2,100	15	....	....	4,300	9,000	22,000
Boots and shoes	1	9,500	14	4	3	7,500	10,500	22,000
Brick and tile	7	32,700	52	....	9	26,452	14,942	55,180
Carriages and wagons	3	31,000	25	....	....	11,120	18,500	45,000
Cordage and twine	1	15,000	20	....	10	10,000	52,000	90,000
Flouring- and grist-mill products	4	30,500	13	....	....	4,406	111,063	133,223
Foundery and machine-shop products	3	117,500	280	....	3	89,011	309,707	471,349
Iron and steel	3	640,000	760	....	....	305,500	1,359,990	2,033,950
Liquors, distilled	1	100,000	32	....	1	15,000	175,000	262,000
Liquors, malt	3	172,815	49	....	....	23,031	96,888	158,832
Lumber, planed	1	15,000	11	....	4	4,000	15,000	23,000
Lumber, sawed	5	67,800	19	....	1	23,066	60,800	100,100
Slaughtering and meat-packing, not including retail butchering establishments.	2	12,500	4	....	....	1,800	55,100	62,700
Tobacco, cigars and cigarettes	26	19,500	66	....	13	22,800	28,360	63,000
Watch cases	1	500,000	200	20	55	150,000	500,000	800,000
CARROLL:								
Liquors, distilled	1	30,000	5	....	2	2,000	18,743	29,745
Lumber, sawed	3	36,500	10	....	....	1,900	23,400	31,250
Mixed textiles (see also Woolen goods)	1	80,000	48	26	29	18,175	95,920	140,000
Woolen goods (see also Mixed textiles)	1	80,000	55	26	29	18,175	95,920	140,000
CARTER:								
Iron and steel	3	185,000	320	....	30	98,000	60,750	114,000
Lumber, sawed	1	8,000	10	....	....	6,000	27,685	37,500
CASEY:								
Flouring- and grist-mill products	6	17,500	10	....	....	1,195	26,930	30,149
Lumber, sawed	17	60,300	70	....	2	24,950	62,875	116,600
CHRISTIAN:								
Carriages and wagons	2	34,000	19	....	5	5,740	11,400	23,700
Cooperage	3	4,500	14	....	....	3,800	6,000	20,500
Flouring- and grist-mill products	12	149,200	43	....	....	12,825	331,250	369,362
Lumber, planed	2	35,000	50	....	....	21,000	90,000	129,000
Lumber, sawed	5	11,150	23	....	....	5,700	18,650	29,590
Tinware, copperware, and sheet-iron ware	3	6,100	6	....	....	2,700	17,600	24,000
CLARK:								
Flouring- and grist-mill products	14	42,000	23	....	3	1,923	44,062	51,930

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

KENTUCKY—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
DAVIESS:								
Brick and tile	9	$9, 150	84		10	$17, 930	$9, 689	$36, 890
Cooperage	8	10, 550	36			25, 865	19, 440	52, 575
Flouring- and grist-mill products	8	58, 000	25		1	9, 508	128, 080	163, 623
Liquors, distilled	11	568, 500	108			46, 175	336, 275	669, 325
Lumber, sawed	9	81, 000	37		2	14, 773	65, 550	112, 000
Saddlery and harness	5	7, 700	6			3, 006	10, 900	21, 600
Tinware, copperware, and sheet-iron ware	4	5, 900	17		2	8, 175	11, 650	25, 500
Tobacco stemming	18	508, 158	111	71	80	62, 156	453, 529	579, 530
FAYETTE:								
Bread and other bakery products	6	15, 375	14	4	1	5, 825	33, 150	48, 436
Brick and tile	2	6, 500	85		15	22, 700	11, 625	44, 500
Carriages and wagons	6	36, 000	58			29, 100	34, 300	83, 500
Cooperage	2	13, 500	21			14, 200	22, 250	46, 000
Flax, dressed	5	106, 000	76		50	40, 700	226, 000	303, 700
Flouring- and grist-mill products	3	58, 000	15			5, 120	59, 069	72, 346
Liquors, distilled	10	470, 500	97			40, 125	395, 000	592, 350
Lumber, planed (see also Sash, doors, and blinds)	1	5, 000	4		1	1, 750	16, 500	20, 000
Lumber, sawed	1	12, 581	12			4, 627	21, 651	30, 000
Printing and publishing	3	35, 200	22	2	5	11, 512	14, 800	38, 349
Saddlery and harness	8	19, 100	28			14, 565	32, 450	65, 500
Sash, doors, and blinds (see also Lumber, planed)	1	18, 000	25			13, 500	15, 000	34, 595
Tinware, copperware, and sheet-iron ware	7	14, 900	20			10, 250	19, 550	37, 900
Woolen goods	2	40, 000	16		18	1, 550	14, 330	21, 100
FLEMING:								
Flouring- and grist-mill products	11	67, 600	17			2, 605	172, 114	187, 139
Lumber, sawed	10	20, 100	39			6, 820	18, 405	37, 244
FRANKLIN:								
Cooperage	2	21, 000	35			20, 260	36, 000	75, 000
Cordage and twine	1	60, 000	60			15, 000	20, 000	50, 000
Cotton goods	1	60, 000	18	10	22	5, 500	31, 453	36, 179
Flouring- and grist-mill products	6	88, 100	21			5, 970	218, 999	237, 579
Liquors, distilled	6	620, 000	103			42, 100	402, 675	614, 000
Liquors, malt	1	25, 000	9		1	4, 322	20, 335	33, 172
Lumber, sawed	13	152, 800	97		18	42, 318	190, 765	279, 300
FULTON:								
Boots and shoes	1	3, 500	8		1	3, 500	17, 000	24, 300
Carriages and wagons	2	50, 800	65			26, 200	51, 000	103, 500
Flouring- and grist-mill products	2	6, 000	3			800	22, 200	30, 000
GARRARD:								
Flouring- and grist-mill products	3	12, 400	6			1, 400	29, 150	32, 625
Liquors, distilled	5	25, 600	6			1, 800	16,750	25, 000
Lumber, sawed	4	9, 200	15			4, 000	13, 550	24, 500
GRANT:								
Flouring- and grist-mill products	12	41, 200	13			2, 973	107, 085	121, 423
Lumber, sawed	16	28, 950	48			8, 975	57, 810	86, 580
GRAVES:								
Flouring- and grist-mill products	13	45, 300	26			6, 150	167, 740	186, 289
Lumber, sawed	11	13, 860	41		1	5, 900	23, 920	39, 550
GRAYSON:								
Flouring- and grist-mill products	8	27, 050	15			3, 150	55, 050	67, 430
Lumber, sawed	11	20, 300	51	1		6, 550	16, 195	32, 140
GREENUP:								
Flouring- and grist-mill products	4	9, 200	5			848	19, 400	23, 914
Iron and steel	6	1, 293, 035	850		50	163, 957	180, 762	233, 600
HARDIN:								
Flouring- and grist-mill products	13	66, 534	53			6, 142	133, 790	160, 701
Lumber, sawed	14	18, 600	33			5, 376	19, 510	36, 950
Slaughtering and meat-packing, not including retail butchering establishments.	1	7, 000	4			1, 000	24, 000	45, 980
HARRISON:								
Flouring- and grist-mill products	9	69, 450	19			3, 955	118, 211	135, 097
Liquors, distilled	10	532, 500	91			35, 127	300, 000	445, 725
HART:								
Flouring- and grist-mill products	10	22, 300	17			1, 781	61, 885	72, 402
Lumber, sawed	14	20, 700	35		1	3, 146	9, 500	20, 340
HENDERSON:								
Flouring- and grist-mill products	7	41, 250	14			1, 943	136, 764	155, 419
Liquors, distilled	1	40, 000	10			3, 725	32, 000	47, 500
Liquors, malt	1	30, 000	7			3, 092	14, 105	22, 610
Lumber, sawed	7	27, 100	31		4	10, 400	39, 750	69, 450
HENRY:								
Flouring- and grist-mill products	8	35, 941	22			3, 860	58, 250	67, 386
Liquors, distilled	1	75, 000	7			2, 750	25, 000	36, 750
Lumber, sawed	11	22, 000	33		2	5, 740	41, 225	60, 350
HICKMAN:								
Flouring- and grist-mill products	5	14, 988	15			2, 466	72, 175	80, 891
Lumber, sawed	15	31, 050	61		2	15, 149	70, 340	109, 950

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

KENTUCKY—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
HOPKINS:								
Lumber, sawed	7	$23,700	42	....	....	$6,755	$24,890	$41,700
Saddlery and harness	1	7,000	5	....	4	2,000	10,000	25,000
JEFFERSON:								
Agricultural implements	7	1,916,000	680	10	10	262,408	641,500	1,222,900
Awnings and tents	2	15,000	14	105	2	9,900	37,000	58,000
Bagging, flax, hemp, and jute	1	150,000	35	105	10	28,500	150,000	213,500
Baking and yeast powders (see also Drugs and chemicals)	2	11,000	7	3	....	4,604	22,000	38,000
Bells	2	26,000	15	....	....	5,460	12,800	34,300
Belting and hose, leather	2	19,000	5	....	....	3,300	17,000	30,000
Bookbinding and blank-book making	3	49,400	32	22	....	20,140	53,150	95,800
Boot and shoe uppers	5	14,050	23	11	....	18,857	69,600	102,980
Boots and shoes	12	181,300	288	125	24	145,707	306,173	521,552
Boxes, cigar	2	5,000	8	7	3	5,000	12,840	21,600
Boxes, fancy and paper	1	6,000	4	40	1	5,500	5,500	20,000
Boxes, wooden, packing	4	58,672	56	....	3	27,400	55,400	107,000
Brass castings	6	69,600	52	....	9	20,020	80. 020	114,276
Bread and other bakery products	69	192,000	193	21	6	69,431	377,311	592,925
Brick and tile (see also Drain and sewer pipe)	16	127,350	299	....	16	68,140	45,680	151,175
Bridges	1	250,000	110	....	15	70,000	180,000	300,000
Brooms and brushes	8	15,900	58	8	2	24,810	35,600	75,980
Cars, railroad, street, and repairs	2	6,000	37	....	....	17,500	14,775	39,500
Carriage and wagon materials	2	26,000	26	....	....	8,884	16,000	34,000
Carriages and sleds, children's	1	25,000	25	5	5	13,246	33,653	55,899
Carriages and wagons	31	341,250	379	2	14	157,422	393,540	723,575
Cement	2	375,000	147	....	....	25,000	111,000	145,000
Clothing, men's	35	701,800	782	763	4	300,511	724,536	1,308,718
Clothing, women's	3	45,000	2	220	25	53,300	275,600	388,900
Coffee and spices, roasted and ground	3	39,500	21	....	8	20,500	159,000	209,200
Coffins, burial cases, and undertakers' goods	3	110,300	68	3	....	29,100	41,700	120,800
Confectionery	17	170,900	90	17	5	38,814	151,749	263,430
Cooperage	22	272,200	537	....	7	254,931	368,660	762,800
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	1	15,000	12	....	....	6,550	50,000	71,000
Cordage and twine	4	5,500	14	....	7	5,718	15,220	26,500
Cork cutting	1	12,000	10	5	7	3,500	18,000	24,000
Cutlery and edge tools (see also Hardware)	5	54,600	73	....	1	31,979	28,600	75,350
Drain and sewer pipe (see also Brick and tile)	2	26,000	20	....	2	8,500	11,700	32,500
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds)	4	23,000	13	....	....	5,400	22,300	46,000
Flouring- and grist-mill products	9	270,000	96	....	....	35,550	839,165	954,250
Foundery and machine-shop products (see also Iron works, architectural and ornamental).	32	2,044,750	1,533	....	35	612,155	1,312,881	2,343,039
Furniture (see also Mattresses and spring beds; Upholstering)	18	421,600	543	4	32	220,000	359,705	797,460
Furniture, chairs	7	130,900	184	10	40	85,676	117,845	244,670
Glass	3	295,000	132	1	36	32,917	37,079	123,075
Glue	2	70,000	40	....	5	8,345	4,400	54,000
Grease and tallow	1	16,000	4	....	....	2,000	101,982	125,100
Hairwork	6	8,400	....	8	....	2,431	10,265	25,600
Handles, wooden	1	50,000	100	....	....	32,000	58,740	136,000
Hardware (see also Cutlery and edge tools)	3	10,500	14	....	....	6,850	6,500	21,800
Iron and steel	3	392,000	468	....	2	149,187	305,784	514,623
Iron forgings	1	25,000	26	....	6	10,954	26,400	41,355
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	4	33,500	31	....	....	12,004	19,940	48,493
Jewelry	7	25,099	31	2	1	14,794	28,384	53,703
Leather, curried	6	99,000	51	....	....	14,825	296,690	355,400
Leather, tanned	14	1,615,000	382	1	10	163,653	1,322,931	1,922,590
Liquors, distilled	19	1,065,300	221	....	2	91,480	967,775	1,402,850
Liquors, malt	20	712,000	275	1	2	134,291	575,533	959,221
Lithographing (see also Printing and publishing)	4	26,200	43	12	10	22,324	22,526	59,270
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	9	268,768	235	....	2	106,475	336,997	611,204
Lumber, sawed	17	328,200	127	....	13	33,907	146,990	255,925
Malt	2	89,000	26	....	1	19,000	350,000	510,000
Marble and stone work	17	140,375	167	....	....	80,714	133,846	319,500
Mattresses and spring beds (see also Furniture)	10	15,450	35	6	....	15,573	40,280	75,800
Millinery and lace goods	7	61,000	3	79	5	20,240	96,600	149,900
Mineral and soda waters	7	19,900	15	....	4	7,872	10,100	30,593
Mixed textiles (see also Woolen goods)	3	410,000	79	154	112	100,862	446,570	654,329
Musical instruments, organs and materials	1	25,000	10	....	2	3,050	9,000	20,000
Musical instruments, pianos and materials	5	40,700	26	....	....	12,833	13,800	42,200
Oil, linseed	1	75,000	12	....	....	4,500	50,000	70,000
Oleomargarine	1	400,000	75	....	10	10,000	200,000	250,000
Paints	2	10,800	11	....	....	4,880	20,900	34,000
Paper	2	600,000	172	113	10	82,460	363,070	619,422
Patent medicines and compounds (see also Drugs and chemicals)	9	119,500	33	10	5	14,186	166,000	352,800
Printing and publishing (see also Lithographing)	36	1,333,500	668	104	65	416,551	433,164	1,188,067
Pumps, not including steam pumps	5	22,250	24	....	2	11,160	12,010	33,789
Roofing and roofing materials	8	16,300	26	....	2	11,687	32,700	58,350
Saddlery and harness	35	396,150	398	19	23	159,571	520,525	882,542
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	2	130,000	43	....	3	12,800	105,000	129,000
Shipbuilding	3	8,500	26	....	....	15,400	24,300	45,000
Shirts	8	64,300	9	100	....	19,594	30,774	65,315
Slaughtering and meat-packing, not including retail butchering establishments.	23	2,144,500	358	....	8	141,092	3,438,459	4,287,158

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

KENTUCKY—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed: Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
JEFFERSON—continued.								
Soap and candles	2	$322, 340	66	27		$27, 000	$321, 581	$382, 425
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	45	178, 900	151		5	73, 548	228, 395	419, 030
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	9	460, 000	742	436	203	188, 517	1, 162, 891	2, 312, 802
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	54	248, 237	336	67	111	141, 148	245, 863	684, 842
Trunks and valises	7	59, 800	98		17	44, 101	72, 300	164, 100
Upholstering (see also Furniture)	4	13, 100	13	3		5, 000	22, 900	38, 200
Vinegar	3	42, 500	15			5, 210	64, 805	89, 000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	6	93, 000	62		36	36, 299	50, 756	114, 767
Woolen goods (see also Mixed textiles)	5	425, 500	96	154	114	102, 412	452, 840	670, 329
JESSAMINE:								
Flax, dressed	2	55, 000	44		20	19, 000	190, 000	225, 000
Flouring- and grist-mill products	6	52, 600	9			2, 999	103, 821	116, 040
Liquors, distilled	2	19, 500	12			4, 525	48, 000	71, 750
Lumber, sawed	2	16, 000	18			3, 500	20, 500	36, 500
KENTON:								
Bread and other bakery products	20	39, 050	24	7	3	9, 176	52, 458	88, 840
Brick and tile	10	7, 200	77		22	16, 050	15, 950	43, 795
Carriages and wagons	4	40, 700	39			18, 156	22, 200	51, 500
Coffee and spices, roasted and ground	1	20, 000	4			2, 392	58, 500	87, 753
Cooperage	6	2, 660	35			10, 265	18, 340	34, 070
Cordage and twine	2	57, 000	58		45	41, 805	121, 900	182, 850
Flouring- and grist-mill products	8	88, 100	34			12, 633	234, 249	257, 312
Foundery and machine-shop products	1	50, 000	90			31, 000	25, 000	65, 500
Furniture	2	32, 500	40			11, 000	13, 000	27, 500
Glass	2	500, 000	232	10	111	117, 405	97, 025	265, 330
Iron and steel	3	730, 000	533		32	281, 925	663, 705	1, 012, 004
Iron nails and spikes, cut and wrought	1	25, 000	13			4, 680	16, 148	32, 000
Iron railing, wrought	3	7, 500	26			8, 200	10, 560	25, 480
Leather, curried	1	15, 000	10			4, 408	40, 425	50, 425
Leather, tanned	3	37, 000	39			15, 900	301, 106	330, 450
Liquors, distilled	3	255, 000		1		38, 775	425, 500	635, 000
Liquors, malt	4	319, 129	94			43, 912	188, 395	313, 659
Lumber, planed	2	50, 000	28			11, 220	42, 000	57, 000
Lumber, sawed	7	24, 300	21			6, 915	74, 215	92, 860
Marble and stone work	7	12, 500	33			15, 417	28, 600	67, 330
Saddlery and harness	4	13, 500	20		1	7, 600	14, 700	27, 421
Shipbuilding	1	40, 000	74			36, 931	38, 500	88, 515
Slaughtering and meat-packing, not including retail butchering establishments.	3	30, 500	10			5, 384	96, 900	111, 000
Sporting goods	2	12, 000	15	70	5	12, 100	10, 200	34, 000
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	13	581, 500	279	88	161	150, 202	1, 057, 339	1, 395, 533
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	16	40, 927	57	1	21	22, 453	56, 859	101, 022
Wirework	2	55, 500	100		4	26, 900	67, 400	116, 000
Woolen goods	1	15, 000	7	1	2	1, 500	12, 100	20, 000
LEWIS:								
Cooperage	9	11, 480	49		3	17, 550	20, 280	52, 900
Flouring- and grist-mill products	7	29, 000	8			1, 860	24, 025	28, 940
Leather, curried	3	13, 600	9			2, 500	52, 115	60, 400
Leather, tanned	3	16, 000	15			4, 047	40, 800	57, 200
Lumber, sawed	14	37, 800	54		2	12, 875	33, 214	61, 840
LINCOLN:								
Flouring- and grist-mill products	9	33, 800	14			2, 579	63, 435	69, 411
Lumber, sawed	9	35, 025	38		2	7, 136	13, 675	29, 050
LOGAN:								
Flouring- and grist-mill products	17	165, 700	47			13, 794	415, 030	471, 028
Lumber, sawed	7	15, 600	22		2	9, 200	24, 505	46, 400
Woolen goods	3	18, 500	19	3	6	2, 100	13, 290	22, 165
LYON:								
Carriage and wagon materials	1	60, 000	115		5	44, 000	23, 000	80, 000
Iron and steel	2	500, 000	200			60, 000	43, 000	77, 000
MCCRACKEN:								
Carriages and wagons	5	16, 300	28			9, 425	10, 400	24, 300
Confectionery	2	3, 800	5			2, 700	15, 600	24, 500
Flouring- and grist-mill products	3	170, 000	29			13, 444	239, 900	278, 000
Foundery and machine-shop products	3	30, 600	34		1	8, 700	15, 133	60, 291
Furniture	1	38, 850	46		3	12, 425	26, 000	50, 000
Lumber, sawed	5	232, 000	130		5	77, 000	223, 000	358, 300
Printing and publishing	2	8, 500	21		9	11, 100	10, 000	24, 000
Saddlery and harness	3	24, 000	31			17, 165	18, 225	45, 880
Shipbuilding	2	28, 000	38			31, 000	41, 000	80, 000
Tinware, copperware, and sheet-iron ware	5	9, 700	20			8, 860	14, 500	26, 950
Tobacco stemming	2	33, 000	27	10	36	5, 500	42, 000	50, 000
MADISON:								
Carriages and wagons	2	4, 500	17			5, 500	12, 000	24, 000
Flouring- and grist-mill products	10	157, 680	27			7, 261	294, 260	323, 899
Liquors, distilled	5	224, 000	65			21, 500	211, 525	319, 398
Lumber, planed	1	1, 000	60			20, 000	4, 000	25, 000
Saddlery and harness	2	4, 000	10			5, 000	18, 000	30, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

KENTUCKY—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
MARION:								
Flouring- and grist-mill products	5	$99,000	20			$7,000	$267,146	$291,156
Liquors, distilled	8	139,427	57			24,500	206,175	305,000
Lumber, sawed	7	15,600	23		2	7,770	23,055	39,625
MASON:								
Agricultural implements	2	290,000	140			60,000	102,000	232,750
Carriages and wagons	1	20,000	16			5,000	10,000	20,000
Cotton goods	1	200,000	79	43	72	37,600	158,365	281,107
Flouring- and grist-mill products	6	91,000	35			14,030	245,100	302,375
Liquors, distilled	4	103,000	16			6,125	53,070	78,900
Lumber, planed	1	35,000	15			9,000	15,000	36,000
Lumber, sawed	3	31,850	21			12,000	44,000	84,000
Tinware, copperware, and sheet-iron ware	3	12,000	15			5,750	5,500	20,000
Tobacco, cigars and cigarettes	4	39,000	81		15	27,400	46,500	102,000
MEADE:								
Cotton goods	1	100,000	27	38	39	20,750	64,000	101,000
Flouring- and grist-mill products	6	77,600	15			4,325	96,306	110,495
MERCER:								
Flouring- and grist-mill products	16	42,3	21			3,839	66,462	78,663
Liquors, distilled	4	123,000	26			11,675	106,975	160,485
Lumber, sawed	6	8,750	19			4,905	24,185	38,000
MONTGOMERY:								
Lumber, planed	1	15,000	10			4,792	6,500	22,088
NELSON:								
Flouring- and grist-mill products	11	45,600	24			6,232	121,325	150,506
Liquors, distilled	22	815,700	158			65,728	664,569	975,000
Lumber, sawed	17	30,375	48			10,030	29,287	55,350
NICHOLAS:								
Carriages and wagons	1	2,500	7			3,934	10,000	20,000
Flouring- and grist-mill products	5	22,250	14			3,500	114,582	134,242
Lumber, sawed	6	8,100	21			5,700	19,820	31,600
OLDHAM:								
Flouring- and grist-mill products	6	19,300	10			839	37,250	41,886
Liquors, distilled	9	15,500	9			1,850	15,000	23,135
Lumber, sawed	7	10,500	15			3,465	20,700	31,720
OWEN:								
Flouring- and grist-mill products	7	18,800	15			2,611	50,530	55,820
Lumber, sawed	11	18,600	24			6,454	19,155	37,520
PENDLETON:								
Flouring- and grist-mill products	10	39,600	19			3,530	100,918	118,248
Lumber, sawed	10	31,400	41		2	15,765	41,520	71,200
PULASKI:								
Flouring- and grist-mill products	11	25,700	12			1,730	46,778	56,517
Handles, wooden	1	4,000	20			5,000	10,000	20,000
Lumber, sawed	12	54,400	50		5	18,758	72,155	116,020
ROCKCASTLE:								
Leather, curried	1	8,000	6			2,500	54,960	69,120
Leather, tanned	1	12,000	10			5,200	36,500	51,840
Lumber, sawed	9	13,875	38		1	11,800	21,960	49,428
SCOTT:								
Carriages and wagons	3	5,000	19			9,700	6,000	27,500
Flouring- and grist-mill products	11	56,500	24			4,028	112,457	124,543
SHELBY:								
Flouring- and grist-mill products	8	68,300	23			5,637	191,565	217,445
Lumber, sawed	10	17,300	14			1,960	14,850	24,010
SIMPSON:								
Flouring- and grist-mill products	4	35,500	16			2,400	152,320	166,067
TAYLOR:								
Flouring- and grist-mill products	10	8,100	13			921	28,995	33,060
Handles, wooden	1	2,000	10			3,000	30,000	50,000
Lumber, sawed	13	17,700	32			5,725	31,800	54,075
TODD:								
Flouring- and grist-mill products	7	38,500	25			5,400	215,553	239,522
TRIGG:								
Flouring- and grist-mill products	10	32,700	14			3,345	72,110	84,044
Lumber, sawed	7	17,800	23			7,060	20,715	34,625
TRIMBLE:								
Flouring- and grist-mill products	3	21,800	10			2,070	61,224	65,828
Liquors, distilled	2	85,000	19		2	7,750	63,750	96,527
WARREN:								
Flouring- and grist-mill products	9	50,400	22			4,950	115,020	123,973
Handles, wooden	1	5,000	30		10	12,000	3,000	36,000
Liquors, distilled	2	54,000	12			4,375	42,000	61,915
Lumber, sawed	6	14,500	21			3,900	11,350	20,610
Mixed textiles (see also Woolen goods)	1	125,000	10	30	20	16,911	36,686	75,000
Woolen goods (see also Mixed textiles)	1	125,000	19	30	20	16,911	32,488	75,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

KENTUCKY—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
WASHINGTON:								
Flouring- and grist-mill products	12	$46, 600	22			$2, 935	$130, 541	$146, 415
Liquors, distilled	5	23, 000	6			2, 000	19, 125	28, 500
WOODFORD:								
Carriages and wagons	2	30, 000	37			16, 000	27, 000	62, 500
Flouring- and grist-mill products	10	49, 700	19			5, 168	132, 664	148, 055
Liquors, distilled	6	84, 000	16		2	6, 527	63, 150	93, 275

LOUISIANA.

PARISHES AND INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
CADDO:								
Lumber, sawed	6	$95, 900	72		11	$15, 880	$83, 175	$137, 400
Oil, cottonseed and cake	1	75, 000	96			24, 000	100, 000	150, 000
CALCASIEU:								
Lumber, sawed	16	118, 300	153		14	49, 300	265, 030	377, 500
IBERIA:								
Lumber, sawed	2	18, 000	17			4, 810	35, 790	55, 220
Salt	1	250, 000	45			11, 000		56, 160
IBERVILLE:								
Cooperage	16	31, 550	55		1	13, 800	17, 400	50, 150
Lumber, sawed	2	20, 000	21			3, 315	43, 300	62, 600
JEFFERSON:								
Brick and tile	2	6, 000	60			12, 000	2, 800	20, 000
Oil, cottonseed and cake	2	650, 000	365	4	5	110, 000	518, 260	781, 816
ORLEANS (see New Orleans, Table VI).								
SAINT BERNARD:								
Fertilizers	1	24, 000	10			4, 200	18, 000	60, 000
Grease and tallow	1	20, 000	3			1, 500	35, 000	75, 000
Slaughtering and meat-packing, not including retail butchering establishments.	1	500, 000	18			13, 830	1, 375, 000	1, 500, 000
SAINT LANDRY:								
Lumber, sawed	10	29, 200	46			5, 310	22, 400	39, 500
SAINT MARY'S:								
Lumber, sawed	7	44, 000	68		2	17, 750	111, 125	159, 120
TANGIPAHOA:								
Lumber, sawed	7	74, 000	55		1	9, 490	47, 211	72, 800
Foundery and machine-shop products	1	100, 000	100	30	20	60, 000	160, 000	260, 500

MAINE.

COUNTIES AND INDUSTRIES.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ANDROSCOGGIN:								
Belting and hose, leather	2	$11, 000	11			$6, 620	$32, 600	$42, 304
Boots and shoes	18	495, 500	1, 169	435	26	586, 800	1, 809, 334	2, 667, 651
Boxes, wooden, packing	2	18, 000	26	6		10, 880	13, 000	29, 600
Bread and other bakery products	5	27, 200	29	3		13, 600	30, 700	62, 200
Brick and tile	7	21, 350	48			10, 250	6, 950	22, 800
Carriages and wagons	4	14, 500	41			16, 500	11, 700	50, 500
Clothing, men's	2	26, 000	51	303		35, 700	6, 000	63, 100
Confectionery	2	4, 600	4			1, 800	5, 400	20, 000
Cotton goods (see also Mixed textiles)	8	8, 350, 000	1, 666	3, 155	627	1, 486, 375	3, 624, 078	6, 356, 523
Dyeing and finishing textiles	2	590, 000	587	43	41	164, 849	317, 957	1, 100, 000
Flouring- and grist-mill products	20	90, 400	37			9, 859	476, 935	537, 589
Foundery and machine-shop products	5	116, 170	174	1	1	60, 419	111, 641	212, 225
Fruits and vegetables, canned and preserved	1	35, 000	100	15	10	12, 500	22, 500	50, 000
Furniture	4	28, 000	33			12, 200	20, 500	46, 500
Leather, curried	3	6, 400	10			3, 825	74, 925	99, 050
Leather, tanned	4	13, 600	16		1	5, 175	62, 900	89, 250
Lumber, planed	2	33, 000	18			8, 634	18, 751	41, 593
Lumber, sawed	33	372, 300	188		1	39, 532	291, 435	428, 050
Mixed textiles (see also Cotton goods; Woolen goods)	2	120, 000	87	58	5	55, 600	176, 625	278, 021
Paper	2	540, 000	122	67		66, 700	303, 000	403, 000
Printing and publishing	2	44, 000	24	13		21, 336	17, 314	51, 359
Saddlery and harness	6	13, 300	14			5, 700	12, 920	22, 124
Shirts	2	10, 000	4	30		10, 300	16, 000	27, 000
Tinware, copperware, and sheet-iron ware	4	23, 400	17			8, 065	15, 300	29, 800
Tobacco, cigars and cigarettes	5	17, 300	30	2		9, 880	8, 550	29, 875
Woolen goods (see also Mixed textiles)	10	859, 750	341	230	30	294, 248	1, 118, 633	1, 756, 425
AROOSTOOK:								
Dyestuffs and extracts	1	75, 000	14			6, 000	13, 000	67, 500
Flouring- and grist-mill products	22	76, 300	34			9, 430	284, 139	320, 494
Leather, tanned	2	20, 250	38			12, 078	141, 285	225, 520
Lumber, sawed	62	347, 580	467		3	92, 986	215, 260	447, 307
Starch	19	281, 200	240			21, 835	324, 311	423, 425
Tinware, copperware, and sheet-iron ware	8	18, 900	11			3, 311	16, 345	26, 600

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MAINE—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
CUMBERLAND:								
Agricultural implements	2	$18,000	12			$3,600	$16,000	$25,500
Babbitt metal and solder	1	5,000	5			2,191	44,000	47,000
Bookbinding and blank-book making	5	42,700	37	24		22,500	51,000	88,500
Boots and shoes	12	186,000	358	192	5	174,370	504,540	777,750
Boxes, fancy and paper	2	21,000	76	207	15	42,400	20,000	90,000
Boxes, wooden, packing	3	33,400	31			6,900	12,400	29,100
Bread and other bakery products	10	67,900	73	3	4	35,030	118,836	179,254
Brick and tile	10	116,200	102		5	30,925	66,527	129,450
Brooms and brushes	3	45,000	86	2	13	26,000	174,000	235,000
Carriages and wagons	7	69,500	88			49,550	53,443	136,500
Clothing, men's	6	146,800	27	84		38,996	225,500	348,500
Coffee and spices, roasted and ground	5	30,500	19	9		16,065	150,500	195,000
Coffins, burial cases, and undertakers' goods	6	12,500	11	1		7,895	12,402	32,678
Confectionery	9	49,500	38	36		13,950	51,900	85,000
Cooperage	32	80,710	201			48,528	99,595	185,630
Cotton goods (see also Mixed textiles)	5	1,181,000	274	568	118	215,046	651,220	1,158,879
Drugs and chemicals	3	83,000	27	2		9,600	37,250	62,500
Fertilizers	3	140,000	48			12,000	165,000	220,000
Flouring- and grist-mill products	26	175,700	63			19,565	643,275	691,102
Food preparations (see page 39)	1	(*a*)	150	100	50	8,000	61,000	75,000
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	14	589,000	448		7	205,367	349,271	648,600
Fruits and vegetables, canned and preserved	8	811,700	1,831	1,107	721	158,300	691,000	1,158,000
Furniture	12	88,800	129	7	6	55,300	118,450	229,800
Gunpowder	1	150,000	50			35,000	165,000	240,000
Hats and caps	3	18,500	11	13		8,850	28,150	48,300
Iron and steel	1	100,000	190		10	51,544	241,242	322,748
Iron forgings	1	30,000	18			6,575	51,266	62,613
Leather board (see also Paper)	1	20,000	45			17,500	100,000	131,000
Leather, curried	4	75,000	45	10	2	20,784	378,155	436,387
Leather, dressed skins	1	10,000	9			6,000	100,000	125,000
Leather goods	1	2,000	5			2,500	25,000	30,000
Leather, tanned	6	210,000	138		3	55,255	500,857	610,500
Lumber, planed	4	85,000	47		12	27,180	236,600	291,056
Lumber, sawed	61	264,220	342			69,001	210,939	364,667
Marble and stone work	12	20,400	69			22,300	17,287	51,200
Matches	1	64,000	57	35		35,412	251,918	298,573
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	2	135,000	50	53	17	37,000	96,671	167,800
Paints (see also Varnish)	1	16,000	6			3,480	59,638	70,532
Paper (see also Leather board; Wood pulp)	1	1,000,000	432	139		152,657	540,000	1,012,000
Plated and britannia ware	3	63,500	44	2		18,000	14,500	39,300
Printing and publishing	15	155,900	162	28	4	107,184	80,278	227,189
Saddlery and harness	13	15,200	34		1	13,910	29,500	61,130
Shipbuilding	40	164,600	368			178,538	393,225	603,110
Silk and silk goods (see also Mixed textiles)	1	30,000	9	46	5	10,190	61,395	81,585
Slaughtering and meat-packing, not including retail butchering establishments.	4	183,000	77			32,500	949,300	1,028,300
Soap and candles	2	21,200	9			2,660	29,562	50,700
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	3	4,000	13			3,900	12,500	22,000
Sugar and molasses, beet	1	50,000	150			20,000	75,000	111,000
Sugar and molasses, refined	2	460,000	90			34,457	1,416,414	1,499,512
Tinware, copperware, and sheet-iron ware	13	71,500	56			25,775	55,700	123,700
Tobacco, cigars and cigarettes	5	7,900	22	7	1	9,062	14,800	29,600
Trunks and valises	2	8,000	12			6,200	15,000	33,000
Varnish (see also Paints)	1	20,000	5			3,000	42,000	55,000
Wood pulp	4	380,000	176	6		63,865	151,595	267,490
Wooden ware	2	21,000	43			12,700	28,000	56,000
Woolen goods (see also Mixed textiles; Wool hats)	5	256,000	118	83	24	63,245	207,415	345,490
Wool hats (see also Woolen goods)	1	40,000	53	20	22	31,596	80,825	151,730
FRANKLIN:								
Agricultural implements	4	47,500	27	1	2	15,790	26,785	59,520
Boots and shoes	2	18,000	40	8		10,500	17,800	35,700
Flouring- and grist-mill products	10	24,700	7			1,425	66,745	73,398
Fruits and vegetables, canned and preserved	4	35,535	86	86	46	21,650	39,305	81,600
Leather, curried	2	11,000	7			2,750	38,750	50,200
Leather, dressed skins	1	6,000	9			2,700	36,000	48,000
Leather, tanned	2	15,000	7			2,950	30,200	38,000
Lumber, sawed	41	111,200	160		4	18,394	61,436	112,649
Woolen goods	4	175,000	28	29	1	15,835	112,417	154,663
HANCOCK:								
Brick and tile	10	28,800	70			13,353	7,230	26,675
Cordage and twine	1	15,000	13	2		2,300	25,000	54,000
Dyestuffs and extracts	1	40,000	4			385	10,600	32,400
Flouring- and grist-mill products	13	17,300	15			4,252	125,117	138,607
Fruits and vegetables, canned and preserved	1	15,000	20	25	15	10,000	36,700	53,000
Gloves and mittens	1	500		316	200	13,000	24,000	39,000
Leather, tanned	6	111,500	52			19,200	341,540	486,764
Lumber, sawed	56	495,525	492		18	92,082	209,050	420,624
Shipbuilding	104	62,850	138			57,850	106,079	175,699
KENNEBEC:								
Agricultural implements	13	627,700	368		1	144,385	269,835	531,525
Boots and shoes	5	32,500	64	5		14,792	65,128	90,930
Clothing, men's	7	29,650	15	72		15,515	39,746	67,000
Cotton goods (see also Mixed textiles)	5	1,695,000	407	572	162	266,919	570,973	1,161,760
Flouring- and grist-mill products	26	105,300	35			10,085	368,501	418,402

a Capital included in Fruits and vegetables, canned and preserved.

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MAINE—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
KENNEBEC—continued.								
Foundery and machine-shop products	14	$151, 500	114	....	....	$49, 425	$70, 925	$148, 500
Furniture	6	29, 000	51	....	....	23, 300	22, 500	58, 700
Handles, wooden	3	16, 000	20	....	2	8, 500	24, 000	49, 500
Leather, tanned	13	49, 800	51	....	....	14, 847	180, 082	243, 158
Lumber, sawed	48	476, 720	483	....	2	100, 060	490, 872	786, 001
Marble and stone work	10	18, 300	27	....	....	10, 360	10, 175	36, 150
Mixed textiles (see also Cotton goods; Woolen goods)	1	150, 000	40	35	8	24, 000	113, 138	245, 000
Oilcloth, floor	3	580, 000	234	1	....	97, 000	335, 075	470, 000
Paper	4	245, 000	109	59	....	61, 310	243, 659	381, 726
Printing and publishing	8	421, 000	112	141	1	113, 615	828, 900	1, 181, 500
Saddlery and harness	12	15, 040	29	....	....	9, 875	43, 330	68, 900
Sash, doors, and blinds (see also Wood, turned and carved)	8	96, 800	86	....	....	34, 750	82, 825	152, 500
Shirts	2	43, 000	7	55	....	16, 000	41, 000	59, 000
Soap and candles	4	6, 380	14	....	....	3, 001	17, 635	22, 475
Springs, steel, car, and carriage	1	25, 000	34	1	....	11, 238	3, 528	49, 722
Tinware, copperware, and sheet-iron ware	11	19, 300	26	....	....	8, 501	14, 750	28, 695
Wire	1	3, 000	18	....	....	7, 200	15, 000	24, 000
Wood, turned and carved (see also Sash, doors, and blinds)	3	31, 000	32	....	....	11, 855	32, 000	54, 500
Woolen goods (see also Mixed textiles)	4	618, 000	282	124	33	146, 880	603, 630	981, 175
KNOX:								
Boots and shoes	1	30, 000	106	2	2	48, 006	173, 945	232, 119
Carriages and wagons	3	72, 800	31	....	....	10, 000	47, 500	75, 000
Clothing, men's	5	14, 500	15	45	....	14, 304	22, 100	50, 137
Cooperage	10	12, 769	28	....	....	7, 220	9, 725	24, 600
Flouring- and grist-mill products	12	67, 700	21	....	....	6, 250	201, 843	219, 338
Foundery and machine-shop products	5	80, 750	49	....	....	20, 285	22, 100	57, 400
Iron forgings	1	15, 000	20	....	....	8, 000	10, 000	35, 000
Lime	25	937, 650	294	....	....	82, 324	390, 609	589, 195
Lumber, sawed	21	26, 400	64	....	....	9, 916	18, 875	44, 419
Marble and stone work	4	11, 100	37	....	....	13, 900	5, 300	26, 000
Saddlery and harness	4	29, 800	6	....	....	2, 872	26, 400	34, 000
Shipbuilding	33	131, 800	283	....	....	124, 304	309, 995	445, 959
Woolen goods	2	95, 000	80	57	1	37, 814	149, 692	238, 318
LINCOLN:								
Brick and tile	25	18, 050	95	....	....	12, 780	10, 814	31, 063
Flouring- and grist-mill products	11	36, 800	13	....	....	3, 375	83, 535	88, 728
Lumber, sawed	36	187, 200	215	....	4	34, 850	216, 350	317, 400
Shipbuilding	14	30, 950	76	....	....	35, 339	74, 182	111, 999
OXFORD:								
Boots and shoes	2	39, 000	150	100	....	112, 000	370, 779	504, 179
Carriages and sleds, children's	1	35, 000	45	....	....	15, 886	14, 000	35, 307
Flouring- and grist-mill products	19	57, 400	23	....	....	5, 599	135, 060	151, 791
Handles, wooden	4	32, 450	26	....	....	6, 300	15, 700	35, 250
Leather, curried	3	112, 000	45	....	....	15, 500	334, 515	367, 750
Leather, tanned	6	121, 300	53	....	....	18, 175	344, 665	395, 868
Lumber, sawed	84	365, 830	449	....	17	78, 547	227, 075	444, 245
Mixed textiles (see also Woolen goods)	2	350, 000	72	93	30	65, 000	220, 900	296, 000
Woolen goods (see also Mixed textiles)	7	358, 000	98	92	36	66, 838	241, 825	331, 644
PENOBSCOT:								
Boots and shoes	4	57, 000	155	23	2	58, 300	223, 200	302, 800
Bread and other bakery products	7	33, 200	29	2	....	11, 932	51, 150	76, 500
Brick and tile	11	51, 450	124	....	10	15, 990	14, 436	47, 400
Brooms and brushes	2	10, 000	22	....	1	6, 000	17, 000	27, 500
Carriages and wagons	7	31, 600	39	....	....	18, 650	27, 700	57, 000
Clothing, men's	11	114, 800	40	253	....	57, 420	187, 300	291, 700
Coffins, burial cases, and undertakers' goods	5	15, 500	14	1	....	7, 500	8, 700	20, 500
Cooperage	20	30, 650	66	....	....	20, 260	31, 200	69, 000
Flouring- and grist-mill products	26	93, 600	40	....	....	12, 082	407, 500	446, 593
Foundery and machine-shop products	10	270, 000	178	....	....	81, 557	91, 955	232, 259
Furniture	8	61, 150	51	1	....	20, 195	54, 965	93, 700
Leather, curried	4	163, 800	110	....	....	40, 970	806, 826	919, 000
Leather, tanned	11	803, 200	298	....	....	110, 459	1, 872, 133	2, 325, 800
Lumber, planed (see also Sash, doors, and blinds)	5	82, 500	62	....	1	21, 800	43, 800	74, 600
Lumber, sawed	106	1, 479, 800	1, 297	....	110	271, 068	1, 651, 608	2, 290, 284
Marble and stone work	9	19, 200	32	....	....	13, 440	15, 550	45, 700
Mixed textiles (see also Woolen goods)	2	32, 500	18	14	2	12, 200	48, 512	63, 300
Paper	2	25, 000	21	16	....	8, 000	27, 600	42, 600
Printing and publishing	11	76, 000	65	22	9	30, 860	26, 925	76, 050
Saddlery and harness	20	14, 175	31	....	....	9, 477	27, 368	49, 217
Sash, doors, and blinds (see also Lumber, planed)	4	27, 300	17	....	....	7, 250	24, 100	44, 000
Saws	2	25, 500	13	....	....	4, 500	10, 075	25, 650
Shipbuilding	16	23, 100	47	....	....	16, 624	41, 754	62, 217
Slaughtering and meat-packing, not including retail butchering establishments.	1	2, 500	3	....	....	800	38, 505	40, 387
Soap and candles	4	25, 750	21	1	....	6, 465	22, 150	35, 500
Tinware, copperware, and sheet-iron ware	13	48, 800	44	....	....	17, 575	41, 300	78, 200
Woolen goods (see also Mixed textiles)	11	109, 700	45	24	3	22, 860	127, 974	181, 755
PISCATAQUIS:								
Clothing, men's	3	16, 500	5	46	....	6, 500	20, 000	29, 500
Flouring- and grist-mill products	12	31, 400	14	....	....	3, 190	87, 150	98, 022
Iron and steel	1	150, 000	300	....	....	44, 950	23, 569	60, 375
Leather, tanned	2	30, 000	8	....	....	2, 600	25, 900	33, 000
Lumber, sawed	36	124, 600	216	....	1	32, 536	67, 148	155, 191

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MAINE—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
PISCATAQUIS—continued.								
Mixed textiles (see also Woolen goods)	3	$170, 000	68	93	4	$52, 850	$257, 424	$366, 846
Musical instruments, organs and materials	1	20, 000	26			9, 000	10, 000	40, 000
Wood, turned and carved	1	20, 000	20		10	10, 000	10, 000	25, 000
Woolen goods (see also Mixed textiles)	7	351, 000	140	149	5	91, 150	540, 124	765, 846
SAGADAHOC:								
Brass castings	2	65, 000	16			9, 000	30, 000	56, 000
Clothing, men's	2	7, 000	4	19		7, 500	19, 000	32, 000
Coffee and spices, roasted and ground	1	2, 500	1			416	19, 000	21, 000
Cordage and twine	1	65, 000	25			8, 000	45, 000	75, 000
Flouring- and grist-mill products	3	29, 000	9			5, 027	79, 626	87, 923
Kaolin and ground earths	2	29, 100	19			8, 750	3, 050	54, 600
Lumber, sawed	27	241, 000	164			30, 638	188, 744	275, 598
Paper	1	150, 000	50	25		29, 000	177, 200	259, 995
Printing and publishing	2	8, 500	17			10, 300	15, 300	31, 000
Shipbuilding	22	265, 300	784			327, 505	695, 548	1, 076, 928
Slaughtering and meat-packing, not including retail butchering establishments.	1	9, 000	3			1, 000	20, 800	25, 000
SOMERSET:								
Clothing, men's	15	18, 300	48	146	15	32, 162	19, 100	68, 344
Cutlery and edge tools	4	34, 000	35			14, 070	15, 398	35, 494
Flouring- and grist-mill products	20	68, 000	27			7, 751	213, 252	244, 652
Fruits and vegetables, canned and preserved	1	20, 000	300	200	300	12, 000	25, 000	44, 000
Furniture	5	37, 000	34			12, 500	30, 000	55, 000
Handles, wooden	4	16, 000	25		3	6, 142	17, 050	31, 885
Leather, curried	5	19, 000	10			3, 020	39, 210	56, 800
Leather, tanned	8	74, 750	36			9, 375	79, 720	107, 400
Lumber, planed (see also Sash, doors, and blinds)	3	11, 300	11			5, 600	15, 650	23, 850
Lumber, sawed	62	432, 525	415		3	69, 187	236, 646	407, 326
Oilcloth, floor	1	115, 000	55	1		27, 500	200, 000	243, 000
Paper	1	20, 000	9	5		5, 024	55, 000	65, 500
Saddlery and harness	18	24, 400	21	2		8, 295	25, 580	42, 455
Sash, doors, and blinds (see also Lumber, planed)	5	30, 350	23			7, 950	14, 050	29, 350
Woolen goods	8	339, 198	179	102	48	74, 875	390, 526	690, 023
WALDO:								
Boots and shoes	1	40, 000	75	25		40, 000	81, 672	137, 852
Carriages and wagons	3	18, 000	15			7, 025	10, 800	21, 900
Clothing, men's	4	9, 000	7	132		18, 000	30, 700	54, 500
Cooperage	12	9, 600	25			4, 866	8, 255	20, 000
Flouring- and grist-mill products	13	29, 550	14			2, 555	105, 645	120, 026
Leather, tanned	5	75, 000	26		2	8, 450	237, 780	310, 000
Lumber, sawed	42	74, 630	134		3	14, 648	45, 319	95, 115
Sash, doors, and blinds (see also Wood, turned and carved)	3	60, 000	45			20, 000	41, 475	79, 600
Shipbuilding	6	26, 800	29			13, 150	17, 754	33, 655
Wood, turned and carved (see also Sash, doors, and blinds)	2	30, 500	27			9, 300	14, 075	28, 200
WASHINGTON:								
Boxes, wooden, packing	1	20, 000	30		20	11, 200	20, 000	45, 000
Clothing, men's	9	28, 925	18	103		21, 700	28, 800	58, 350
Fertilizers	1	30, 000	50			15, 000	20, 000	40, 000
Flouring- and grist-mill products	10	30, 100	10			2, 013	96, 521	106, 660
Foundery and machine-shop products	5	28, 500	25			8, 550	19, 100	45, 000
Iron and steel	1	200, 000	193		7	45, 000	115, 700	200, 205
Leather, curried	3	100, 600	25			9, 380	581, 130	633, 616
Leather, tanned	7	831, 100	607			186, 180	1, 598, 765	2, 068, 421
Lumber, sawed	51	644, 150	716		16	110, 864	328, 419	576, 660
Marble and stone work	4	31, 300	33		1	12, 660	4, 450	22, 500
Shipbuilding	92	55, 350	124			46, 904	85, 603	141, 868
Tinware, copperware, and sheet-iron ware	12	24, 100	16			5, 340	9, 950	23, 850
Wood, turned and carved	1	20, 000	6			4, 000	20, 000	30, 000
YORK:								
Agricultural implements	3	16, 000	12		4	4, 500	9, 605	24, 600
Blacking	1	8, 000	4	13		5, 000	10, 000	36, 000
Boots and shoes	7	471, 000	517	390	70	290, 400	634, 048	1, 074, 560
Carriages and wagons	8	22, 200	48			17, 900	28, 150	58, 200
Clothing, men's	2	15, 000	8	22		5, 500	15, 000	26, 000
Cooperage	10	20, 034	27			5, 865	22, 038	31, 867
Cotton goods (see also Mixed textiles)	6	4, 066, 078	1, 511	2, 186	513	968, 300	2, 473, 881	4, 642, 201
Felt goods (see also Woolen goods)	1	100, 000	41	11	2	14, 326	67, 538	120, 000
Flouring- and grist-mill products	18	60, 250	23			7, 424	186, 082	222, 698
Foundery and machine-shop products	11	521, 100	605	3		235, 700	446, 341	833, 116
Leather board	2	82, 000	63	10		31, 500	55, 000	145, 000
Leather, curried	1	10, 000	2			1, 065	19, 220	24, 960
Leather, tanned	4	89, 000	44			16, 460	105, 825	145, 920
Lumber, sawed	82	695, 716	678		1	96, 833	492, 781	768, 332
Mixed textiles (see also Cotton goods; Woolen goods)	3	332, 880	152	105	67	110, 945	324, 947	492, 970
Saddlery and harness	7	5, 400	15			4, 125	10, 650	20, 300
Sash, doors, and blinds	2	15, 000	15			8, 600	12, 000	25, 000
Shipbuilding	32	50, 600	116			37, 545	210, 517	256, 411
Tinware, copperware, and sheet-iron ware	5	6, 700	18		1	7, 800	10, 500	28, 090
Tobacco, cigars and cigarettes	6	16, 800	34	10	2	15, 772	20, 737	58, 111
Woolen goods (see also Felt goods; Mixed textiles)	11	676, 880	374	206	89	226, 450	750, 572	1, 173, 734

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MARYLAND.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
ALLEGANY:								
Bread and other bakery products	5	$6,000	11	1	3	$5,325	$16,500	$28,235
Brick and tile	7	238,500	206	....	43	82,850	45,790	154,700
Cement	1	50,000	38	1	1	12,320	2,610	22,328
Flouring- and grist-mill products	19	124,900	56	....	....	13,303	283,965	336,055
Foundery and machine-shop products	5	43,300	42	....	1	17,730	27,090	56,000
Furniture	5	45,500	30	....	2	11,825	14,250	34,400
Iron and steel	3	1,650,000	579	....	22	153,368	579,496	822,000
Leather, tanned	8	408,675	177	....	....	56,835	519,675	731,092
Liquors, malt	7	24,100	7	....	....	2,825	14,390	25,980
Lumber, sawed	9	21,125	21	....	....	4,420	23,150	38,400
Printing and publishing	4	22,100	30	....	12	13,490	7,400	26,200
Sash, doors, and blinds	3	25,000	28	....	3	10,000	29,200	51,000
Shipbuilding	6	18,500	66	....	....	32,350	67,300	111,100
Tinware, copperware, and sheet-iron ware	15	22,500	37	....	1	12,774	17,620	41,250
ANNE ARUNDEL:								
Flouring- and grist-mill products	13	34,400	22	....	....	2,865	42,555	52,249
Fruits and vegetables, canned and preserved	1	15,000	15	5	25	5,000	30,000	50,000
BALTIMORE CITY (see Table VI).								
BALTIMORE:								
Brass and copper, rolled	1	40,000	13	....	....	3,459	46,000	60,000
Brick and tile	6	200,000	167	....	34	33,334	17,171	63,698
Carriages and wagons	7	14,200	35	....	....	12,150	9,700	30,050
Cooperage	5	11,025	35	....	....	7,077	28,510	42,770
Cotton goods	10	2,823,000	744	1,322	675	543,988	2,106,714	3,364,687
Fertilizers	8	683,000	181	....	....	64,537	649,360	880,400
Flouring- and grist-mill products	53	358,350	104	....	....	46,353	1,663,942	1,849,219
Foundery and machine-shop products	1	200,000	250	....	....	90,000	120,000	250,000
Leather, curried	2	7,300	5	....	....	1,950	18,167	22,250
Liquors, distilled	3	435,000	79	....	....	34,225	429,000	634,500
Liquors, malt	19	955,000	208	....	....	98,245	491,720	893,220
Lumber, sawed	32	55,350	40	....	....	5,886	64,826	101,950
Paints	1	50,000	20	....	....	7,810	53,000	74,000
Paper	15	110,500	129	71	14	49,115	277,672	358,861
Slaughtering and meat-packing, not including retail butchering establishments.	3	160,000	34	....	....	14,700	604,140	634,960
Soap and candles	2	15,750	15	....	....	9,050	27,968	48,240
Upholstering materials	1	1,000,000	386	82	132	250,000	400,000	700,000
Wirework	1	57,000	62	....	....	32,000	200,000	245,000
Woolen goods	2	214,500	107	77	18	38,350	221,820	287,900
CAROLINE:								
Flouring- and grist-mill products	17	73,200	13	....	....	3,025	105,728	116,445
Fruits and vegetables, canned and preserved	5	51,100	99	285	110	13,700	54,250	96,085
Lumber, sawed	20	52,970	46	....	....	6,479	35,574	56,459
CARROLL:								
Agricultural implements	5	20,500	19	....	....	4,825	6,825	20,885
Cheese and butter (factory)	4	6,700	6	....	....	1,350	38,626	54,309
Fertilizers	4	48,400	14	....	5	2,500	67,000	86.500
Flouring- and grist-mill products	61	209,870	69	....	....	10,614	463,308	534,961
Foundery and machine-shop products	3	78,200	77	....	....	30,500	11,500	63,500
Fruits and vegetables, canned and preserved	2	25,000	12	23	10	6,000	24,500	38,000
Leather, tanned	10	122,200	40	....	....	10,908	137,832	190,908
Lumber, sawed	36	284,804	35	....	1	3,473	26,539	45,443
Paper	4	54,548	43	2	4	10,761	72,068	134,230
Tobacco, cigars and cigarettes	5	18,900	45	1	1	13.400	37.500	61,900
Woolen goods	3	23,260	17	12	6	4,701	20,840	38,066
CECIL:								
Carriages and wagons	3	10,500	13	....	....	4,600	11,500	20,000
Cotton goods	2	234,000	14	8	8	5,000	24,389	30,000
Fertilizers	1	25,000	15	....	....	2,850	45,000	60,000
Flouring- and grist-mill products	31	157,700	45	....	....	8,728	309,138	368,794
Foundry and machine-shop products	3	26,154	43	....	....	19,276	32,751	77,400
Iron and steel	8	550,000	305	....	5	132,157	322,292	637,460
Lumber, planed	1	9,000	3	....	....	1,000	20,000	30,000
Lumber, sawed	15	51,100	30	....	....	5,705	40,445	61,880
Paper	4	200,000	73	24	5	41,000	244,600	340,500
DORCHESTER:								
Flouring- and grist-mill products	12	65,400	15	....	....	4,575	69,666	81,090
Lumber, sawed	23	64,800	62	....	1	11,651	53,665	86,575
Shipbuilding	13	26,820	41	....	....	18,312	30,060	51,900
FREDERICK:								
Bread and other bakery products	7	15,650	8	3	....	2,658	20,368	30,830
Carriages and wagons	9	19,550	50	....	....	13,325	18,200	43,200
Cheese and butter (factory)	3	5,900	4	....	....	1,186	15,990	23,020
Clothing, men's	14	21,467	39	17	....	18,087	46,050	79,900
Confectionery	7	25,100	15	5	....	5,150	19,500	31,717
Cooperage	9	5,400	23	....	....	4,620	18,300	29,335
Fertilizers	3	79,600	25	....	....	6,200	120,300	139,200
Flouring- and grist-mill products	85	360,050	102	....	....	16,635	962,924	1,101,356
Foundery and machine-shop products	6	15,700	18	....	....	5,425	4,450	22,000
Fruits and vegetables, canned and preserved	1	115,000	600	300	300	50,000	175,000	240,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MARYLAND—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
FREDERICK—continued.								
Furniture	16	$34, 350	30	....	1	$6, 055	$18, 942	$36, 598
Iron and steel	2	575, 000	200	....	....	50, 000	112, 000	185, 000
Leather, curried	8	21, 850	9	....	....	2, 416	25, 061	30, 420
Leather, tanned	14	101, 100	56	....	1	16, 762	140, 662	208, 857
Lime	12	55, 950	95	....	....	20, 415	36, 978	79, 690
Liquors, distilled	3	31, 000	7	....	....	1, 780	18, 785	29, 180
Printing and publishing	5	21, 800	49	4	....	8, 850	8, 100	28, 700
Saddlery and harness	19	21, 850	23	....	3	6, 155	27, 276	47, 391
Sash, doors, and blinds	3	52, 000	28	....	....	11, 541	33, 000	48, 000
Tinware, copperware, and sheet-iron ware	14	33, 381	34	....	....	10, 100	30, 481	58, 378
Tobacco, cigars and cigarettes	11	11, 800	25	....	4	6, 662	16, 714	32, 007
GARRETT:								
Flouring- and grist-mill products	12	18, 637	10	....	....	1, 984	26, 465	32, 535
Lumber, sawed	20	308, 750	181	....	2	45, 640	219, 237	330, 515
Woolen goods	2	6, 500	8	3	4	3, 075	8, 732	20, 722
HARFORD:								
Fertilizers	3	40, 500	15	....	1	4, 300	32, 050	41, 550
Flouring- and grist-mill products	41	169, 900	55	....	....	7, 916	252, 799	299, 364
Fruits and vegetables, canned and preserved	56	186, 992	890	663	411	83, 155	338, 482	535, 894
Kaolin and ground earths	5	48, 400	44	....	....	12, 280	8, 300	31, 060
Lumber, sawed	23	111, 150	64	....	1	12, 322	49, 842	81, 697
Shipbuilding	1	2, 600	27	....	....	12, 700	13, 800	28, 000
HOWARD:								
Cotton goods	3	574, 816	195	213	120	100, 418	433, 031	738, 000
Flouring- and grist-mill products	17	88, 200	36	....	....	9, 514	101, 280	124, 591
Paper	1	50, 000	25	....	....	7, 000	48, 000	60, 000
KENT:								
Agricultural implements	12	24, 250	33	....	....	12, 301	9, 090	32, 342
Fertilizers	2	23, 000	16	....	....	1, 700	14, 825	21, 050
Flouring- and grist-mill products	9	40, 600	15	....	....	2, 775	68, 745	79, 559
Fruits and vegetables, canned and preserved	1	22, 000	10	115	....	6, 000	3, 000	35, 000
MONTGOMERY:								
Fertilizers	1	21, 000	8	....	....	2, 200	26, 000	31, 500
Flouring- and grist-mill products	30	321, 550	49	....	....	11, 111	174, 249	202, 177
PRINCE GEORGE'S:								
Cotton goods	1	270, 000	64	109	28	35, 985	141, 516	222, 061
Flouring- and grist-mill products	15	45, 738	24	....	....	4, 608	54, 920	64, 465
Iron and steel	1	60, 000	190	....	15	31, 300	47, 042	86, 700
Lumber, sawed	9	16, 400	38	....	....	7, 755	18, 062	32, 947
QUEEN ANNE:								
Flouring- and grist-mill products	10	49, 600	16	....	....	2, 425	59, 365	71, 001
Fruits and vegetables, canned and preserved	1	20, 000	20	10	10	6, 000	14, 000	25, 000
Woolen goods	1	60, 000	16	3	9	8, 565	79, 600	112, 000
SAINT MARY'S:								
Flouring- and grist-mill products	9	48, 500	17	....	....	3, 112	74, 601	84, 441
Lumber, sawed	6	15, 250	21	....	....	3, 090	21, 095	34, 600
SOMERSET:								
Fertilizers	1	17, 000	15	....	....	3, 500	42, 000	60, 000
Flouring- and grist-mill products	4	19, 700	12	....	....	2, 680	73, 287	89, 900
Lumber, sawed	12	32, 150	57	....	1	6, 781	33, 772	55, 095
Shipbuilding	29	9, 700	29	....	....	14, 780	8, 540	26, 050
TALBOT:								
Fertilizers	2	30, 000	22	....	....	5, 600	60, 000	75, 000
Flouring- and grist-mill products	8	34, 325	18	....	....	2, 131	63, 009	72, 249
Lumber, sawed	15	64, 300	64	....	....	12, 027	60, 856	102, 214
Shipbuilding	21	9, 140	25	....	....	10, 739	16, 243	30, 100
WASHINGTON:								
Agricultural implements	5	205, 650	143	....	....	44, 615	100, 340	269, 320
Carriages and wagons	5	25, 300	31	....	....	8, 700	10, 100	23, 900
Clothing, men's	11	21, 600	38	36	1	10, 450	24, 000	42, 300
Fertilizers	4	59, 000	29	....	1	6, 350	61, 000	78, 600
Flouring- and grist-mill products	52	250, 850	74	....	....	11, 896	805, 501	911, 743
Gloves and mittens	2	19, 700	14	40	10	8, 600	17, 200	32, 400
Iron and steel	2	110, 000	39	....	....	5, 686	24, 535	65, 950
Leather, tanned	5	11, 900	6	....	....	1, 775	15, 805	21, 926
Lumber, sawed	16	20, 988	24	....	....	2, 740	20, 816	33, 840
Paper	1	60, 000	28	24	23	12, 000	95, 800	135, 000
Printing and publishing	4	29, 000	27	....	....	8, 270	6, 500	30, 196
Sash, doors, and blinds	1	30, 000	29	....	....	9, 983	14, 150	27, 250
Tinware, copperware, and sheet-iron ware	12	11, 416	29	....	....	6, 745	12, 711	35, 650
Tobacco, cigars and cigarettes	9	7, 675	27	....	9	6, 950	10, 921	29, 268
WICOMICO:								
Flouring- and grist-mill products	17	60, 250	15	....	....	2, 734	46, 776	54, 439
Lumber, sawed	45	122, 350	183	....	14	29, 134	130, 464	244, 627
Shipbuilding	24	18, 200	37	....	....	17, 035	15, 480	36, 800
WORCESTER:								
Flouring- and grist-mill products	9	19, 350	20	....	....	3, 175	47, 410	54, 968
Lumber, sawed	28	101, 286	200	....	3	37, 566	130, 879	219, 870
Shipbuilding	3	18, 000	43	....	....	19, 600	18, 500	42, 500

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MASSACHUSETTS.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
BARNSTABLE:								
Boots and shoes	2	$35,000	39	10	4	$14,758	$53,631	$72,720
Cars, railroad, street, and repairs	2	31,250	64			10,551	82,608	102,770
Clothing, men's	3	12,000	15	389		11,300	67,900	86,100
Cooperage	10	14,400	15			4,405	13,490	24,230
Fertilizers	2	1,005,000	150			44,050	362,000	606,000
Foundery and machine-shop products	3	63,000	92			29,400	47,700	91,550
Glass	2	206,000	180	25	12	100,000	85,000	200,000
Iron nails and spikes, cut and wrought	1	25,000	19	12	2	8,000	20,000	40,000
Shipbuilding	20	25,850	39			24,154	26,928	59,898
Shoddy	1	10,000	9		1	3,500	15,000	22,000
Tinware, copperware, and sheet-iron ware	9	13,000	11			4,350	11,400	24,400
BERKSHIRE:								
Boot and shoe findings	1	8,700	7			2,079	13,500	25,000
Boots and shoes	4	265,000	433	210	62	121,298	937,000	1,274,944
Boxes, wooden, packing	3	12,200	15			4,975	63,300	73,150
Bread and other bakery products	7	20,100	23	2		11,076	40,950	65,697
Carriages and wagons	9	41,000	100			42,730	50,560	126,397
Cheese and butter (factory)	8	23,800	14	2	1	3,252	26,471	40,250
Clothing, men's	5	15,500	22	23		13,500	23,700	45,700
Cooperage	6	3,875	11			4,655	13,045	22,250
Cotton goods (see also Mixed textiles)	18	2,944,276	869	1,123	476	652,552	1,391,202	2,634,111
Dyeing and finishing textiles	2	1,487,000	326	49	116	188,403	446,735	1,142,917
Flouring- and grist-mill products	31	316,800	61			22,361	570,530	656,230
Foundery and machine-shop products	12	172,345	115	1	1	54,424	26,418	162,303
Furniture	11	72,250	46			25,480	46,600	101,250
Glass	4	120,000	155	2		55,342	63,294	149,845
High explosives	1	45,600	15			11,700	33,550	60,000
Iron and steel	4	682,000	390			176,000	169,026	312,810
Iron nails and spikes, cut and wrought	1	30,000	12	5	8	12,000	32,000	58,000
Kaolin and ground earths	6	40,000	53		1	15,917	28,276	56,450
Leather, curried	4	56,945	26			10,646	154,780	175,104
Leather, tanned	5	72,945	29			10,766	142,096	164,600
Lime	7	30,000	73			26,025	37,500	85,400
Liquors, malt	1	50,000	12			5,121	26,505	47,376
Lumber, sawed	69	515,300	186		4	32,794	156,832	260,281
Marble and stone work	11	12,825	22			9,700	9,717	30,550
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	7	763,000	420	299	77	277,500	1,029,143	1,511,312
Paper	21	2,295,483	733	670		519,258	1,881,763	3,071,744
Printing and publishing	5	36,500	28	6	1	16,338	16,241	39,707
Saddlery and harness	15	30,500	35			14,853	26,350	55,447
Sash, doors, and blinds	2	41,200	31			15,200	75,900	93,250
Shoddy (see also Mixed textiles)	1	15,000	8	2		4,500	15,000	24,000
Silk and silk goods (see also Mixed textiles)	1	20,000	11	38	15	10,000	26,900	38,000
Tinware, copperware, and sheet-iron ware	15	41,650	54	3		24,558	48,450	105,350
Tobacco, cigars and cigarettes	8	15,500	15			10,160	11,150	36,100
Woolen goods (see also Mixed textiles)	22	3,231,500	1,799	1,059	385	1,018,224	3,656,662	6,310,186
BRISTOL:								
Agricultural implements	3	403,000	494		15	176,150	391,175	988,150
Belting and hose, leather	2	74,000	23	2		15,000	88,000	115,000
Bookbinding and blank-book making	3	9,000	7	9		5,200	10,950	21,200
Boots and shoes	12	187,500	385	91		171,681	472,445	714,340
Boxes, fancy and paper	5	18,200	10	37	4	12,364	15,900	40,600
Brass and copper, rolled	2	700,000	240			96,282	710,823	894,461
Brass castings	3	24,000	22		1	9,400	17,500	34,800
Bread and other bakery products	21	111,800	167	13	4	70,587	351,933	481,255
Brick and tile	13	215,100	200		2	64,349	31,407	161,422
Brooms and brushes	4	6,900	12	3		6,800	14,300	27,000
Buttons	3	44,500	27	21		18,193	39,471	82,500
Carriages and wagons	17	152,900	213			86,334	108,696	244,936
Clothing, men's	17	61,000	27	77		30,252	75,200	140,150
Coffee and spices, roasted and ground	2	19,000	8	3		4,800	55,000	65,310
Coffins, burial cases, and undertakers' goods	10	87,000	36	18	1	34,497	77,500	146,061
Combs	1	15,000	45	5		15,000	20,000	42,000
Confectionery	3	9,000	8	10		5,700	22,640	34,140
Cooperage	15	73,400	84			28,900	71,500	119,980
Cordage and twine	2	75,750	157	9	7	57,030	528,868	626,963
Cotton goods (see also Hosiery and knit goods)	52	29,712,295	7,841	8,558	3,013	5,225,149	11,268,944	21,906,662
Cotton ties	1	5,000	4		1	1,800	25,000	30,000
Crucibles	2	60,000	24		3	15,609	39,570	68,452
Cutlery and edge tools (see also Tools)	3	28,000	26		2	9,200	7,600	23,500
Drugs and chemicals	4	25,000	22			9,350	16,850	38,200
Dyeing and finishing textiles	3	912,700	434	56	83	170,811	336,360	703,606
Electroplating	4	5,900	11	2		5,500	8,250	24,100
Enameled goods	1	70,000	37			17,286	121,582	166,888
Fertilizers	1	50,000	50			7,500	45,000	60,000
Fire-arms	1	40,000	30			8,400	10,000	25,000
Flouring- and grist-mill products	20	160,800	60	1		24,683	555,215	641,107
Foundery and machine-shop products (see also Steamfittings and heating apparatus).	48	1,865,425	1,984	56	8	1,016,074	1,245,102	2,679,307
Glass	1	110,000	124	4	2	50,000	32,000	125,000
Glass, cut, stained, and ornamented	2	18,000	23	4		12,200	22,000	44,000
Hosiery and knit goods (see also Cotton goods; Woolen goods)	1	50,000	47	68	28	50,000	153,000	250,000
Iron and steel	5	947,000	1,079		50	367,226	960,268	1,793,350
Iron bolts, nuts, washers, and rivets	1	25,000	50		5	13,000	20,000	50,000
Iron nails and spikes, cut and wrought	6	715,000	352	198	108	258,770	749,577	1,113,375
Japanning	1	5,000	9	14		7,000	7,000	24,000
Jewelry	63	1,564,000	1,952	582	25	1,178,044	1,295,469	3,366,643
Leather, curried	6	72,550	81	1		35,857	331,109	400,630

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MASSACHUSETTS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
BRISTOL—continued.								
Leather, tanned	5	$67,950	57			$27,756	$177,988	$218,372
Liquors, malt	3	121,000	58			27,670	139,850	234,184
Looking-glass and picture frames	2	43,000	79	35		43,496	47,078	124,336
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	7	22,700	36			13,488	10,748	33,000
Lumber, sawed	39	128,000	126		4	28,582	63,637	130,630
Marble and stone work	14	23,484	61			31,515	18,732	63,193
Matches	1	20,000	10	20		10,000	80,000	95,000
Mineral and soda waters	3	13,000	25			10,600	12,000	34,500
Oil, lubricating	2	7,000	7	6		3,600	43,000	51,600
Paints	3	41,000	24			13,030	91,600	121,900
Paper	1	40,000	17		5	9,420	21,268	55,000
Paving materials	2	4,800	12			6,460	12,000	21,000
Plated and britannia ware	2	303,000	554	150	10	351,800	232,000	615,000
Printing and publishing	18	153,400	154	26	13	89,246	96,066	249,100
Saddlery and harness	22	28,800	51		2	21,455	43,350	83,032
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	5	63,000	54		2	25,200	43,200	94,600
Shipbuilding	31	65,775	136			82,450	133,285	231,786
Shirts	1	20,000	7	30		9,000	24,000	40,000
Slaughtering and meat-packing, not including retail butchering establishments.	8	133,000	78		3	30,695	670,400	772,105
Soap and candles	13	922,300	109	11		58,976	1,116,723	1,337,481
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	3	26,500	31			12,350	23,350	40,400
Stone- and earthen-ware	3	32,000	24	2		10,675	5,135	39,500
Straw goods	1	50,000	50	125	25	90,000	100,000	235,000
Tinware, copperware, and sheet-iron ware	31	78,500	117	23	1	46,749	88,159	177,528
Tobacco, cigars and cigarettes	11	18,400	29	2		11,800	20,900	42,220
Tools (see also Cutlery and edge tools)	7	16,050	24	3	5	11,925	13,250	35,830
Upholstering	7	7,100	29	7		15,175	16,800	42,200
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	3	59,100	87		11	21,424	19,000	52,400
Woolen goods (see also Hosiery and knit goods; Worsted goods)	1	160,000	33	31		49,560	186,026	309,747
Worsted goods (see also Woolen goods)	1	147,000	12	94		30,031	113,090	210,000
ESSEX:								
Bagging, flax, hemp, and jute	3	240,000	256	193	146	129,796	235,000	410,160
Belting and hose, leather	3	16,600	17			6,600	66,031	80,374
Blacking	7	10,200	12			7,480	28,350	48,808
Bookbinding and blank-book making	5	8,900	12	11		6,502	7,550	26,875
Boot and shoe, cut stock	91	808,470	602	329	27	340,466	4,612,470	5,413,102
Boot and shoe findings	29	118,900	164	260	10	131,540	259,225	490,500
Boots and shoes	401	7,090,675	17,663	7,458	108	9,736,197	21,251,350	35,658,193
Boxes, fancy and paper	12	57,000	69	140	1	78,510	107,285	238,609
Boxes, wooden, packing	12	97,700	98	26	12	51,150	171,850	278,219
Brass castings	5	8,100	17			8,113	9,710	26,400
Bread and other bakery products	43	173,340	241	15	5	121,086	383,435	610,482
Brick and tile	12	89,000	187			38,140	35,645	100,832
Brooms and brushes	3	41,000	25	29		13,578	19,610	57,750
Carriage and wagon materials	14	284,950	290			122,153	302,350	505,106
Carriages and wagons	78	701,850	1,035			493,643	953,311	1,780,645
Cars, railroad, street, and repairs	1	10,000	40			12,000	4,000	21,000
Clothing, men's	12	51,800	38	124		43,768	93,000	161,400
Coffee and spices, roasted and ground	2	34,000	9			4,050	43,000	50,350
Combs	7	169,200	134	21	4	58,798	82,925	200,850
Confectionery	9	8,700	12	4		5,646	18,325	31,850
Cooperage	4	12,500	28			10,950	10,300	25,200
Cordage and twine	2	16,200	8		1	2,620	40,400	44,900
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	14	9,292,400	2,456	4,873	537	2,005,943	4,539,513	8,088,302
Drugs and chemicals (see also Patent medicines and compounds)	2	151,000	10			3,740	36,690	44,000
Dyeing and finishing textiles	5	1,845,500	1,251	158	102	566,816	1,108,906	2,868,815
Fertilizers	3	5,600	11			5,300	9,750	31,000
Flouring- and grist-mill products	26	492,400	99			47,023	1,030,982	1,162,769
Food preparations (see page 39)	2	31,180	56			8,418	90,563	108,621
Foundery and machine-shop products	55	865,262	1,023	36	18	498,309	684,396	1,441,028
Furniture (see also Upholstering)	14	83,600	108	1		47,904	60,580	145,600
Glue	7	159,000	98			35,411	57,221	134,700
Hammocks	1	8,000	4	22		6,000	20,000	40,000
Hosiery and knit goods (see also Cotton goods; Woolen goods)	5	260,000	226	252	9	151,608	245,128	451,887
Iron and steel	1	100,000	30			5,500	70,000	108,000
Iron forgings	1	25,000	25			9,740	30,000	50,000
Iron nails and spikes, cut and wrought	5	44,000	26	5	4	24,350	80,600	134,000
Lasts	8	32,200	45			27,990	13,200	71,500
Leather board (see also Paper)	1	10,000	22			8,000	25,000	42,000
Leather, curried	75	1,480,235	1,282	7	5	667,676	6,764,153	7,939,253
Leather, dressed skins	15	171,300	330	1	10	169,316	835,880	1,214,767
Leather, tanned	67	1,150,685	962		12	475,758	4,573,183	5,542,018
Linen goods	1	300,000	140	100	40	84,849	327,934	487,451
Liquors, distilled	1	50,000	8			2,500	20,200	35,900
Liquors, malt	3	115,000	47			22,354	112,517	203,952
Looking-glass and picture frames	5	8,600	7	1		3,150	12,900	23,000
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	8	179,500	106			39,250	271,486	340,010
Lumber, sawed	19	146,100	67			16,790	94,340	149,045
Marble and stone work	22	65,200	116			48,651	42,665	130,890
Mineral and soda waters	8	42,000	49			26,158	35,418	86,090
Mixed textiles (see also Cotton goods; Woolen goods)	4	2,831,500	1,322	1,250	122	911,863	2,069,026	3,797,948

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MASSACHUSETTS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
ESSEX—continued.								
Needles and pins	3	$28, 000	31	1	....	$21, 000	$41, 800	$72, 500
Oil, lubricating	1	30, 000	14	....	....	8, 400	37, 000	53, 000
Paints	5	277, 000	78	....	....	38, 454	337, 300	427, 250
Paper (see also Leather board)	4	440, 000	328	162	1	184, 114	654, 045	1, 035, 050
Patent medicines and compounds (see also Drugs and chemicals)	4	12, 500	13	6	....	9, 500	15, 150	54, 945
Printing and publishing	22	118, 600	129	21	11	61, 997	72, 371	182, 161
Rubber and elastic goods	1	25, 000	22	23	....	15, 952	51, 804	77, 682
Saddlery and harness	37	50, 825	76	....	....	35, 252	65, 611	136, 839
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	5	16, 245	51	....	....	26, 825	74, 813	114, 016
Sewing machines and attachments	1	125, 000	252	....	....	113, 402	174, 059	343, 279
Shipbuilding	94	195, 075	243	....	....	118, 132	216, 201	385, 334
Slaughtering and meat-packing, not including retail butchering establishments.	6	33, 000	17	....	....	8, 150	249, 745	280, 820
Soap and candles	19	135, 000	70	....	1	29, 063	183, 920	269, 961
Tinware, copperware, and sheet-iron ware	42	159, 100	174	7	....	87, 140	139, 223	305, 274
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	5	37, 400	9	1	....	3, 100	9, 956	26, 240
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	27	47, 800	49	38	1	32, 710	58, 390	116, 567
Upholstering (see also Furniture)	6	5, 100	10	....	....	6, 300	18, 950	34, 100
Window blinds and shades	1	10, 000	15	....	....	4, 510	15, 465	25, 000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	10	71, 950	103	4	....	51, 350	41, 628	135, 393
Wool hats (see also Woolen goods)	6	430, 325	578	214	101	313, 935	829, 100	1, 438, 041
Woolen goods (see also Mixed textiles; Wool hats; Worsted goods).	15	4, 576, 450	2, 377	1, 645	371	1, 383, 911	4, 857, 483	7, 735, 983
Worsted goods (see also Woolen goods)	5	4, 211, 385	852	2, 091	367	1, 149, 434	3, 101, 068	5, 676, 428
FRANKLIN:								
Agricultural implements	3	7, 000	30	....	....	10, 200	5, 500	21, 500
Boots and shoes	2	21, 000	36	4	....	15, 000	54, 400	84, 000
Brick and tile	4	30, 000	77	1	1	15, 150	9, 425	33, 575
Carriages and sleds, children's	1	10, 000	23	2	....	9, 600	16, 000	29, 000
Cotton goods (see also Mixed textiles)	5	510, 075	207	186	80	91, 077	206, 339	408, 290
Cutlery and edge tools (see also Hardware)	4	1, 085, 247	790	76	104	338, 458	364, 669	829, 313
Flouring- and grist-mill products	38	90, 875	37	....	....	11, 956	289, 367	335, 331
Foundery and machine-shop products	6	182, 200	216	....	....	96, 050	166, 225	297, 050
Furniture	5	28, 500	54	....	....	23, 096	34, 122	71, 495
Furniture, chairs	8	70, 300	77	130	5	45, 850	62, 230	137, 500
Hardware (see also Cutlery and edge tools)	3	219, 000	199	5	1	68, 275	91, 000	242, 000
Leather, curried	2	5, 500	2	....	....	700	19, 290	23, 645
Leather, tanned	3	12, 500	6	....	....	1, 950	17, 075	24, 000
Lumber, sawed	83	251, 245	200	....	1	37, 250	193, 585	318, 954
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	1	25, 000	12	8	1	6, 000	16, 485	30, 000
Musical instruments, pianos and materials	2	42, 000	32	....	....	19, 000	25, 000	55, 000
Paper	3	1, 357, 926	249	236	....	144, 357	505, 812	921, 338
Pocket-books	2	20, 000	29	45	....	23. 900	34, 927	86, 687
Sash, doors, and blinds	6	27, 500	32	....	....	14, 600	18, 400	45, 600
Sewing machines and attachments	2	428, 000	330	....	....	170, 167	351, 300	626, 317
Silk and silk goods (see also Mixed textiles)	1	30, 000	3	23	9	7, 155	56, 660	86, 745
Slaughtering and meat-packing, not including retail butchering establishments.	2	13, 000	12	....	....	4, 900	82, 800	93, 580
Wooden ware	4	4, 650	15	....	....	5, 750	10, 800	22, 000
Woolen goods (see also Mixed textiles)	3	151, 000	78	39	12	38, 700	141, 145	243, 930
HAMPDEN:								
Agricultural implements	3	102, 000	69	....	....	28, 900	49, 850	100, 500
Belting and hose, leather	2	5, 000	6	....	....	2, 230	9, 788	21, 787
Boxes, cigar	4	11, 300	18	11	4	9, 794	25, 257	53, 950
Boxes, fancy and paper	6	24, 500	35	154	....	46, [illegible]09	80, 900	145, 267
Boxes, wooden, packing	5	7, 500	26	....	....	10, 700	24, 850	44, 045
Brass castings	4	59, 300	73	....	10	27, 550	46, 400	101, 000
Bread and other bakery products	13	64, 250	69	12	2	42, 289	148, 665	269, 554
Brick and tile	14	135, 000	326	....	....	68, 000	50, 065	154, 194
Bridges	1	15, 000	65	....	....	29, 200	15, 000	50, 000
Buttons	3	133, 000	81	316	35	114, 316	92, 620	274, 229
Cardboard	4	78, 000	62	12	....	37, 532	160, 327	227, 704
Carpets, other than rag (see also Woolen goods)	1	50, 000	51	10	1	26, 765	140, 568	208, 000
Carriages and wagons	13	90, 700	117	....	....	59, 925	62, 900	155, 080
Cars, railroad, street, and repairs	3	493, 000	458	10	....	204, 113	719, 078	995, 677
Clothing, men's	19	57, 800	72	104	....	75, 968	115, 400	227, 100
Coffee and spices, roasted and ground	1	16, 000	6	....	....	2, 700	51, 000	60, 000
Coffins, burial cases, and undertakers' goods	3	30, 000	22	7	3	2, 700	19, 640	30, 500
Collars and cuffs, paper	4	190, 000	30	28	....	30, 533	333, 238	408, 451
Confectionery	5	87, 300	49	8	....	31, 250	161, 560	225, 900
Cotton goods (see also Mixed textiles)	13	8, 417, 250	2, 621	3, 779	1, 072	1, 890, 354	4, 684, 290	8, 794, 088
Cutlery and edge tools (see also Hardware)	2	75, 000	97	2	11	81, 993	61, 474	177, 795
Drugs and chemicals	1	61, 000	21	....	....	8, 878	62, 450	85, 000
Dyeing and finishing textiles	4	191, 000	138	8	14	56, 182	504, 817	694, 350
Electroplating	5	8, 500	18	....	1	7, 925	18, 400	60, 950
Emery wheels	1	60, 000	8	....	....	4, 400	9, 600	20, 000
Envelopes	4	500, 000	93	525	10	154, 750	1, 121, 450	1, 445, 570
Fancy articles	4	94, 500	30	10	1	17, 425	25, 900	51, 500
Fertilizers	1	15, 000	17	2	....	9, 000	35, 000	45, 000
Fire-arms	5	3, 015, 455	656	....	....	435, 225	237, 355	761, 399
Flavoring extracts	4	20, 000	5	2	....	4, 200	25, 000	40, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MASSACHUSETTS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
HAMPDEN—continued.								
Flouring- and grist-mill products	23	$231, 940	64	....	1	$31, 174	$1, 257, 340	$1, 376, 089
Food preparations (see page 39)	1	13, 000	3	2	....	2, 700	5, 000	25, 000
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	36	1, 068, 700	1, 253	12	13	519, 402	622, 909	1, 396, 172
Furniture (see also Mattresses and spring beds)	13	122, 950	99	3	....	42, 102	122, 372	209, 520
Gas machines and meters	1	60, 000	26	....	....	14, 562	32, 000	75, 000
Gunpowder	2	15, 000	7	....	....	4, 240	14, 410	34, 391
Hand-stamps	3	15, 700	19	1	....	10, 600	20, 750	38, 500
Hardware (see also Cutlery and edge tools)	3	231, 400	198	7	20	100, 234	150, 900	311, 700
Iron forgings	1	35, 000	22	....	....	15, 000	50, 000	80, 000
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	2	33, 500	65	....	....	22, 610	42, 639	146, 407
Jewelry	4	13, 900	8	15	....	10, 185	29, 450	51, 000
Kaolin and ground earths	2	128, 500	21	....	....	7, 000	5, 800	20, 000
Leather, curried	5	13, 500	17	....	....	6, 263	181, 315	197, 700
Leather, dressed skins	1	20, 000	9	8	....	10, 500	70, 000	98, 000
Leather, tanned	6	18, 500	24	....	....	9, 112	199, 490	232, 100
Liquors, distilled	2	60, 000	10	....	1	4, 300	39, 000	59, 000
Liquors, malt	4	66, 000	33	....	....	14, 889	79, 440	136, 250
Lithographing (see also Printing and publishing)	3	37, 000	36	....	1	15, 656	25, 400	53, 656
Looking-glass and picture frames	3	8, 800	5	....	....	3, 600	13, 900	21, 100
Lumber, planed (see also Sash, doors, and blinds)	4	63, 000	72	....	....	33, 660	150, 328	204, 601
Lumber, sawed	28	186, 450	155	....	....	53, 227	190, 513	310, 885
Marble and stone work	13	67, 480	139	....	1	62, 568	58, 900	159, 900
Mattresses and spring beds (see also Furniture)	5	21, 065	20	6	....	12, 871	32, 322	64, 401
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	4	217, 800	164	153	30	81, 400	422, 894	558, 625
Musical instruments, organs and materials	3	7, 000	40	....	....	23, 249	25, 925	64, 244
Musical instruments, pianos and materials	1	20, 000	45	....	....	20, 000	15, 000	45, 000
Needles and pins	1	100, 000	92	13	20	36, 000	21, 165	84, 660
Paper (see also Cardboard; Collars and cuffs, paper; Envelopes; Wood pulp).	25	4, 496, 979	1, 273	1, 954	30	1, 038, 167	3, 324, 766	5, 695, 049
Postal cards	1	20, 000	10	18	....	10, 000	200, 000	190, 000
Printing and publishing (see also Lithographing)	17	188, 000	248	85	11	175, 862	193, 312	435, 400
Rubber and elastic goods	3	56, 000	92	126	23	53, 802	79, 300	158, 660
Saddlery and harness	14	65, 100	170	1	....	34, 675	137, 650	208, 404
Sash, doors, and blinds (see also Lumber, planed)	4	21, 000	53	....	....	23, 013	44, 664	77, 141
Screws	1	50, 000	60	6	4	14, 000	35, 000	60, 000
Sewing machines and attachments	3	51, 200	53	....	....	17, 450	31, 500	94, 400
Shoddy (see also Mixed textiles)	1	10, 000	58	4	8	15, 295	87, 605	147, 765
Silk and silk goods (see also Mixed textiles)	2	250, 000	115	174	58	74, 600	438, 450	725, 400
Slaughtering and meat-packing, not including retail butchering establishments.	6	183, 000	44	....	....	27, 130	1, 118, 115	1, 290, 530
Soap and candles	9	140, 250	41	3	....	18, 186	210, 800	245, 734
Spectacles and eyeglasses	2	21, 000	37	3	7	30, 000	45, 483	89, 979
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	2	48, 000	42	....	....	18, 760	24, 000	48, 000
Straw goods	3	250, 000	550	40	....	172, 000	305, 000	555, 000
Tinware, copperware, and sheet-iron ware	27	166, 600	166	6	2	70, 210	196, 500	318, 912
Tobacco, cigars and cigarettes	60	315, 155	340	183	4	216, 239	513, 755	878, 192
Toys and games	5	85, 000	127	30	8	59, 513	43, 605	151, 322
Watches	1	200, 000	115	55	....	85, 500	60, 000	150, 000
Whips	38	619, 600	312	144	8	220, 984	369, 768	938, 742
Wire	2	87, 000	60	2	2	34, 388	105, 295	190, 736
Wirework	2	6, 200	16	3	1	13, 950	9, 730	26, 180
Wood pulp	2	80, 000	46	....	....	15, 160	89, 808	154, 193
Woolen goods (see also Carpets, other than rag; Mixed textiles; Worsted goods).	18	1, 797, 594	956	464	170	502, 350	1, 832, 974	2, 920, 140
Worsted goods (see also Woolen goods)	4	515, 000	489	420	87	314, 553	909, 041	1, 425, 059
HAMPSHIRE:								
Agricultural implements	2	62, 400	62	....	....	25, 462	57, 650	131, 522
Baskets, rattan and willow ware	4	126, 425	70	....	10	27, 894	37, 160	103, 337
Boxes, wooden, packing	4	16, 200	25	....	3	8, 300	13, 700	27, 300
Bread and other bakery products	4	47, 700	25	2	....	11, 156	61, 360	91, 923
Brick and tile	13	41, 600	193	7	....	27, 830	24, 319	82, 030
Brooms and brushes	14	127, 250	95	7	3	36, 747	147, 307	244, 407
Buttons	7	339, 000	154	254	40	150, 215	174, 218	461, 385
Carriages and wagons	4	8, 500	26	....	....	9, 100	11, 500	23, 800
Coffins, burial cases, and undertakers' goods	1	30, 000	18	....	....	9, 000	6, 000	20, 000
Cotton goods (see also Mixed textiles)	8	2, 103, 400	906	1, 404	295	611, 808	1, 302, 819	2, 491, 321
Cutlery and edge tools	4	135, 000	170	12	58	93, 700	80, 700	241, 100
Emery wheels	2	53, 000	24	....	....	11, 319	27, 044	86, 398
Fire-arms	1	17, 000	35	1	2	16, 000	6, 000	24, 000
Flouring- and grist-mill products	23	164, 600	36	....	....	11, 800	335, 769	369, 099
Foundery and machine-shop products	7	112, 000	84	....	1	44, 272	82, 600	147, 650
Hat and cap materials	1	8, 000	4	....	....	3, 000	12, 000	20, 000
Iron nails and spikes, cut and wrought	1	30, 000	25	13	27	19, 600	48, 000	75, 000
Lumber, planed (see also Wood, turned and carved)	3	8, 000	12	....	....	3, 500	12, 911	20, 400
Lumber, sawed	62	160, 925	172	....	....	41, 837	273, 492	382, 687
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	3	360, 000	228	132	36	123, 218	375, 386	580, 928
Paper	11	973, 358	163	257	14	135, 231	445, 379	813, 840
Pocket-books	1	7, 500	10	3	4	8, 000	15, 000	25, 000
Rubber and elastic goods	2	300, 000	155	72	20	110, 751	539, 135	782, 897
Sewing machines and attachments	1	125, 000	200	....	....	80, 000	30, 000	125, 000
Silk and silk goods (see also Mixed textiles)	4	437, 400	60	452	69	203, 625	658, 290	1, 457, 300

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MASSACHUSETTS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
HAMPSHIRE—continued.								
Slaughtering and meat-packing, not including retail butchering establishments.	3	$21,000	14	....	....	$7,317	$109,035	$133,011
Soap and candles	3	21,200	16	....	....	6,000	51,100	65,000
Straw goods	2	80,000	181	23	....	57,900	132,750	252,000
Tinware, copperware, and sheet-iron ware	8	100,350	67	....	....	39,039	66,100	168,750
Tobacco, cigars and cigarettes	5	9,100	18	2	....	8,800	13,800	29,100
Wire	2	33,000	22	....	....	11,286	26,005	41,663
Wood, turned and carved (see also Lumber, planed)	7	13,300	33	4	....	9,828	6,775	29,277
Woolen goods (see also Mixed textiles)	8	1,007,500	779	398	137	355,324	1,233,139	1,836,568
MIDDLESEX:								
Ammunition	1	100,000	80	100	15	58,259	114,600	198,114
Baskets, rattan and willow ware	4	1,008,500	516	251	40	227,080	358,710	649,200
Belting and hose, leather	3	49,500	21	....	....	12,368	116,944	144,340
Bookbinding and blank-book making	10	155,300	96	121	2	87,313	116,080	235,835
Boot and shoe cut stock	20	92,500	174	256	76	115,185	224,480	404,850
Boots and shoes	157	3,626,550	8,122	1,931	504	4,114,318	12,127,354	18,215,501
Boots and shoes, rubber	1	500,000	400	451	11	296,442	1,044,364	1,707,842
Boxes, fancy and paper	4	6,550	7	29	1	9,510	16,700	32,000
Boxes, wooden, packing	21	207,100	273	2	8	118,974	334,232	536,957
Brass and copper, rolled	1	300,000	200	....	....	64,123	199,633	361,590
Brass castings	3	6,500	14	....	....	8,625	16,299	31,200
Bread and other bakery products	52	267,200	306	107	54	192,068	667,611	1,069,270
Brick and tile	15	859,500	745	....	15	122,539	234,954	426,680
Bridges	1	9,500	22	....	....	9,787	28,457	49,376
Brooms and brushes	9	50,450	111	38	5	43,965	108,514	209,113
Carpets, other than rag (see also Woolen goods)	2	2,050,000	756	1,144	19	482,050	1,349,786	2,434,115
Carriage and wagon materials	2	15,500	8	....	....	7,100	13,300	25,800
Carriages and wagons	33	332,100	296	....	....	171,671	256,689	517,168
Cars, railroad, street, and repairs	1	75,000	28	....	....	16,800	25,000	45,000
Cleansing and polishing preparations	1	16,000	40	7	....	20,000	25,000	50,000
Clothing, men's	25	640,550	61	482	24	106,258	349,485	560,355
Clothing, women's	3	20,500	....	150	....	24,996	59,517	100,543
Coffins, burial cases, and undertakers' goods	2	155,000	78	6	....	56,150	118,200	185,000
Collars and cuffs, paper	2	155,000	26	15	....	16,500	348,532	394,385
Confectionery	14	108,000	68	54	1	42,987	223,835	312,376
Cooperage	20	183,292	311	....	11	124,402	221,318	375,437
Cordage and twine	9	6,750	14	....	5	4,995	10,300	20,730
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	18	12,472,011	3,928	8,729	1,109	3,437,972	8,833,579	20,929,964
Cutlery and edge tools (see also Hardware; Tools)	11	71,300	57	1	....	26,344	58,385	128,550
Drugs and chemicals (see also Patent medicines and compounds)	13	625,600	188	13	3	91,401	529,176	932,884
Dyeing and finishing textiles	9	3,613,000	1,261	250	80	657,870	1,370,856	2,998,751
Dyestuffs and extracts	2	130,000	52	....	....	26,154	152,721	253,040
Explosives and fireworks	1	10,000	8	6	3	7,000	12,000	30,000
Felt goods (see also Woolen goods)	2	60,000	26	....	....	11,285	26,517	49,000
Fertilizers	3	26,500	8	....	....	3,139	9,060	21,160
Files (see also Saws)	2	17,000	24	....	....	8,425	5,500	42,500
Flavoring extracts	1	5,640	4	7	....	3,300	21,350	28,000
Flouring- and grist-mill products	51	295,550	77	1	....	33,801	812,297	962,791
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	83	1,971,269	2,705	19	53	1,328,079	1,839,329	3,906,360
Fruits and vegetables, canned and preserved	2	12,000	12	4	....	4,400	17,500	29,000
Furnishing goods, men's	4	22,824	20	107	4	23,950	77,549	130,400
Furniture (see also Mattresses and spring beds; Upholstering)	31	370,100	749	12	7	338,551	305,771	838,156
Furs, dressed	2	600	7	....	....	6,500	230,000	245,000
Glass	3	300,000	306	24	22	151,000	125,500	307,500
Glue	5	117,500	86	....	1	42,150	133,400	186,700
Gold and silver leaf and foil	2	5,500	10	8	....	8,700	30,200	41,800
Grease and tallow	3	41,000	28	....	....	14,600	77,000	97,000
Gunpowder	1	200,000	35	....	....	25,000	58,508	106,230
Hand-knit goods	4	8,000	9	44	1	9,425	7,716	20,060
Hardware (see also Cutlery and edge tools; Tools)	2	43,500	30	2	....	13,354	9,946	25,500
Hat and cap materials	1	8,000	2	....	....	2,000	24,000	30,000
Hats and caps, not including wool hats	3	28,500	260	7	....	24,500	154,640	326,580
Hosiery and knit goods (see also Cotton goods; Woolen goods)	5	49,000	20	87	5	22,654	30,240	76,925
Housefurnishing goods	2	52,000	42	5	....	32,070	140,306	196,206
Iron and steel	1	100,000	100	....	....	64,000	366,100	460,000
Iron bolts, nuts, washers, and rivets	2	137,000	67	....	15	29,734	98,150	169,952
Iron nails and spikes, cut and wrought	2	18,000	31	3	4	17,367	114,000	147,000
Iron pipe, wrought	2	21,000	10	....	....	5,854	11,000	20,070
Lard, refined	1	3,000	13	....	....	8,000	75,000	88,000
Lasts	6	68,790	51	....	1	54,165	28,520	87,758
Leather board (see also Paper)	8	299,200	74	16	6	29,777	109,800	182,000
Leather, curried	51	1,723,689	1,881	2	18	803,425	7,807,770	9,351,104
Leather, tanned	32	1,022,500	1,001	....	12	406,260	4,674,049	5,514,916
Liquors, distilled	2	225,600	60	....	....	25,878	264,420	411,426
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	1	30,000	10	....	....	6,750	10,000	21,250
Lumber, sawed	48	309,900	200	....	....	39,738	214,905	333,560
Marble and stone work	40	168,500	264	1	....	122,743	96,574	3[illegible]2,813
Mattresses and spring beds (see also Furniture)	6	37,000	68	11	4	27,256	69,754	123,740
Mineral and soda waters	4	22,500	24	....	2	10,276	19,887	36,819
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	4	193,000	123	83	17	72,713	216,625	345,159

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MASSACHUSETTS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
MIDDLESEX—continued.								
Musical instruments, organs and materials	7	$607, 200	495	15	15	$333, 650	$299, 156	$802, 792
Musical instruments, pianos and materials	12	104, 700	202	10	7	108, 805	86, 399	245, 150
Paper (see also Collars and cuffs, paper; Leather board)	12	578, 000	266	80	4	138, 448	819, 671	1, 188, 500
Patent medicines and compounds (see also Drugs and chemicals)	4	298, 000	147	62	5	117, 300	281, 300	575, 000
Paving materials	6	20, 500	69	....	....	21, 400	21, 550	52, 047
Perfumery and cosmetics	2	61, 000	14	6	1	8, 500	117, 170	201, 500
Pickles, preserves, and sauces	3	33, 075	25	14	....	19, 222	109, 208	152, 852
Printing and publishing	36	467, 700	686	368	49	504, 475	179, 866	1, 030, 880
Roofing and roofing materials	7	13, 500	25	....	....	11, 014	24, 544	45, 522
Rubber and elastic goods	1	200, 000	100	100	....	60, 000	262, 836	461. 257
Saddlery and harness	65	76, 800	114	7	....	46, 927	107, 530	213, 833
Safes, doors, and vaults, fire-proof	1	15, 000	100	....	....	42, 000	80, 000	140, 000
Sand and emery paper and cloth	2	46, 000	[illegible]	6	....	11, 620	49, 029	79, 374
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	9	195, 000	145	....	4	67, 336	133, 414	259, 641
Saws	2	6, 300	24	....	....	11, 766	14, 180	32, 735
Screws	3	18, 500	19	....	....	8, 250	11, 550	26, 600
Sewing machines and attachments	2	80, 000	100	18	17	35, 000	10, 500	75, 000
Shirts	6	51, 300	13	193	6	43, 373	81, 202	155, 900
Shoddy (see also Mixed textiles)	4	65, 000	40	49	1	26, 300	142, 000	227, 000
Silk and silk goods (see also Mixed textiles)	1	33, 700	8	30	....	15, 500	61, 585	83, 400
Slaughtering and meat-packing, not including retail butchering establishments.	17	1, 367, 840	766	....	....	362, 809	10, 219, 486	11, 349, 566
Soap and candles	27	530, 850	287	....	28	131, 151	1, 719, 699	2, 197, 254
Sporting goods	3	267, 500	16	220	25	55, 585	248, 902	353, 690
Springs, steel, car, and carriage	1	3, 000	8	....	....	4, 000	12, 000	22, 000
Stamped ware (see also Tinware, copperware, and sheet-iron ware)	2	185, 000	262	73	6	141, 000	193, 000	378, 000
Starch	1	30, 000	15	....	....	8, 500	40, 000	60, 000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	2	700, 000	448	....	....	234, 332	216, 716	649, 364
Stone- and earthen-ware	3	51, 000	47	....	....	25, 100	11, 570	44, 236
Straw goods	3	112, 560	170	432	15	130, 304	314, 917	540, 000
Sugar and molasses, refined	1	350, 000	130	....	....	86, 799	5, 938, 680	6, 361, 679
Telegraph and telephone apparatus	1	12, 000	25	....	....	15, 600	10, 000	31, 000
Tinware, copperware, and sheet-iron ware (see also Stamped ware)	57	236, 428	234	5	....	107, 761	188, 575	397, 384
Tobacco, cigars and cigarettes	33	38, 600	85	13	....	45, 140	54, 523	131, 621
Tools (see also Cutlery and edge tools; Hardware)	6	38, 700	39	....	....	20, 100	16, 643	55, 583
Upholstering (see also Furniture)	12	15, 100	18	2	....	9, 275	38, 790	65, 620
Vinegar	15	139, 200	66	....	2	22, 518	111, 550	158, 620
Watches	2	1, 504, 000	827	500	....	747, 995	644, 081	1, 617, 913
Window blinds and shades	2	116, 000	71	27	10	31, 500	125, 652	182, 587
Wirework	2	85, 000	60	3	5	32, 395	52, 757	108, 068
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	11	106, 800	170	7	16	77, 465	96, 710	219, 630
Wooden ware	4	100, 000	78	....	1	24, 350	32, 000	69, 500
Woolen goods (see also Carpets, other than rag; Felt goods; Hosiery and knit goods; Mixed textiles; Worsted goods).	18	5, 800, 509	2, 366	1, 757	512	1, 498, 966	6, 083, 644	9, 786, 459
Worsted goods (see also Woolen goods)	9	1, 084, 362	364	524	126	285, 670	1, 771, 137	2, 399, 529
NORFOLK:								
Boot and shoe cut stock	10	53, 580	59	41	1	27, 726	246, 507	341, 555
Boot and shoe findings	9	26, 550	24	42	2	13, 800	38, 800	75, 250
Boots and shoes	125	2, 435, 100	5, 390	679	85	2, 582, 585	5, 703, 241	9, 540, 806
Boxes, fancy and paper	3	11, 000	3	38	....	11, 200	18, 000	33, 600
Boxes, wooden, packing	8	73, 100	84	....	....	25, 775	69, 400	109, 586
Brass and copper, rolled	1	300, 000	80	....	....	41, 000	400, 000	500, 000
Brass castings	2	20, 300	9	....	....	4, 400	62, 400	68, 950
Bread and other bakery products	5	23, 000	39	1	....	22, 150	56, 050	97, 200
Carriages and wagons	11	126, 500	135	1	....	66, 580	76, 400	182, 700
Chocolate	2	125, 000	13	10	....	13, 500	130, 000	195, 000
Clothing, women's	1	200	2	25	....	4, 200	11, 000	20, 500
Cordage and twine	2	14, 000	12	12	1	7, 600	20, 260	32, 920
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	9	537, 164	243	211	57	117, 152	440, 123	611, 357
Drugs and chemicals	1	15, 750	13	....	....	5, 312	33, 433	51, 949
Fancy articles	2	6, 500	11	33	5	8, 303	11, 007	26, 893
Felt goods (see also Woolen goods)	7	470, 000	274	29	20	91, 755	862, 532	1, 211, 000
Flouring- and grist-mill products	16	94, 250	35	....	....	14, 477	341, 522	391, 793
Food preparations (see page 39)	1	60, 000	25	10	....	10, 000	90, 000	120, 000
Foundery and machine-shop products	12	243, 900	213	4	....	113, 294	206, 071	337, 856
Furniture (see also Mattresses and spring beds)	2	14, 000	19	....	....	9, 800	42, 200	55, 000
Graphite	1	50, 000	11	16	1	14, 000	125, 000	150, 000
Hosiery and knit goods (see also Cotton goods; Woolen goods)	31	756, 050	335	447	70	218, 234	500, 366	921, 401
Ink	3	109. 000	24	....	2	17, 000	57, 300	92, 700
Instruments, professional and scientific	1	20, 000	12	....	....	9, 000	25, 000	40, 000
Iron and steel	2	300, 000	358	....	14	148, 402	395, 227	593, 002
Iron nails and spikes, cut and wrought	2	25, 000	13	2	5	13, 250	5, 400	71, 000
Jewelry	6	162, 500	242	51	5	142, 342	125, 000	356, 000
Kaolin and ground earths	1	30, 000	22	....	....	6, 218	51, 600	64, 800
Lasts	2	38, 000	24	....	....	19, 000	7, 830	47, 536
Leather board (see also Paper)	2	29, 000	51	....	4	7, 875	6, 425	23, 750
Leather, curried	8	65, 400	86	....	....	42, 870	332, 344	415, 585
Leather goods	3	15, 100	7	....	1	3, 600	44, 000	85, 700
Leather, tanned	3	220, 000	191	....	8	98, 675	765, 689	945, 000
Lumber, sawed	16	47, 750	38	....	2	8, 806	34, 223	55, 817
Marble and stone work	13	115, 200	187	....	....	70, 450	52, 700	174, 300

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MASSACHUSETTS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
NORFOLK—continued.								
Mattresses and spring beds (see also Furniture)	3	$11,500	17	7		$3,990	$21,760	$28,900
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	5	495,000	148	135	38	114,893	451,548	711,141
Musical instruments, pianos and materials	1	8,000	10			6,000	15,125	24,000
Oilcloth, floor	1	17,000	21			10,750	50,000	65,000
Paints	2	35,500	30	6		13,080	20,300	40,500
Paper (see also Leather board)	9	625,300	201	86		124,016	507,795	755,625
Printing and publishing	6	26,000	28	2	4	14,834	10,000	32,212
Rubber and elastic goods	2	75,000	43	55	10	29,000	380,000	450,000
Shipbuilding	4	12,400	41			22,610	32,940	62,850
Shoddy (see also Mixed textiles)	5	223,500	118	27		78,031	482,000	734,300
Silk and silk goods (see also Mixed textiles)	1	300,000	53	272		87,500	478,445	850,000
Slaughtering and meat-packing, not including retail butchering establishments.	2	15,000	9			5,200	72,255	83,800
Soap and candles	5	11,700	13			4,260	18,800	28,400
Sporting goods	2	19,000	5	7		4,500	12,000	21,000
Straw goods	6	896,000	723	2,226	30	706,510	1,586,417	2,514,850
Tinware, copperware, and sheet-iron ware	16	42,100	35			16,293	28,326	67,526
Tools	3	20,500	23	8		11,900	5,900	32,500
Wirework	1	12,000	7			950	11,000	22,000
Woolen goods (see also Felt goods; Mixed textiles)	12	1,935,000	777	398	100	477,398	1,661,610	2,696,799
PLYMOUTH:								
Blacking	2	5,500	5			3,086	11,805	25,118
Boot and shoe cut stock	10	57,000	123	102	6	49,925	306,977	444,900
Boot and shoe findings	5	29,950	18	6	1	13,747	72,375	135,250
Boots and shoes	161	2,762,396	6,848	1,391	43	3,773,903	8,593,307	13,559,045
Boxes, fancy and paper	1	7,925	3	30		6,500	12,850	24,190
Boxes, wooden, packing	21	133,000	173	5	4	63,706	141,436	277,429
Brass ware	1	50,000	24	10		3,690	75,000	100,000
Bread and other bakery products	5	46,500	46	6	1	21,900	45,200	152,140
Brick and tile	7	42,500	132			23,750	17,910	64,275
Carriages and wagons	7	10,600	24			9,200	8,300	25,900
Clothing, men's	4	3,400	8	29		7,500	38,100	52,400
Cordage and twine	5	711,700	354	7	27	135,672	811,758	1,130,482
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	5	283,000	96	54	31	49,420	170,441	276,861
Cutlery and edge tools (see also Tools)	4	16,150	24		1	11,500	9,250	29,600
Drugs and chemicals	1	5,000	3			2,250	20,000	25,000
Fertilizers	1	35,000	60			15,000	85,000	120,000
Flouring- and grist-mill products	19	86,600	26			11,038	252,403	285,825
Foundery and machine-shop products	21	304,000	319	4	1	147,763	159,037	399,912
Furniture	9	22,900	58	1		23,710	23,450	59,600
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	1	2,000	12	37	1	10,920	30,200	45,000
Hosiery and knit goods (see also Cotton goods; Gloves and mittens; Woolen goods).	1	25,000	6	50	11	15,000	55,050	95,000
Iron and steel	9	1,235,000	948	6	39	387,315	1,456,324	2,129,779
Iron bolts, nuts, washers, and rivets	2	64,000	69	5	8	45,000	135,000	200,000
Iron nails and spikes, cut and wrought	17	1,149,055	339	126	66	219,950	783,775	1,212,900
Lasts	3	26,000	35			24,600	33,000	72,000
Leather, dressed skins	2	2,150	20	2		9,240	11,200	24,500
Lumber, sawed	94	324,120	323		8	66,517	233,552	419,935
Marble and stone work	6	22,100	15			7,175	15,000	34,650
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	1	90,000	17	23		11,000	22,370	40,000
Needles and pins	1	45,000	65	35		40,000	16,000	72,000
Paper	1	35,000	12			7,000	19,750	32,300
Printing and publishing	5	27,800	31	4		13,790	12,550	38,000
Rubber and elastic goods	1	10,000	15			7,700	50,000	100,000
Saddlery and harness	12	8,950	13	6	1	5,570	14,550	26,460
Silk and silk goods (see also Mixed textiles)	1	90,000	17	23		11,000	22,370	40,000
Slaughtering and meat-packing, not including retail butchering establishments.	1	15,500	12			7,100	103,250	125,000
Straw goods	3	151,400	103	232	1	100,650	202,700	329,300
Tinware, copperware, and sheet-iron ware	16	26,045	21			8,347	16,778	38,363
Tools (see also Cutlery and edge tools)	5	18,550	50			35,975	8,400	52,900
Varnish	1	10,000	4			2,500	40,000	50,000
Woolen goods (see also Mixed textiles)	2	300,000	203	53	16	100,002	343,105	548,848
Zinc	2	15,000	12			2,250	32,000	38,500
SUFFOLK:								
Artificial feathers and flowers (see also Millinery and lace goods)	4	20,000	16	162		25,540	21,350	124,900
Awnings and tents	4	16,200	12	40	1	21,180	43,840	77,150
Bags, other than paper	1	10,000	7	13	5	7,000	60,000	75,000
Baking and yeast powders (see also Drugs and chemicals)	5	279,000	44	42	8	30,530	230,230	385,230
Belting and hose, leather	3	40,000	28			16,383	160,000	204,000
Belting and hose, linen	1	10,000	10			4,500	12,000	23,000
Billiard tables and materials	4	47,200	43			20,000	42,700	88,300
Blacking	6	63,500	38	44		28,080	204,000	324,400
Bluing	1	30,000	10	7		10,000	36,000	56,000
Bone-, ivory-, and lamp-black	1	16,000	6		1	3,900	20,000	32,000
Bookbinding and blank-book making	47	410,828	425	600	31	403,282	360,790	988,916
Boot and shoe cut stock	13	62,500	57	209	8	61,075	243,600	352,200
Boot and shoe findings	11	117,700	104	71	15	63,012	258,975	389,883
Boots and shoes	17	301,500	756	300	26	407,457	1,069,506	1,649,050
Boxes, fancy and paper	19	140,300	80	444	17	116,032	177,537	381,932

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MASSACHUSETTS—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
SUFFOLK—continued.								
Boxes, wooden, packing	5	$18,500	46	....	1	$16,507	$50,998	$80,900
Brass castings	27	225,400	247	2	4	124,192	206,654	426,230
Bread and other bakery products	122	389,550	528	139	20	287,376	1,100,478	1,697,894
Brick and tile (see also Drain and sewer pipe)	9	128,800	196	....	4	45,789	81,239	102,070
Bridges	9	53,000	138	....	....	61,620	206,300	325,500
Brooms and brushes	17	294,800	252	167	5	170,301	498,109	838,040
Buttons	2	26,000	30	138	....	36,000	43,600	95,000
Carpets, other than rag (see also Woolen goods)	1	1,000,000	254	402	....	333,865	1,073,108	1,510,305
Carriage and wagon materials	3	52,000	23	....	....	15,363	70,000	110,770
Carriages and sleds, children's	2	42,000	97	7	10	37,875	95,384	150,200
Carriages and wagons	26	387,000	428	1	....	228,887	263,381	645,985
Cars, railroad, street, and repairs	4	108,000	108	....	....	50,529	68,066	141,396
Cement	1	15,000	6	....	....	3,500	18,000	50,000
Cheese and butter (factory)	1	4,000	5	....	....	2,250	24,287	32,500
Chocolate	1	350,000	58	59	....	42,555	525,000	850,000
Cleansing and polishing preparations	3	51,500	21	....	....	8,484	18,476	49,000
Clothing, men's	226	4,203,893	2,252	6,853	190	3,422,076	9,851,108	16,174,192
Clothing, women's	24	319,900	299	1,740	17	423,573	1,028,135	1,808,520
Coffee and spices, roasted and ground	12	289,000	88	33	....	70,089	1,243,971	1,448,869
Coffins, burial cases, and undertakers' goods	9	27,300	33	....	....	18,956	18,625	52,950
Collars and cuffs, paper	2	180,000	13	37	....	17,493	49,772	86,903
Confectionery	36	256,975	281	261	5	194,836	1,070,425	1,625,014
Cooperage	21	79,467	119	....	....	51,532	86,374	188,560
Coppersmithing (see also Tinware, copperware, and sheet-iron ware).	8	107,200	141	....	5	85,350	115,800	249,100
Cordage and twine	7	706,550	343	108	19	134,995	774,925	1,124,400
Cork cutting	4	32,434	34	16	6	15,749	62,467	106,125
Corsets	5	45,000	19	242	10	59,240	105,000	226,600
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	7	548,000	102	384	80	143,550	534,703	786,340
Cutlery and edge tools (see also Hardware)	11	34,600	41	....	1	19,198	17,670	58,500
Drain and sewer pipe (see also Brick and tile)	2	50,000	12	....	....	4,600	10,500	22,000
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	13	210,000	109	11	2	54,148	323,632	459,097
Dyeing and finishing textiles	3	14,300	22	....	....	11,200	18,500	84,500
Dyestuffs and extracts	2	148,000	120	....	....	67,680	400,000	550,000
Electrical apparatus and supplies (see also Telegraph and telephone apparatus).	9	162,500	86	1	1	48,308	44,506	119,289
Electroplating	19	113,450	91	4	2	41,241	53,990	147,550
Engraving and die-sinking	22	53,150	137	33	4	83,850	68,302	224,031
Engraving, wood	11	20,135	62	....	2	40,125	4,250	83,975
Fancy articles	6	17,500	26	18	11	11,580	23,100	48,200
Fertilizers	6	593,000	269	....	....	141,427	835,490	1,276,170
Files	7	57,200	64	4	....	23,448	11,700	57,133
Fire-arms	1	125,000	65	....	5	24.000	28,000	100,000
Flavoring extracts	7	66,700	22	31	2	20,116	174,275	270,000
Flouring- and grist-mill products	9	524,000	70	....	....	41,242	1,017,010	1,111,000
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	138	5,340,833	4,097	13	19	2,247,446	2,929,690	6,698,775
Fruits and vegetables, canned and preserved	8	242,700	97	181	39	83,997	496,250	681,188
Furnishing goods, men's	15	69,900	25	152	5	47,300	219,250	377,925
Furniture (see also Mattresses and spring beds; Upholstering)	127	1,427,075	2,301	74	26	1,093,337	2,047,483	3,932,731
Furniture, chairs	8	110,000	166	2	....	85,261	207,279	332,238
Furs, dressed	13	64,547	42	73	2	31,016	179,177	263,250
Gas and lamp fixtures	2	25,000	33	....	....	12,500	25,000	54,000
Gas machines and meters	1	47,000	22	2	....	14,056	14,615	39,000
Glass	1	87,000	63	3	24	27,000	24,070	72,000
Glass, cut, stained, and ornamented	10	55,650	77	12	3	48,511	34,630	114,340
Glue	2	35,000	44	4	1	18,525	77,495	106,822
Gold and silver leaf and foil	5	19,300	31	16	5	20,085	65,900	96,175
Grease and tallow	4	392,000	98	....	2	54,880	436,210	564,868
Grindstones	2	29,000	6	....	....	3,900	42,000	55,000
Hairwork	14	28,800	9	66	....	20,791	33,860	74,300
Hand-stamps	5	9,500	12	....	....	4,867	8,750	20,356
Hardware (see also Cutlery and edge tools)	12	118,850	48	4	1	23,375	22,930	82,400
Hardware, saddlery	3	26,000	39	1	2	17,720	9,500	36,300
Hats and caps, not including wool hats	27	106,200	222	167	13	146,252	196,592	441,276
Hones and whetstones	2	7,000	10	14	....	7,400	11,170	31,000
Hosiery and knit goods (see also Cotton goods; Woolen goods)	12	161,800	103	1,394	61	106,325	298,325	498,683
Housefurnishing goods	5	20,700	25	10	4	11,575	22,750	46,200
Ink	2	80,000	22	32	12	25,220	45,480	170,000
Instruments, professional and scientific	12	81,000	93	7	3	53,446	20,400	123,540
Iron and steel	5	1,624,408	1,108	....	12	444,095	1,552,002	2,189,987
Iron bolts, nuts, washers, and rivets	3	30,000	34	4	1	21,060	17,000	54,000
Iron doors and shutters	1	60,000	100	....	....	50,000	200,000	300,000
Iron forgings	3	420,000	149	95	[illegible]	107,779	250,947	502,970
Iron nails and spikes, cut and wrought	1	300,000	125	55	....	84,000	137,000	275,000
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	2	10,000	21	....	....	6,000	17,200	38,000
Japanning	6	4,600	27	....	2	12,890	4,290	25,060
Jewelry	28	193,100	277	94	7	133,382	228,815	481,722
Labels and tags	5	288,000	74	58	....	52,210	338,725	450,325
Lamps and reflectors	2	51,500	50	4	1	26,121	25,000	75,000
Lapidary work	4	39,000	33	[illegible]	[illegible]	19,700	56,575	102,200
Lard, refined	2	42,000	12	....	....	7,344	161,950	174,984
Lead, bar, pipe, sheet, and shot	2	174,000	25	....	....	15,042	483,024	578,057

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MASSACHUSETTS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
SUFFOLK—continued.								
Leather, curried	27	$485, 900	625	....	9	$281, 420	$2, 789, 517	$3, 366, 809
Leather, dressed skins	8	315, 500	200	....	2	82, 753	439, 840	579, 350
Leather, tanned	1	25, 000	30	....	....	18, 600	336, 800	370, 480
Liquors, distilled	3	245, 000	75	....	2	35, 000	415, 500	506, 500
Liquors, malt	19	2, 924, 400	1, 029	....	....	493, 398	2, 496, 159	4, 489, 442
Lithographing (see also Printing and publishing)	9	487, 550	576	98	22	336, 327	437, 360	989, 020
Looking-glass and picture frames	46	124, 200	268	8	14	147, 950	269, 895	534, 597
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	11	372, 500	233	....	5	109, 754	261, 500	480, 810
Lumber, sawed	1	25, 000	30	....	....	15, 672	61, 700	126, 000
Malt	1	20, 000	5	....	....	2, 500	18, 000	27, 000
Marble and stone work	46	700, 400	1, 043	....	....	392, 713	677, 791	1, 456, 511
Matches	1	56, 000	35	36	....	26, 000	160, 500	200, 000
Mattresses and spring beds (see also Furniture)	20	185, 597	181	128	12	137, 194	520, 722	757, 102
Millinery and lace goods (see also Artificial feathers and flowers)	4	38, 500	15	109	20	33, 300	224, 900	317, 000
Millstones	1	40, 000	59	1	....	24, 000	24, 000	65, 000
Mineral and soda waters	8	74, 600	90	....	1	51, 340	137, 084	239, 644
Mirrors	1	3, 000	32	....	....	15, 000	15, 000	50, 000
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	5	600, 000	106	462	26	176, 010	581, 472	909, 000
Models and patterns	22	24, 850	84	2	1	39, 564	13, 640	88, 455
Musical instruments and materials (not specified)	6	28, 200	39	1	....	19, 550	7, 307	36, 000
Musical instruments, organs and materials	8	445, 366	512	8	....	319, 804	414, 090	904, 732
Musical instruments, pianos and materials	23	1, 673, 000	1, 107	11	3	693, 867	943, 069	2, 166, 966
Nets and seines	1	50, 000	10	35	....	17, 000	95, 000	123, 000
Oil, illuminating, not including petroleum refining	3	90, 000	11	....	....	6, 500	300, 000	345, 000
Oil lubricating	2	52, 000	11	....	....	5, 800	90, 000	145, 000
Oil, neat's-foot	1	8, 000	10	....	....	3, 380	60, 000	70, 000
Oilcloth, floor	1	25, 000	56	1	....	24, 480	100, 026	150, 710
Oleomargarine	1	3, 000	28	2	....	6, 875	50, 000	65, 000
Paints (see also Varnish)	6	241, 500	69	2	2	38, 830	281, 400	390, 900
Patent medicines and compounds (see also Drugs and chemicals)	21	179, 650	67	56	2	49, 647	345, 850	771, 631
Perfumery and cosmetics	7	21, 500	23	17	....	12, 690	69, 550	126, 000
Pickles, preserves, and sauces	4	12, 500	9	10	2	6, 530	34, 500	78, 000
Plated and britannia ware	2	56, 000	16	1	....	11, 000	12, 610	43, 000
Printing and publishing (see also Lithographing)	147	2, 501, 035	2, 348	443	98	1, 787, 413	1, 958, 668	5, 479, 518
Printing materials	4	15, 300	12	1	2	8, 460	12, 000	28, 050
Refrigerators	5	52, 350	64	....	....	22, 450	44, 400	87, 700
Roofing and roofing materials	44	186, 625	256	....	....	119, 842	304, 205	537, 567
Rubber and elastic goods	11	1, 135, 000	440	521	10	370, 011	1, 352, 841	2, 161, 969
Saddlery and harness	73	179, 800	398	21	7	168, 507	251, 427	561, 458
Safes, doors, and vaults, fire-proof	2	37, 000	70	....	....	27, 800	106, 000	170, 000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	12	73, 800	86	3	4	39, 625	124, 480	195, 045
Scales and balances	3	49, 000	39	1	4	23, 770	11, 440	51, 613
Sewing machines and attachments	3	243, 000	41	....	....	29, 358	36, 870	102, 700
Shipbuilding	116	1, 451, 850	841	....	....	536, 458	724, 422	1, 479, 148
Shirts	7	69, 300	34	159	3	44, 626	206, 800	329, 800
Shoddy (see also Mixed textiles)	1	5, 000	12	4	....	4, 600	20, 000	30, 000
Show-cases	5	10, 800	17	....	1	8, 900	10, 460	29, 980
Silk and silk goods (see also Mixed textiles)	9	132, 800	81	262	37	106, 845	222, 815	443, 425
Slaughtering and meat-packing, not including retail butchering establishments.	21	918, 000	211	....	....	153, 263	6, 509, 139	7, 096, 777
Soap and candles	15	174, 200	68	14	....	38, 651	138, 660	251, 383
Soda-water apparatus	3	95, 000	189	5	6	73, 335	279, 638	487, 306
Spectacles and eyeglasses	7	8, 200	18	2	1	11, 500	4, 630	25, 730
Starch	1	20, 000	7	....	....	3, 675	41, 553	49, 710
Stationery goods	10	48, 800	73	11	3	41, 635	103, 870	257, 650
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	9	269, 500	186	....	17	97, 980	228, 918	398, 780
Stencils and brands	12	28, 500	28	3	4	16, 660	14, 527	53, 200
Stereotyping and electrotyping (see also Type founding)	5	38, 000	96	2	....	79, 021	34, 908	115, 630
Stone- and earthen-ware	6	63, 000	76	7	4	34, 950	24, 235	102, 900
Straw goods	3	41, 000	33	125	5	51, 227	122, 974	226, 295
Sugar and molasses, refined	4	1, 629, 500	395	....	....	202, 061	15, 544, 084	16, 518, 760
Surgical appliances	5	30, 500	30	19	2	28, 300	43, 000	106, 000
Telegraph and telephone apparatus (see also Electrical apparatus and supplies).	1	100, 000	160	....	15	75, 000	229, 625	378, 930
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	96	323, 980	522	23	16	250, 833	534, 961	1, 062, 072
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	2	220, 000	51	157	9	43, 031	108, 183	151, 538
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	100	170, 506	369	151	17	216, 574	328, 053	634, 567
Trunks and valises	20	104, 500	158	6	....	82, 665	235, 503	490, 708
Type founding (see also Stereotyping and electrotyping)	4	147, 200	111	86	5	100, 263	67, 443	222, 000
Umbrellas and canes	3	17, 600	7	15	....	8, 811	28, 425	50, 046
Upholstering (see also Furniture)	42	123, 757	180	45	3	105, 373	210, 767	392, 348
Varnish (see also Paints)	5	74, 000	18	....	....	10, 539	185, 500	248, 500
Veneering	1	25, 000	19	....	....	4, 530	4, 150	25, 000
Washing-machines and clothes-wringers	2	40, 150	17	....	....	9, 600	61, 200	123, 000
Watch cases	5	65, 000	103	16	3	86, 142	274, 480	427, 371
Watches	2	176, 500	87	20	....	79, 350	26, 000	148, 000
Whalebone and rattan	4	24, 500	31	21	2	19, 115	11, 044	60, 417
Window blinds and shades	14	42, 250	57	17	....	25, 540	61, 760	112, 845
Wirework	15	69, 400	107	16	11	55, 106	104, 771	214, 567
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	44	327, 960	441	1	8	208, 829	433, 855	791, 355
Wooden ware	3	6, 000	21	....	....	8, 950	13, 840	33, 500
Woolen goods (see also Carpets, other than rag; Mixed textiles)	1	100, 000	71	35	2	18, 000	46, 875	75, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MASSACHUSETTS—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
WORCESTER:								
Agricultural implements	7	$305, 000	267	1	1	$115, 934	$116, 322	$394, 520
Bagging, flax, hemp, and jute	2	720, 000	227	197	107	116, 886	296, 521	553, 053
Belting and hose, leather	2	103, 000	29			14, 545	225, 950	256, 140
Bluing	3	17, 400	5			3, 050	45, 125	53, 174
Bookbinding and blank-book making	6	34, 200	29	13		15, 904	35, 382	64, 750
Boot and shoe cut stock	18	115, 050	130	385	69	104, 555	226, 050	433, 127
Boot and shoe findings	6	8, 800	13	9	5	6, 650	7, 890	24, 540
Boots and shoes	98	4, 363, 412	7, 290	1, 300	457	3, 930, 559	9, 626, 477	15, 103, 099
Boxes, fancy and paper	7	25, 400	11	74	2	17, 461	26, 123	58, 170
Boxes, wooden, packing	20	111, 580	142	3	2	58, 256	185, 490	308, 052
Brass castings	4	16, 200	19		1	8, 520	50, 390	67, 244
Bread and other bakery products	18	80, 200	116	8	6	61, 927	259, 642	395, 554
Brick and tile	19	91, 200	244	1		48, 292	26, 186	106, 000
Brooms and brushes	4	10, 100	19	10		9, 900	13, 650	34, 200
Buttons	13	48, 400	180	70	20	73, 250	61, 100	172, 750
Carpets, other than rag (see also Woolen goods)	3	1, 537, 646	535	703	33	380, 622	1, 387, 211	2, 185, 209
Carriage and wagon materials	10	53, 100	33			18, 279	43, 751	88, 150
Carriages and sleds, children's	2	36, 000	37			13, 500	18, 800	39, 500
Carriages and wagons	16	172, 100	239	26		103, 016	158, 500	339, 330
Cars, railroad, street, and repairs	1	135, 000	61			38, 560	126, 208	174, 768
Cheese and butter (factory)	8	60, 250	21	2		6, 802	66, 993	103, 873
Clothing, men's	26	114, 300	233	208		111, 322	219, 046	423, 990
Clothing, women's	3	42, 000		53		13, 976	50, 150	74, 975
Coffee and spices, roasted and ground	2	4, 200	4			1, 800	26, 000	29, 700
Coffins, burial cases, and undertakers' goods	4	23, 000	19	2		11, 573	22, 737	40, 604
Combs	14	101, 990	272	53	21	131, 364	111, 489	316, 010
Confectionery	6	16, 900	17	8		5, 725	23, 715	38, 220
Corsets	5	112, 200	92	999	151	278, 822	450, 600	788, 425
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	57	7, 298, 930	3, 340	3, 257	986	2, 015, 931	4, 270, 726	7, 853, 539
Cutlery and edge tools (see also Hardware; Tools)	18	576, 375	467	1	2	224, 795	265, 130	626, 896
Drugs and chemicals (see also Patent medicines and compounds)	1	20, 000	14			8, 400	12, 000	35, 000
Dyeing and finishing textiles	2	550, 000	521	41	35	164, 149	780, 000	990, 000
Envelopes	2	55, 000	58	210		80, 477	476, 900	624, 776
Fancy articles	7	71, 250	232	47	24	88, 585	76, 887	206, 500
Felt goods (see also Woolen goods)	2	290, 000	155	8		60, 400	309, 290	367, 320
Files (see also Saws)	4	13, 800	36		3	15, 450	6, 425	31, 100
Fire-arms	4	124, 000	306		22	136, 091	61, 300	247, 828
Flouring- and grist-mill products	85	414, 150	116			40, 215	1, 335, 238	1, 462, 611
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	128	4, 277, 601	4, 266	52	110	2, 037, 227	3, 176, 722	6, 377, 641
Fruits and vegetables, canned and preserved	2	55, 700	12	15		8, 200	20, 550	37, 800
Furniture (see also Mattresses and spring beds; Upholstering)	24	316, 500	392	5	10	169, 511	329, 491	610, 756
Furniture, chairs	44	1, 765, 800	1, 853	112	40	895, 276	1, 490, 070	2, 816, 099
Gas machines and meters	2	85, 000	33			19, 331	21, 674	62, 500
Grease and tallow	5	15, 500	21			7, 750	29, 820	51, 700
Hardware (see also Cutlery and edge tools; Tools)	3	50, 600	45			17, 400	23, 800	65, 800
Hats and caps, not including wool hats	6	64, 500	101	33	4	65, 700	49, 725	132, 410
Hones and whetstones	3	22, 525	10	53		10, 770	11, 500	34, 000
Hosiery and knit goods (see also Cotton goods; Woolen goods)	1	161, 525	49	91	28	42, 746	110, 000	185, 000
Instruments, professional and scientific	3	14, 800	21	1	2	11, 352	6, 850	29, 300
Iron and steel	3	1, 750, 000	2, 354	15	10	984, 001	1, 688, 285	2, 701, 993
Iron bolts, nuts, washers, and rivets	1	10, 000	25			15, 000	30, 000	60, 000
Iron pipe, wrought	1	8, 500	7			3, 675	15, 000	20, 000
Iron railing, wrought	1	37, 500	22			9, 100	18, 560	35, 360
Ivory and bone work	3	21, 000	39	5	1	18, 300	13, 700	43, 500
Japanning	1	32, 560	12			12, 797	30, 629	52, 405
Lasts	4	55, 000	48			31, 302	24, 333	90, 009
Leather board (see also Paper)	2	60, 000	16			4, 513	19, 375	28, 875
Leather, curried	14	402, 200	206			89, 965	1, 164, 795	1, 409, 005
Leather, tanned	10	121, 800	108			45, 090	433, 370	544, 395
Linen goods	1	30, 000	15	8	8	7, 100	14, 000	27, 000
Looking-glass and picture frames	9	7, 500	42			10, 362	23, 975	45, 075
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	2	59, 000	40			22, 800	49, 200	83, 000
Lumber, sawed	147	385, 550	443		11	90, 399	387, 326	632, 390
Marble and stone work	26	89, 600	170			83, 854	81, 553	218, 375
Mattresses and spring beds (see also Furniture)	5	10, 000	9	3		4, 300	9, 075	22, 950
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	35	1, 591, 500	1, 128	800	138	753, 879	2, 385, 936	4, 559, 716
Musical instruments, organs and materials	9	255, 800	397	14		188, 662	282, 830	558, 025
Musical instruments, pianos and materials	6	58, 000	77			43, 049	48, 254	116, 740
Paper (see also Envelopes; Leather board)	9	875, 000	281	118	8	167, 348	1, 032, 972	1, 619, 750
Patent medicines and compounds (see also Drugs and chemicals)	4	15, 500	5	4		3, 450	7, 700	20, 500
Photographing materials	1	15, 000	12	3		10, 000	25, 000	40, 000
Pocket-books	2	10, 000	19	41		10, 800	21, 733	37, 916
Printing and publishing	20	161, 334	156	20	8	103, 963	74, 809	249, 482
Roofing and roofing materials	7	12, 200	29			15, 075	38, 230	67, 175
Saddlery and harness	35	50, 600	59	4		27, 200	46, 334	114, 745
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	12	294, 600	319	1	20	140, 152	297, 527	502, 033
Saws	5	129, 000	82			38, 795	97, 866	171, 216
Screws	4	88, 500	120	1	10	48, 737	72, 502	158, 990
Shoddy (see also Mixed textiles)	17	132, 000	89	19	22	41, 213	547, 110	1, 120, 920
Silk and silk goods (see also Mixed textiles)	1	10, 000	5	9		5, 000	22, 000	34, 990

Table V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MASSACHUSETTS—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Worcester—continued.								
Slaughtering and meat-packing, not including retail butchering establishments.	11	$205, 100	95		2	$46, 585	$1, 523, 105	$1, 726, 593
Soap and candles	18	57, 650	36	1		13, 728	35, 358	80, 783
Spectacles and eyeglasses	4	67, 000	182	13	8	83, 175	97, 665	215, 150
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	6, 000	8			5, 500	40, 000	50, 000
Stone- and earthen-ware	3	27, 500	35	4		17, 500	8, 000	44, 000
Straw goods	11	780, 500	720	1, 978	17	659, 041	1, 351, 404	2, 249, 683
Tinware, copperware, and sheet-iron ware	50	115, 500	150	17		62, 517	100, 570	221, 174
Tobacco, cigars and cigarettes	18	46, 800	73	17	3	42, 772	94, 814	171, 102
Tools (see also Cutlery and edge tools; Hardware)	18	491, 227	309		3	156, 615	147, 963	401, 792
Toys and games	4	39, 000	90	7	12	41, 000	25, 300	85, 000
Umbrellas and canes	1	10, 000	15			6, 199	8, 000	39, 768
Upholstering (see also Furniture; Mattresses and spring beds)	8	11, 875	24	3		12, 300	28, 700	55, 200
Wire	4	1, 622, 000	2, 360	20	10	915, 726	2, 856, 600	4, 307, 000
Wirework	4	155, 100	106	108	2	70, 082	272, 001	386, 266
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	22	58, 850	81	5	2	29, 010	27, 847	84, 413
Wooden ware	13	213, 600	259	13	38	112, 455	207, 670	386, 800
Woolen goods (see also Carpets, other than rag; Felt goods; Mixed textiles; Worsted goods).	66	5, 610, 500	3, 702	2, 329	560	2, 012, 803	7, 790, 689	12, 627, 533
Worsted goods (see also Woolen goods)	4	237, 500	96	211	50	90, 342	571, 140	755, 000

MICHIGAN.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Alcona:								
Lumber, sawed	4	$140, 000	90		5	$29, 750	$143, 442	$211, 792
Allegan:								
Agricultural implements	9	66, 052	47			14, 513	27, 245	65, 589
Cheese and butter (factory)	4	5, 200	7	1		1, 742	15, 046	20, 966
Clothing, men's	5	10, 200	9	7		6, 200	10, 000	21, 500
Cooperage	7	5, 500	24			7, 300	7, 050	22, 400
Flouring- and grist-mill products	24	264, 250	75			20, 942	697, 375	791, 573
Furniture	4	26, 690	15			5, 750	9, 600	20, 200
Furniture, chairs	1	30, 000	48		12	18, 000	40, 000	63, 000
Leather, tanned	4	36, 800	46			33, 550	113, 360	174, 250
Lumber, sawed	54	338, 235	272	1	25	71, 680	498, 372	762, 473
Paper	1	50, 000	16	11		10, 500	54, 000	74, 880
Saddlery and harness	9	8, 100	12			3, 990	13, 585	27, 550
Sash, doors, and blinds	3	22, 000	8			3, 750	11, 200	24, 600
Alpena:								
Flouring- and grist-mill products	2	16, 000	6			1, 081	20, 825	25, 842
Lumber, sawed	18	747, 250	591	9	42	168, 350	876, 750	1, 330, 805
Antrim:								
Iron and steel	1	500, 000	251			98, 603	190, 981	389, 740
Lumber, sawed	6	60, 400	17		6	5, 375	25, 375	35, 700
Barraga:								
Lumber, sawed	1	85, 000	50			16, 875	165, 021	237, 000
Barry:								
Flouring- and grist-mill products	13	103, 800	29			9, 666	297, 871	324, 940
Lumber, sawed	26	42, 950	75			9, 101	34, 457	67, 005
Sash, doors, and blinds	1	20, 000	10			3, 000	15, 000	30, 000
Sporting goods	1	20, 000	55	5	10	25, 000	15, 000	50, 000
Bay:								
Cooperage	14	15, 994	79		4	32, 920	47, 480	106, 840
Flouring- and grist-mill products	5	68, 000	36			13, 575	215, 175	241, 804
Foundery and machine-shop products	9	278, 000	322		5	126, 583	176, 200	340, 695
Liquors, malt	4	55, 500	21			10, 585	45, 824	81, 218
Lumber, planed (see also Sash, doors, and blinds)	3	11, 000	14			5, 200	79, 000	94, 000
Lumber, sawed	46	4, 088, 500	1, 818	1	134	554, 530	4, 401, 581	5, 832, 307
Needles and pins	1	20, 000	8	7		3, 000	9, 500	20, 000
Salt	28	926, 000	531		21	244, 860	405, 758	936, 473
Sash, doors, and blinds (see also Lumber, planed)	3	51, 000	60		3	21, 500	32, 790	59, 000
Slaughtering and meat-packing, not including retail butchering establishments.	2	20, 000	8			4, 600	95, 698	104, 783
Wooden ware	1	75, 000	100	10	20	60, 000	75, 000	160, 000
Benzie:								
Flouring- and grist-mill products	5	64, 900	4			950	17, 834	23, 643
Lumber, sawed	15	183, 300	172		10	58, 253	379, 148	516, 902
Berrien:								
Boxes, wooden, packing	7	72, 200	159	32	22	41, 419	72, 600	157, 200
Carriages and wagons	4	36, 500	142		14	33, 000	80, 000	118, 000
Cooperage	10	16, 600	31			9, 615	22, 225	42, 200
Flouring- and grist-mill products	23	258, 967	72			25, 227	751, 900	830, 355
Foundery and machine-shop products	6	24, 300	33			11, 000	8, 800	27, 700
Fruits and vegetables, canned and preserved	2	10, 200	37	6	8	5, 466	24, 127	33, 360
Furniture	11	96, 040	176			57, 179	59, 639	161, 384
Handles, wooden	2	20, 000	25		5	9, 600	10, 000	27, 000
Hosiery and knit goods	2	34, 289	34	109	5	32, 260	46, 365	98, 640
Lumber, sawed	41	301, 050	364		23	102, 853	353, 956	563, 597

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MICHIGAN—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
BERRIEN—continued.								
Paper (see also Wood pulp)	1	$60,000	26	9		$14,392	$21,800	$45,000
Saddlery and harness	7	27,200	22		1	7,956	13,645	39,125
Sash, doors, and blinds	1	18,000	16			7,000	15,000	26,000
Shipbuilding	2	2,200	20			11,150	27,050	41,200
Soap and candles	1	10,000	6	2		4,000	12,000	20,000
Tinware, copperware, and sheet-iron ware	5	12,300	9			3,600	13,600	23,000
Wood pulp	1	30,000	40		3	14,400	26,000	70,000
Wooden ware	2	80,550	148	10	9	49,000	42,250	99,829
BRANCH:								
Agricultural implements	3	19,800	28			6,250	10,700	42,875
Carriages and wagons	5	20,300	29			9,481	10,894	27,069
Clothing, men's	2	15,000	6	7		5,068	15,285	23,150
Cooperage	8	14,400	30			10,341	9,150	33,175
Flouring- and grist-mill products	10	116,500	27			11,954	305,036	344,464
Lumber, sawed	30	83,200	145		8	35,774	100,830	183,618
Saddlery and harness	7	12,625	16			5,603	13,730	25,600
Sash, doors, and blinds	3	31,000	20			7,150	10,400	24,250
Tinware, copperware, and sheet-iron ware	5	4,300	9			5,040	14,300	25,400
Tobacco, cigars and cigarettes	6	46,400	157	33	29	71,834	81,902	255,482
CALHOUN:								
Agricultural implements	5	843,500	517		4	193,779	490,146	1,055,855
Bookbinding and blank-book making	1	100,000	40	45	3	24,260	45,634	100,000
Carriages and wagons	5	118,500	38			19,960	19,500	46,200
Cooperage	6	14,100	32			8,916	10,300	22,650
Flouring- and grist-mill products	19	601,500	94			34,566	1,044,093	1,227,414
Foundery and machine-shop products	7	104,500	94			36,409	58,900	126,800
Furniture	4	34,500	40		3	16,000	16,750	47,500
Hosiery and knit goods	2	13,000	5	50		6,500	13,018	27,125
Leather, curried	2	2,584	2			1,167	28,135	31,500
Leather, tanned	2	4,916	7			2,783	24,140	44,400
Lumber, planed (see also Sash, doors, and blinds)	3	30,500	12			4,100	19,000	34,000
Lumber, sawed	13	40,300	64		4	13,853	42,355	75,500
Paper	1	13,500	12	4		7,562	26,090	51,570
Sash, doors, and blinds (see also Lumber, planed)	3	50,000	56			15,000	33,000	76,500
Tinware, copperware, and sheet-iron ware	4	18,800	9			5,000	12,200	22,500
Tobacco, cigars and cigarettes	4	26,700	45	9	4	16,840	25,640	53,540
CASS:								
Agricultural implements	1	33,000	15			6,000	10,000	22,968
Clothing, men's	1	15,000	3			2,500	15,000	25,000
Flouring- and grist-mill products	18	140,698	42			10,155	297,959	330,342
Foundery and machine-shop products	4	23,850	38			25,635	41,200	83,200
Fruits and vegetables, canned and preserved	1	6,000	20	40		6,600	19,500	35,000
Hosiery and knit goods	1	30,000	11	17	6	5,500	44,500	51,000
Lumber, sawed	29	97,700	144		1	30,333	90,763	149,435
Saddlery and harness	8	11,800	15			6,270	15,365	30,359
CHEBOYGAN:								
Flouring- and grist-mill products	2	15,000	5			1,775	31,690	39,157
Lumber, sawed	7	771,000	132			28,650	350,600	504,500
CHIPPEWA:								
Lumber, sawed	3	310,000	134	3	5	34,600	76,500	132,700
CLARE:								
Flouring- and grist-mill products	1	7,000	2			675	16,845	20,000
Lumber, sawed	5	14,000	93			30,545	70,400	143,250
CLINTON:								
Agricultural implements	6	23,100	37			16,048	10,395	35,295
Carriages and wagons	3	14,000	40		3	22,300	39,500	72,900
Cooperage	3	5,975	38		8	14,800	60,700	102,100
Flouring- and grist-mill products	12	104,800	33			8,970	269,695	342,376
Lumber, sawed	24	70,260	106			17,484	50,360	101,554
Sash, doors, and blinds	2	112,000	78			31,000	62,700	186,000
DELTA:								
Charcoal	4	46,400	250			72,800	24,000	110,400
Iron and steel	1	325,000	225			100,000	192,510	217,650
Lumber, sawed	6	550,000	126	2	1	29,505	279,101	395,350
EATON:								
Carriages and wagons	2	18,000	23			6,700	11,000	22,000
Flouring- and grist-mill products	10	84,500	36			9,784	234,315	291,463
Furniture	3	15,000	44		1	21,000	11,200	64,325
Lumber, sawed	40	169,200	256	2	7	45,342	110,217	223,403
Sash, doors, and blinds	7	51,500	43			17,140	27,822	57,865
EMMET:								
Flouring- and grist-mill products	3	36,000	6			1,860	24,240	28,838
Lumber, sawed	8	159,500	88	2	1	27,747	80,375	139,100
GENESEE:								
Carriages and wagons	6	68,200	112			43,600	89,900	170,000
Clothing, men's	3	5,000	11	10		9,200	11,700	24,700
Cooperage	5	12,400	44			9,800	7,050	24,300
Flouring- and grist-mill products	18	242,200	76			24,047	736,541	807,822
Foundery and machine-shop products	8	72,539	44			17,135	12,625	47,967

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MICHIGAN—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
GENESEE—continued.								
Lumber, planed (see also Sash, doors, and blinds)	2	$38,000	26			$7,500	$16,600	$33,000
Lumber, sawed	23	604,400	292		12	87,662	370,214	551,450
Paper	2	32,000	32		2	14,150	8,500	34,750
Saddlery and harness	13	27,315	26			10,539	21,695	45,700
Sash, doors, and blinds (see also Lumber planed)	2	24,000	20			7,260	16,000	36,800
Tinware, copperware, and sheet-iron ware	6	6,400	11			6,545	8,980	21,300
Tobacco, cigars and cigarettes	2	14,532	16	3	4	11,160	11,902	32,307
Woolen goods	1	150,000	44	40	8	20,000	112,000	114,000
GRAND TRAVERSE:								
Carriages and wagons	1	13,000	25		2	12,000	10,820	26,637
Flouring- and grist-mill products	3	47,000	8			5,236	90,765	100,720
Lumber, sawed	16	591,000	275	1	1	85,739	198,750	381,415
Saddlery and harness	3	11,300	7			2,535	23,700	33,100
GRATIOT:								
Flouring- and grist-mill products	5	54,000	15			5,710	169,689	198,757
Lumber, sawed	23	149,400	234	1	3	69,196	104,145	230,940
HILLSDALE:								
Carriages and wagons	7	33,000	46			18,053	30,740	64,215
Clothing, men's	2	9,500	7	11		7,000	13,000	24,000
Cooperage	16	11,170	40			15,862	30,771	53,052
Cotton goods	1	20,000	34	38	14	16,800	41,000	70,000
Flouring- and grist-mill products	23	243,750	77			24,207	804,372	888,718
Foundery and machine-shop products	3	18,600	14			6,600	12,780	23,180
Furniture	9	26,775	38			15,052	25,260	49,526
Lumber, planed	2	9,000	10			3,850	22,300	43,763
Lumber, sawed	36	82,100	133			18,212	52,464	113,230
Saddlery and harness	10	13,400	19			5,166	16,860	30,651
Washing-machines and clothes-wringers	1	30,000	33			10,000	13,000	35,000
HOUGHTON:								
Liquors, malt	4	75,800	33		2	12,064	51,980	92,661
Lumber, sawed	3	145,000	75		9	26,000	106,400	174,500
HURON:								
Flouring- and grist-mill products	12	76,500	29			9,803	251,882	289,050
Grindstones	2	45,000	168			40,000	23,600	77,000
Lumber, sawed	19	120,450	270		19	50,370	99,347	206,209
Salt	6	171,800	178		5	64,400	106,020	227,299
INGHAM:								
Agricultural implements	9	106,500	120		5	42,415	65,599	151,446
Bread and other bakery products	3	12,600	10	3	1	4,800	66,000	76,000
Brick and tile	6	23,650	90		22	14,885	8,200	31,470
Carriages and wagons	4	33,500	47			16,000	22,500	52,500
Charcoal	15	9,400	75			7,365	11,275	25,040
Clothing, men's	5	7,900	13	5		5,100	19,000	27,600
Cooperage	12	39,300	84			31,005	31,800	92,725
Flouring- and grist-mill products	15	160,700	65			16,166	526,166	585,488
Foundery and machine-shop products	4	39,900	26			7,050	7,000	20,500
Furniture	7	19,800	16		1	6,100	8,950	38,700
Handles, wooden	2	9,000	52		1	14,000	12,000	36,000
Liquors, malt	2	20,000	16			4,391	18,625	53,225
Lumber, planed (see also Sash, doors, and blinds)	1	12,000	10			2,700	4,000	20,000
Lumber, sawed	37	203,000	242	3	10	59,048	118,262	267,085
Marble and stone work	8	9,300	26			9,530	15,100	39,300
Saddlery and harness	10	15,650	21			7,638	18,200	46,200
Sash, doors, and blinds (see also Lumber, planed)	5	104,000	59		1	25,000	105,900	154,000
Tinware, copperware, and sheet-iron ware	11	22,600	52		1	20,550	31,370	69,500
IONIA:								
Agricultural implements	7	28,500	20			7,600	9,185	27,295
Boots and shoes	1	8,000	209			30,000	65,000	112,000
Carriages and wagons	5	17,500	22			9,400	8,300	27,675
Flouring- and grist-mill products	19	182,150	66			20,288	546,929	605,927
Lumber, sawed	35	394,120	310	10	7	80,625	227,875	486,040
Saddlery and harness	8	10,550	18			7,238	16,722	29,800
Tinware, copperware, and sheet-iron ware	6	21,100	28			13,350	13,500	36,000
IOSCO:								
Lumber, sawed	20	1,243,300	629		53	195,900	1,323,164	1,997,070
Salt	4	100,000	76		10	35,210	48,021	146,960
ISABELLA:								
Flouring- and grist-mill products	5	47,600	11			1,925	66,775	74,386
Lumber, sawed	16	229,350	118	2		25,775	68,337	152,795
JACKSON:								
Agricultural implements	6	273,500	204			57,618	144,022	292,812
Boots and shoes	1	25,000	25	1	1	13,500	47,770	72,000
Bread and other bakery products	3	9,500	13			6,140	22,840	33,930
Brick and tile	2	52,720	71		10	23,490	18,377	54,926
Brooms and brushes	2	11,000	20			6,638	20,733	29,169
Carriages and wagons	7	302,500	187			81,550	219,750	398,200
Clothing, men's	8	23,905	21	20		17,912	28,958	59,313
Cooperage	9	63,300	115			27,488	106,041	176,207
Corsets	2	42,000	16	205		38,760	93,000	181,500
Drugs and chemicals	1	25,000	20			10,000	15,000	60,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MICHIGAN—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
JACKSON—continued.								
Flouring- and grist-mill products	25	$241, 000	69	....	....	$12, 240	$712, 439	$791, 383
Foundery and machine-shop products	7	401, 362	154	....	....	66, 560	186, 046	367, 977
Furniture (see also Mattresses and spring beds)	4	52, 500	33	....	....	15, 000	42, 400	69, 950
Liquors, malt	2	35, 000	14	....	....	6, 845	29, 804	52, 642
Mattresses and spring beds (see also Furniture)	4	3, 550	7	....	....	2, 967	24, 680	35, 334
Printing and publishing	7	53, 400	49	....	....	33, 428	37, 650	87, 800
Saddlery and harness	8	14, 100	20	....	....	8, 437	25, 960	43, 650
Sash, doors, and blinds	6	75, 000	54	....	....	22, 402	98, 700	172, 928
Tinware, copperware, and sheet-iron ware	11	10, 700	21	....	....	8, 880	12, 000	28, 942
Tobacco, cigars and cigarettes	6	21, 200	68	....	....	18, 485	27, 486	107, 156
Wood pulp	1	50, 000	20	....	....	8, 000	80, 000	85, 000
KALAMAZOO:								
Agricultural implements	11	338, 400	207	....	7	77, 870	197, 524	505, 414
Bread and other bakery products	6	5, 850	8	1	1	2, 144	14, 370	22, 968
Carriages and wagons	8	65, 800	72	....	....	27, 992	27, 900	79, 890
Clothing, men's	4	21, 800	20	14	....	15, 433	25, 139	51, 390
Coffins, burial cases, and undertakers' goods	1	14, 000	20	1	4	7, 800	30, 000	45, 000
Flouring- and grist-mill products	15	151, 500	81	....	....	16, 201	420, 160	458, 218
Foundery and machine-shop products	7	37, 791	61	....	4	24, 377	32, 180	77, 535
Hosiery and knit goods	1	6, 000	2	50	3	7, 000	30, 800	48, 000
Lumber, sawed	9	67, 300	47	....	9	8, 500	31, 785	65, 624
Marble and stone work	2	8, 000	18	....	....	9, 400	12, 000	27, 000
Paper	1	186, 838	50	20	10	38, 341	107, 000	221, 441
Printing and publishing	4	45, 500	53	4	12	26, 450	23, 480	65, 135
Regalia and society banners and emblems	1	8, 000	3	10	....	3, 120	15, 000	30, 000
Roofing and roofing materials	1	7, 500	5	....	....	2, 000	17, 656	22, 170
Saddlery and harness	13	18, 490	21	....	....	6, 962	19, 291	36, 382
Sash, doors, and blinds	4	226, 000	134	....	1	46, 500	114, 600	185, 115
Springs, steel, car, and carriage	2	100, 000	90	....	5	30, 000	168, 000	230, 000
Tinware, copperware, and sheet-iron ware	7	7, 050	15	....	....	5, 528	13, 150	26, 267
Windmills	5	69, 050	56	....	....	19, 225	74, 350	122, 490
KALKASKA:								
Lumber, sawed	6	18, 000	48	....	....	18, 400	66, 275	132, 235
KENT:								
Agricultural implements	10	269, 525	208	3	15	76, 878	168, 866	317, 029
Baking and yeast powders (see also Drugs and chemicals)	1	5, 000	3	2	....	1, 800	20, 000	30, 000
Belting and hose, leather	2	10, 500	11	....	5	5, 640	49, 000	74, 000
Boots and shoes	1	20, 000	27	3	....	18, 000	39, 050	67, 000
Boxes, wooden, packing	1	7, 580	14	....	1	7, 000	40, 392	56, 645
Bread and other bakery products	14	80, 759	57	4	3	31, 420	195, 050	253, 500
Brick and tile	2	70, 000	107	....	5	23, 865	15, 070	64, 357
Brooms and brushes	2	75, 600	55	68	50	37, 667	52, 321	100, 700
Carriage and wagon materials	3	14, 875	30	....	....	9, 425	15, 126	33, 700
Carriages and sleds, children's	1	10, 000	15	....	5	6, 000	8, 000	20, 000
Carriages and wagons	17	337, 056	190	....	11	77, 540	122, 225	290, 141
Clothing, men's	11	121, 620	110	89	....	63, 400	169, 929	332, 542
Coffins, burial cases, and undertakers' goods	3	71, 300	86	....	1	37, 048	33, 929	119, 308
Confectionery	4	53, 075	72	18	5	28, 774	124, 650	165, 000
Cooperage	14	32, 700	62	....	....	21, 503	60, 201	95, 433
Cutlery and edge tools	2	20, 000	23	....	1	10, 500	14, 500	31, 500
Drugs and chemicals (see also Baking and yeast powders)	4	69, 500	40	1	1	14, 390	36, 536	84, 427
Fertilizers	1	50, 000	35	....	....	10, 694	10, 136	27, 081
Files	3	3, 200	18	....	....	8, 900	10, 700	22, 000
Flavoring extracts	1	25, 000	8	1	11	7, 000	30, 000	50, 000
Flouring- and grist-mill products	31	351, 500	92	....	....	42, 089	1, 074, 417	1, 212, 615
Foundery and machine-shop products	13	267, 971	276	....	....	133, 499	188, 451	384, 611
Furniture	14	1, 336, 456	1, 721	9	99	653, 062	827, 886	1, 848, 172
Furniture, chairs	1	300, 000	300	50	100	66, 856	80, 157	167, 592
Furs, dressed	1	1, 200	3	4	....	3, 500	9, 500	22, 000
Housefurnishing goods	2	23, 000	37	23	12	24, 800	41, 480	83, 600
Liquors, malt	7	278, 000	65	....	....	29, 883	128, 553	229, 526
Looking-glass and picture frames	4	10, 600	9	5	....	5, 950	14, 650	30, 518
Lumber, planed (see also Sash, doors, and blinds)	3	70, 000	69	....	15	32, 000	60, 450	112, 000
Lumber, sawed	67	1, 351, 335	812	10	....	242, 299	820, 669	1, 506, 491
Marble and stone work	6	11, 800	15	....	....	5, 944	11, 300	25, 500
Musical instruments, organs and materials	1	15, 000	24	....	1	7, 800	18, 377	26, 179
Paper	1	15, 000	15	....	10	10, 000	12, 800	25, 000
Printing and publishing	20	93, 450	151	3	57	79, 250	46, 662	168, 324
Saddlery and harness	14	17, 750	50	....	1	20, 175	44, 800	80, 376
Sash, doors, and blinds (see also Lumber, planed)	9	82, 500	105	....	2	40, 189	97, 896	173, 043
Tinware, copperware, and sheet-iron ware	14	28, 900	58	....	....	30, 474	51, 175	100, 240
Tobacco, cigars and cigarettes	19	40, 150	65	5	8	27, 045	73, 455	126, 863
Wooden ware	3	243, 500	173	....	37	76, 271	96, 200	195, 000
LAKE:								
Flouring- and grist-mill products	2	7, 000	7	....	....	2, 336	33, 767	38, 673
Lumber, sawed	16	115, 200	207	5	....	60, 952	97, 915	223, 830
LAPEER:								
Agricultural implements	6	37, 500	31	....	....	12, 414	16, 815	44, 877
Carriages and wagons	6	16, 800	24	....	....	7, 752	14, 900	29, 100
Cooperage	4	3, 430	13	....	....	3, 418	19, 075	25, 195
Flouring- and grist-mill products	19	180, 800	66	....	....	17, 338	718, 537	803, 802
Foundery and machine-shop products	5	17, 600	18	....	....	6, 375	6, 025	22, 396

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MICHIGAN—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
LAPEER—continued.								
Lumber, sawed	45	$622, 100	590	29	6	$170, 898	$513, 003	$999, 130
Saddlery and harness	5	19, 150	16			11, 554	25, 920	41, 100
Sash, doors, and blinds	3	16, 000	26			7, 358	12, 300	32, 800
LEELANAW:								
Flouring- and grist-mill products	5	14, 000	4			1, 110	25, 810	29, 650
Lumber, sawed	8	64, 500	70	1		11, 479	31, 015	69, 174
LENAWEE:								
Bread and other bakery products	3	27, 800	11		2	3, 382	12, 090	34, 040
Brick and tile	13	53, 500	106		2	18, 192	21, 797	63, 020
Carriage and wagon materials	1	25, 000	35			9, 000	18, 000	32, 400
Carriages and wagons	9	69, 000	59			24, 046	32, 000	74, 895
Cheese and butter (factory)	10	20, 750	17	2		3, 910	51, 305	78, 270
Cooperage	12	10, 850	20			5, 697	7, 650	21, 957
Flouring- and grist-mill products	33	359, 924	99			30, 428	782, 544	934, 502
Foundery and machine-shop products	9	124, 300	68		1	29, 200	31, 885	103, 730
Fruits and vegetables, canned and preserved	2	30, 000	16	70	5	4, 161	18, 000	25, 904
Furniture	10	40, 300	52			15, 700	22, 550	55, 800
Leather, curried	1	6, 000	1			200	17, 800	21, 500
Leather, tanned	2	17, 000	5			1, 600	16, 390	23, 750
Liquors, malt	2	28, 000	10			4, 592	19, 521	34, 842
Lumber, sawed	45	179, 414	263		16	53, 053	180, 784	330, 965
Marble and stone work	3	23, 500	35	1	1	18, 668	8, 150	35, 600
Paper	2	43, 000	28			12, 800	19, 545	45, 700
Printing and publishing	4	54, 800	34	1	2	13, 500	8, 450	28, 500
Saddlery and harness	17	22, 400	31		1	12, 050	30, 150	55, 277
Sash, doors, and blinds	5	43, 500	32		1	13, 517	26, 500	46, 250
Slaughtering and meat-packing, not including retail butchering establishments.	1	38, 000	4			1, 200	23, 280	30, 000
Tinware, copperware, and sheet-iron ware	10	12, 000	16			5, 425	15, 800	32, 390
Tobacco, cigars and cigarettes	7	9, 900	16		2	5, 846	11, 500	25, 140
Wheelbarrows	2	22, 000	23			7, 000	12, 000	28, 500
Woolen goods	2	170, 800	38	27	8	23, 007	82, 491	129, 753
LIVINGSTON:								
Flouring- and grist-mill products	15	119, 400	30			7, 455	239, 404	275, 569
Lumber, sawed	10	87, 400	102		10	24, 875	82, 150	147, 800
MACKINAC:								
Lumber, sawed	3	495, 000	125	2		33, 750	72, 667	163, 574
MACOMB:								
Agricultural implements	5	23, 282	22		1	7, 670	7, 932	26, 280
Carriages and wagons	6	66, 835	79			31, 900	78, 221	144, 125
Drugs and chemicals	10	7, 100	14			2, 125	4, 050	25, 580
Flouring- and grist-mill products	14	103, 000	37			11, 830	283, 236	323, 734
Handles, wooden	2	3, 700	5			1, 500	3, 395	20, 500
Lumber, sawed	16	161, 860	323		42	83, 415	133, 475	314, 050
Saddlery and harness	18	19, 200	29			8, 071	21, 164	40, 387
Sash, doors, and blinds	3	24, 000	26			8, 200	21, 000	41, 312
Shipbuilding	4	4, 600	30			12, 750	34, 700	57, 500
Wood pulp	1	10, 000	9			3, 000	12, 000	20, 000
MANISTEE:								
Carriages and wagons	2	10, 500	14			7, 000	8, 500	20, 000
Flouring- and grist-mill products	2	14, 500	6			2, 170	24, 400	30, 268
Foundery and machine-shop products	5	35, 000	52			23, 100	33, 550	75, 500
Lumber, sawed	28	2, 607, 500	1, 149		128	407, 302	1, 365, 813	2, 722, 580
MARQUETTE:								
Charcoal	15	22, 000	55			19, 900	5, 250	32, 950
Gunpowder (see also High explosives)	1	75, 000	18			10, 000	75, 000	90, 000
High explosives (see also Gunpowder)	1	25, 000	10			9, 000	34, 000	44, 000
Iron and steel	4	880, 000	445		25	94, 541	459, 257	633, 329
Lumber, sawed	8	214, 000	206			82, 900	130, 700	259, 900
Printing and publishing	2	18, 500	13	2	1	7, 700	21, 500	33, 500
MASON:								
Flouring- and grist-mill products	2	5, 500	4			1, 465	17, 500	20, 177
Foundery and machine-shop products	3	25, 900	42			11, 845	10, 565	31, 600
Lumber, sawed	20	3, 645, 500	616		47	198, 014	1, 232, 324	1, 987, 459
MECOSTA:								
Flouring- and grist-mill products	7	89, 500	13			7, 000	177, 897	198, 076
Foundery and machine-shop products	2	26, 000	49			13, 590	39, 000	65, 000
Furniture	1	22, 400	20			7, 500	6, 000	20, 000
Looking-glass and picture frames	2	27, 500	25			18, 500	12, 500	40, 000
Lumber, sawed	20	325, 000	243			80, 268	206, 635	427, 777
Sash, doors, and blinds	2	40, 000	31		1	15, 480	43, 100	69, 570
MENOMINEE:								
Iron and steel	1	40, 000	150			60, 000	181, 000	270, 000
Lumber, sawed	12	1, 492, 000	417	13	57	170, 882	1, 253, 190	1, 916, 163
MIDLAND:								
Flouring- and grist-mill products	1	16, 000	6			2, 098	50, 000	66, 350
Lumber, sawed	17	141, 800	173		15	54, 255	177, 555	328, 535
Salt	1	20, 000	15			6, 750	16, 000	25, 901

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MICHIGAN—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
MONROE:								
Carriages and wagons	7	$12, 500	21	....	....	$7, 955	$13, 050	$27, 300
Flouring- and grist-mill products	15	124, 900	45	....	....	10, 404	261, 603	300, 039
Liquors, malt	2	32, 000	9	....	....	4, 075	17, 846	31, 280
Lumber, sawed	34	193, 900	294	....	29	74, 132	124, 450	280, 815
MONTCALM:								
Carriages and wagons	5	9, 500	18	....	....	8, 602	13, 007	32, 345
Clothing, men's	6	7, 300	22	14	....	12, 800	22, 700	43, 900
Flouring- and grist-mill products	15	188, 000	53	....	....	21,765	754, 592	820, 123
Foundery and machine-shop products	5	43, 100	25	....	....	13, 876	8, 470	39, 604
Lumber, planed (see also Sash, doors, and blinds)	5	61, 000	63	....	....	27, 000	149, 500	200, 000
Lumber, sawed	133	1, 500, 400	2, 235	17	15	781, 211	2, 200, 293	4, 046, 649
Saddlery and harness	6	11, 050	13	....	....	5, 700	19, 800	33, 100
Sash, doors, and blinds (see also Lumber, planed)	2	24, 500	16	....	....	5, 800	35, 000	47, 500
Tinware, copperware, and sheet-iron ware	8	11, 100	16	....	....	8, 276	27, 500	48, 500
MUSKEGON:								
Bread and other bakery products	4	6, 700	10	2	....	3, 650	16, 000	28, 750
Carriages and wagons	1	10, 100	32	....	....	11, 764	12, 700	32, 800
Cooperage	2	40, 800	31	....	....	7, 600	40, 800	67, 000
Flouring- and grist-mill products	4	63, 000	17	....	....	5, 900	140, 271	158, 583
Foundery and machine-shop products	4	67, 000	124	....	....	47, 548	55, 062	146, 875
Furniture	3	10, 500	14	....	....	6, 400	18, 600	32, 000
Iron and steel	1	150, 000	200	....	....	24, 000	82, 917	129, 108
Leather, tanned	1	50, 000	35	....	....	25, 000	88, 200	150, 000
Liquors, malt	1	40, 000	10	1	1	5, 490	23, 630	42, 180
Lumber, planed	6	39, 000	87	....	7	33, 405	47, 500	96, 125
Lumber, sawed	65	5, 057, 090	2, 076	7	164	793, 543	4, 650, 110	7, 686, 013
Tinware, copperware, and sheet-iron ware	8	17, 150	11	....	....	6, 300	16, 800	32, 000
Tobacco, cigars and cigarettes	4	15, 300	31	....	9	13, 722	35, 100	73, 800
Window blinds and shades	1	25, 000	59	....	27	12, 000	35, 000	50, 000
NEWAYGO:								
Flouring- and grist-mill products	6	41, 000	9	....	....	1, 925	55, 380	67, 546
Leather, curried	1	33, 334	8	....	....	2, 974	121, 300	150, 000
Leather, tanned	1	66, 666	16	....	....	5, 947	100, 000	120, 000
Lumber, sawed	41	643, 600	554	2	16	214, 335	813, 976	1, 334, 586
OAKLAND:								
Agricultural implements	8	30, 500	31	....	....	6, 300	13, 600	35, 400
Brick and tile	9	23, 300	53	....	3	11, 000	15, 105	36, 535
Carriages and wagons	7	16, 450	39	....	....	14, 650	24, 400	53, 500
Clothing, men's	9	16, 300	18	20	....	11, 600	26, 900	51, 505
Cooperage	17	15, 550	32	....	....	10, 140	14, 075	34, 480
Flouring- and grist-mill products	43	295, 900	106	....	....	23, 738	826, 693	975, 579
Foundery and machine-shop products	12	47, 600	29	....	....	9, 960	13, 300	34, 825
Furniture	6	19, 300	17	1	....	4, 750	7, 800	32, 800
Hosiery and knit goods (see also Woolen goods)	1	23, 000	18	200	112	9, 000	26, 900	43, 000
Lumber, sawed	18	31, 000	58	....	....	8, 848	32, 955	59, 796
Paper	2	62, 000	26	....	1	10, 100	37, 000	66, 060
Saddlery and harness	19	23, 900	22	....	....	7, 166	22, 830	49, 255
Sash, doors, and blinds	3	18, 057	32	....	....	15, 087	30, 050	49, 592
Vinegar	4	24, 500	11	....	....	4, 150	3, 600	26, 300
Woolen goods	2	23, 500	7	10	1	5, 208	20, 174	35, 244
OCEANA:								
Charcoal	1	13, 850	160	....	....	51, 000	15, 375	69, 950
Flouring- and grist-mill products	6	91, 000	14	....	....	5, 010	136, 325	152, 686
Lumber, sawed	31	524, 000	347	3	4	98, 386	223, 356	451, 784
OSCEOLA:								
Flouring- and grist-mill products	7	52, 700	13	....	1	4, 990	121, 495	141, 339
Lumber, sawed	25	370, 900	237	3	8	77, 080	233, 060	387, 155
OTSEGO:								
Lumber, sawed	4	370, 000	105	....	....	32, 000	122, 700	215, 000
OTTAWA:								
Agricultural implements	2	31, 000	29	....	4	7, 200	16, 927	37, 750
Brick and tile	4	14, 300	75	....	....	12, 150	7, 000	28, 400
Clothing, men's	6	9, 275	26	6	1	8, 721	15, 760	33, 000
Flouring- and grist-mill products	10	96, 000	48	....	....	17, 390	369, 902	432, 251
Foundery and machine-shop products	3	11, 500	21	....	....	11, 425	5, 550	24, 000
Leather, curried	3	31, 334	26	....	....	13, 834	181, 370	220, 775
Leather, tanned	5	157, 666	82	....	....	42, 561	333, 120	431, 200
Lumber, planed	3	42, 600	53	....	5	22, 056	27, 000	66, 306
Lumber, sawed	40	1, 645, 700	620	2	95	188, 627	1, 520, 720	2, 262, 710
Shipbuilding	5	12, 050	82	....	....	35, 050	63, 000	105, 750
SAGINAW:								
Boxes, wooden, packing	3	54, 000	53	....	30	17, 790	21, 700	50, 000
Bread and other bakery products	6	13, 000	11	2	2	5, 850	19, 677	35, 780
Brick and tile	10	30, 144	142	2	2	21, 622	13, 685	50, 882
Carriages and wagons	4	17, 100	45	....	3	21, 908	29, 800	61, 500
Clothing, men's	2	100, 800	41	30	....	23, 300	35, 100	76, 500
Coffee and spices, roasted and ground	1	8, 000	4	....	....	1, 800	45, 000	50, 000
Cooperage	22	38, 825	112	....	3	43, 845	79, 015	139, 960
Files	1	7, 000	9	....	5	6, 264	10, 000	20, 000
Flouring- and grist-mill products	13	190, 900	57	....	....	21, 028	512, 034	558, 636
Foundery and machine-shop products	17	194, 520	233	....	2	123, 871	190, 729	406, 417

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MICHIGAN—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed: Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
SAGINAW—continued.								
Furniture (see also Upholstering)	6	$57,000	63	3	2	$27,298	$24,801	$73,300
Galvanizing	1	7,000	15			2,217	8,491	20,200
Leather, curried	2	11,667	7			3,295	52,675	65,675
Leather, tanned	3	27,333	17			8,105	54,100	76,850
Liquors, malt	7	101,000	33			16,165	69,759	124,280
Lumber, planed (see also Sash, doors, and blinds)	3	168,500	46		5	23,600	142,880	223,815
Lumber, sawed	83	2,578,900	1,474	4	202	505,360	3,282,130	4,778,439
Printing and publishing	7	34,000	56	2	12	28,357	18,410	47,700
Saddlery and harness	10	27,461	28	1	1	12,081	35,842	62,775
Salt	47	929,409	616		16	190,632	433,934	935,280
Salt, ground	1	7,000	7	7	6	5,000	19,000	30,000
Sash, doors, and blinds (see also Lumber, planed)	4	91,000	91		14	35,709	61,500	131,727
Shipbuilding	11	86,600	253			121,116	259,540	414,500
Slaughtering and meat-packing, not including retail butchering establishments.	2	30,000	13			4,660	180,075	209,620
Soap and candles	1	11,000	7			2,730	20,000	25,000
Tinware, copperware, and sheet-iron ware	15	23,720	39		2	14,262	23,470	48,450
Tobacco, cigars and cigarettes	10	16,956	50		18	18,271	27,998	61,614
Upholstering (see also Furniture)	1	5,000	9		1	5,000	12,000	20,000
Wooden ware	1	125,000	120		60	30,000	25,000	80,000
SAINT CLAIR:								
Boots and shoes	1	2,000	9	3		6,240	20,534	31,100
Brick and tile	6	27,085	57		7	11,636	6,510	26,978
Carriage and wagon materials	1	12,000	16			4,000	10,000	21,000
Carriages and wagons	4	13,700	27			11,200	16,700	36,000
Cheese and butter (factory)	11	11,350	12	3		1,810	12,855	20,126
Flouring- and grist-mill products	23	185,825	60			22,377	657,342	740,024
Foundery and machine-shop products	10	74,500	71		3	24,185	52,157	99,920
Leather, curried	2	18,334	5			1,900	16,375	20,175
Leather, tanned	2	36,666	11			3,800	31,700	49,200
Lime	2	10,000	6			1,700	16,000	20,000
Liquors, malt	6	58,500	13	1		4,790	20,657	36,726
Lumber, sawed	25	527,900	280	3	42	67,339	384,639	583,410
Saddlery and harness	3	9,200	15			8,300	40,850	54,000
Shipbuilding	13	74,400	145			64,413	66,152	155,061
Tinware, copperware, and sheet-iron ware	6	14,990	22			10,700	14,000	36,000
Woolen goods	3	21,500	10	3	2	3,700	13,643	20,325
SAINT JOSEPH:								
Agricultural implements	4	76,800	105			26,663	40,800	132,800
Carriages and wagons	7	39,400	45			16,035	19,500	54,335
Clothing, men's	7	8,600	15	6		7,900	9,700	25,220
Cooperage	7	8,400	29			7,195	12,370	23,000
Flouring- and grist-mill products	21	237,500	63			14,882	767,934	868,687
Furniture	7	65,400	43		5	15,307	39,550	68,800
Lumber, sawed	14	34,300	46			8,229	17,921	35,842
Oil, essential	46	19,480	79			5,567	20,543	67,251
Paper	3	237,000	65	7		17,293	71,020	119,061
Pumps, not including steam pumps	2	26,237	2			6,339	10,951	24,740
Saddlery and harness	15	15,650	21			5,544	25,515	44,900
Sash, doors, and blinds	5	27,700	28			9,200	21,700	39,000
Tinware, copperware, and sheet-iron ware	6	6,950	6			2,150	13,822	22,000
Tobacco, cigars and cigarettes	8	11,400	26	1		10,662	29,783	57,239
Wooden ware	1	10,000	75			30,000	9,000	60,000
SANILAC:								
Carriages and wagons	4	10,000	17			8,050	16,500	65,540
Flouring- and grist-mill products	10	50,900	32			11,925	224,375	273,483
Lumber, sawed	17	58,300	154	3	1	23,765	41,153	94,246
Saddlery and harness	3	4,500	8			2,900	12,800	57,000
SCHOOLCRAFT:								
Lumber, sawed	2	503,000	40			15,000	75,800	154,000
SHIAWASSEE:								
Carriages and wagons	7	18,000	28		3	10,475	15,500	35,000
Charcoal	1	4,000	10			5,000	12,000	40,000
Flouring- and grist-mill products	15	137,000	45			12,352	285,291	322,858
Foundery and machine-shop products	3	19,000	12			4,100	11,200	26,000
Furniture	6	106,700	139		2	46,920	67,296	152,946
Leather, curried	1	6,000	5			2,340	33,700	40,000
Leather, tanned	1	12,000	9			4,680	24,400	32,500
Lumber, sawed	22	88,800	131			26,061	67,600	125,380
Saddlery and harness	11	8,850	13			4,217	11,230	22,530
Sash, doors, and blinds	2	22,500	40			11,200	13,800	57,500
Tobacco, cigars and cigarettes	1	4,000	7	1		4,500	12,000	22,000
TUSCOLA:								
Cheese and butter (factory)	3	4,450	1			250	20,605	24,820
Flouring- and grist-mill products	12	59,000	31			20,360	251,647	312,553
Lumber, sawed	25	70,432	172	1	11	28,245	77,562	145,249
Saddlery and harness	6	10,100	9			3,431	10,900	24,200
Woolen goods	2	27,600	15	5	2	3,975	12,999	26,400

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MICHIGAN—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
VAN BUREN:								
Agricultural implements	4	$20, 500	39	....	....	$12, 000	$12, 035	$43, 735
Cooperage	9	12, 400	25	....	....	6, 280	14, 910	27, 500
Drugs and chemicals	1	18, 000	30	....	....	10, 800	14, 000	38, 172
Flouring- and grist-mill products	22	203, 100	60	....	....	18, 633	415, 822	486, 017
Iron and steel	2	300, 000	451	....	....	100, 967	300, 348	453, 152
Leather, tanned	1	20, 000	7	....	....	3, 000	33, 250	42, 000
Lumber, sawed	51	236, 100	408	....	6	93, 966	293, 990	509, 474
WASHTENAW:								
Agricultural implements	5	69, 000	76	....	6	23, 347	31, 319	81, 296
Boots and shoes	1	2, 500	15	5	....	9, 000	16, 000	29, 000
Bread and other bakery products	8	18, 100	17	2	1	7, 378	20, 296	39, 300
Carriages and wagons	9	54, 450	92	....	5	29, 304	46, 800	112, 850
Clothing, men's	7	11, 400	10	9	....	8, 473	10, 700	26, 570
Cooperage	9	20, 800	44	....	1	12, 175	31, 000	48, 700
Flouring- and grist-mill products	21	379, 600	82	....	....	30, 215	967, 538	1, 124, 954
Foundery and machine-shop products	5	41, 700	31	....	....	8, 000	21, 800	36, 600
Furniture	7	73, 300	107	....	14	36, 300	42, 600	96, 800
Housefurnishing goods	1	20, 000	25	....	....	8, 800	13, 000	25, 000
Leather, curried	5	15, 835	11	....	....	4, 968	53, 880	66, 900
Leather, tanned	5	31, 665	23	....	....	9, 932	38, 000	56, 200
Liquors, malt	4	57, 000	16	....	....	7, 473	32, 063	57, 207
Lumber, sawed	18	38, 700	49	....	....	6, 660	26, 823	47, 134
Malt	1	30, 000	7	....	....	3, 000	27, 000	33, 000
Marble and stone work	3	11, 850	27	....	....	10, 050	8, 096	25, 379
Paper	4	295, 000	124	79	....	68, 874	359, 269	488, 452
Printing and publishing	4	109, 200	33	10	2	26, 364	12, 563	52, 440
Saddlery and harness	9	31, 200	27	....	1	11, 105	16, 900	41, 650
Sash, doors, and blinds	6	38, 500	36	....	1	10, 622	43, 704	61, 000
Tinware, copperware, and sheet-iron ware	14	36, 100	34	....	2	13, 525	24, 900	56, 400
Woolen goods	5	108, 000	40	19	1	10, 100	57, 944	71, 828
WAYNE:								
Agricultural implements	3	14, 000	30	....	....	7, 700	7, 205	22, 895
Baking and yeast powders (see also Drugs and chemicals)	6	38, 000	33	10	3	17, 596	84, 800	141, 600
Baskets, rattan and willow ware	7	13, 100	22	9	7	13, 720	10, 325	32, 400
Billiard tables and materials	2	18, 000	17	....	....	11, 500	24, 000	42, 000
Boot and shoe uppers	3	7, 300	22	12	2	12, 150	20, 500	42, 200
Boots and shoes	4	276, 000	396	53	25	259, 432	542, 750	895, 000
Boxes, cigar	4	41, 000	30	25	29	23, 450	58, 000	103, 000
Boxes, fancy and paper	3	5, 900	6	30	1	10, 160	34, 500	58, 000
Boxes, wooden, packing	7	57, 600	189	....	37	68, 600	160, 500	260, 800
Brass castings	3	19, 500	60	....	1	22, 150	19, 271	50, 101
Bread and other bakery products	47	225, 400	229	12	35	146, 580	656, 389	930, 157
Brick and tile	24	190, 600	373	43	56	105, 232	64, 670	212, 220
Bridges	1	300, 000	194	....	96	75, 000	269, 050	357, 023
Brooms and brushes	11	39, 850	56	19	45	32. 878	73, 169	129, 463
Carriage and wagon materials	3	24, 200	41	....	....	12, 936	18, 850	41, 800
Carriage and wagons	25	220, 000	295	2	8	132, 145	180, 300	412, 720
Cars, railroad, street, and repairs	2	729, 896	764	....	16	400, 848	902, 111	1, 448, 756
Charcoal	13	14, 525	55	....	2	16, 542	27, 452	67, 874
Cheese and butter (factory)	4	9, 900	6	2	1	2, 950	29, 316	43, 424
Clothing, men's	33	966, 000	275	773	....	391, 926	1, 366, 716	2, 062, 182
Clothing, women's	3	12, 800	....	44	....	9, 280	8, 300	24, 100
Coffee and spices, roasted and ground	3	55, 000	27	6	1	16, 950	100, 000	145, 000
Confectionery	8	207, 200	93	72	5	63, 800	467, 400	584, 200
Cooperage	28	128, 100	219	....	29	79, 900	158, 700	292, 350
Corsets	4	46, 800	20	115	16	41, 450	111, 100	208, 500
Cutlery and edge tools (see also Hardware)	4	9, 000	14	....	2	7, 920	5, 270	20, 500
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	2	78, 000	47	20	15	21, 200	34, 000	208, 400
Emery wheels	1	20, 000	30	....	....	15, 000	35, 000	70, 000
Files (see also Saws)	1	10, 000	31	....	9	8, 000	8, 500	25, 000
Flouring- and grist-mill products	28	624, 000	161	....	....	73, 088	1, 742, 902	1, 992, 219
Foundery and machine-shop products	27	3, 370, 050	1, 622	....	102	704, 795	1, 192, 955	2, 466, 355
Furniture (see also Upholstering)	33	273, 800	308	18	78	136, 570	260, 132	508, 551
Gas machines and meters	1	75, 000	35	....	....	22, 000	20, 000	56, 000
Glass	1	65, 000	50	....	4	30, 000	35, 113	90, 000
Hardware (see also Cutlery and edge tools)	3	27, 000	55	....	7	18, 142	20, 300	49, 000
Hats and caps, not including wool hats	6	298, 000	100	133	1	73, 069	129, 400	293, 500
Hosiery and knit goods	1	35, 000	7	250	50	30, 009	60, 000	100, 000
Housefurnishing goods	1	4, 500	6	9	....	6, 000	10, 000	20, 000
Iron and steel	7	1, 547, 386	1, 088	....	7	436, 986	1, 872, 407	2, 498, 634
Iron bolts, nuts, washers, and rivets	1	100, 000	58	....	40	38, 030	188, 988	283, 947
Iron forgings	1	50, 000	50	....	15	36, 000	90, 000	150, 000
Jewelry	9	89, 302	56	....	4	40, 499	58, 251	135, 600
Leather, curried	7	104, 336	34	....	....	16, 088	233, 975	284, 118
Leather, tanned	11	538, 664	149	2	....	60, 993	503, 026	683, 696
Lime	4	95, 500	30	....	....	10, 440	18, 733	37, 555
Liquors, malt	29	1, 210, 120	304	4	1	151, 498	648, 612	1, 157, 609
Looking-glass and picture frames	13	252, 650	266	74	60	126, 472	217, 797	462, 669
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	1	10, 000	7	....	2	3, 900	2, 000	25, 000
Lumber, sawed	19	237, 032	187	....	36	44, 389	168, 585	304, 015
Marble and stone work	16	110, 100	173	....	9	109, 446	160, 300	348, 200

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MICHIGAN—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
WAYNE—continued.								
Matches	2	$260,000	95	205	75	$80,000	$130,000	$237,500
Musical instruments, organs and materials	1	100,000	100	....	25	50,000	60,000	160,000
Needles and pins	1	160,000	20	30	6	24,600	55,000	130,000
Patent medicines and compounds (see also Drugs and chemicals)	5	48,000	23	36	6	16,920	25,000	87,000
Perfumery and cosmetics	4	25,500	20	9	5	12,900	42,000	94,000
Printing and publishing	39	866,050	677	78	57	373,262	301,359	986,098
Refrigerators	2	10,500	15	....	1	10,880	10,600	26,200
Roofing and roofing materials	5	30,000	65	....	4	25,700	60,500	108,200
Saddlery and harness	29	40,600	72	1	6	34,145	53,100	123,700
Safes, doors, and vaults, fire-proof	1	195,000	150	....	....	55,600	95,000	165,400
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	16	262,500	340	....	68	149,725	280,350	556,500
Saws	1	30,000	12	....	4	9,100	30,900	50,000
Shipbuilding	19	290,700	959	....	....	487,005	611,462	1,215,475
Shirts	5	4,700	18	30	1	12,860	15,800	36,420
Show-cases	1	32,000	27	....	1	11,413	15,270	35,000
Slaughtering and meat-packing, not including retail butchering establishments.	7	485,000	137	....	10	79,067	1,413,426	1,721,231
Spectacles and eyeglasses	3	45,000	53	5	19	23,400	24,500	71,000
Stencils and brands	6	9,200	18	....	....	10,750	10,500	34,100
Telegraph and telephone apparatus	1	6,000	9	....	....	4,299	20,000	35,000
Tinware, copperware, and sheet-iron ware	49	114,150	145	....	24	70,231	105,725	241,200
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	6	545,000	238	175	130	126,725	964,554	1,519,146
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	58	453,700	723	102	74	310,828	572,080	1,196,870
Trunks and valises	3	35,500	78	....	12	44,142	82,758	145,900
Upholstering (see also Furniture)	5	52,200	67	5	9	28,115	112,400	172,400
Varnish	3	504,000	62	....	6	43,100	304,500	452,000
Window blinds and shades	2	13,000	12	20	1	10,750	13,250	31,500
Wirework	4	87,000	135	10	22	69,900	97,500	192,500
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	11	15,550	31	....	3	14,306	13,850	49,849
Woodenware	5	273,000	243	25	6	67,680	131,500	226,950
WEXFORD:								
Flouring- and grist-mill products	5	54,000	14	....	....	4,950	120,201	152,342
Lumber, sawed	18	672,400	341	....	4	123,925	550,498	946,150

MINNESOTA.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ANOKA:								
Flouring- and grist-mill products	4	$149,000	35	....	....	$24,930	$1,081,600	$1,218,965
Lumber, sawed	5	429,000	162	....	4	44,856	235,150	431,500
BECKER:								
Flouring- and grist-mill products	4	96,000	17	....	....	10,825	141,285	169,890
Lumber, sawed	2	27,000	14	....	....	7,200	17,000	28,750
BLUE EARTH:								
Brick and tile	4	42,500	64	....	18	21,850	10,500	47,500
Carriages and wagons	2	16,500	17	....	....	7,950	10,500	23,000
Clothing, men's	7	20,600	18	....	....	10,550	16,700	34,500
Flouring- and grist-mill products	18	260,500	75	....	....	26,075	496,838	594,668
Foundery and machine-shop products	2	25,400	16	....	....	6,200	12,600	21,500
Furniture	3	20,000	19	....	....	7,341	10,750	22,750
Liquors, malt	4	37,000	10	....	....	3,999	17,272	30,762
Lumber, sawed	14	33,450	39	1	....	7,540	34,022	61,875
Oil, linseed	1	150,000	30	....	....	15,000	127,000	152,000
Saddlery and harness	9	23,800	18	....	....	6,515	16,135	31,251
BROWN:								
Flouring- and grist-mill products	7	119,000	55	....	....	23,784	332,285	397,419
Liquors, malt	5	39,000	18	1	3	7,091	30,263	53,992
CARLTON:								
Lumber, sawed	5	148,000	113	....	....	42,500	169,200	271,500
CARVER:								
Agricultural implements	2	14,000	16	....	....	6,212	28,000	44,428
Brick and tile	6	37,000	116	....	39	25,800	13,235	67,700
Flouring- and grist-mill products	8	78,000	40	....	....	11,692	172,595	200,104
Liquors, malt	6	35,500	16	....	....	4,273	18,325	32,592
CASS:								
Lumber, sawed	1	115,000	40	....	....	16,000	75,000	108,300
CHISAGO:								
Flouring- and grist-mill products	5	39,000	7	....	....	3,600	106,004	126,445
Lumber, sawed	8	64,500	39	....	....	11,456	37,530	68,950
CLAY:								
Brick and tile	2	22,000	25	....	....	5,000	4,800	25,000
Flouring- and grist-mill products	3	45,000	18	....	....	9,580	103,260	131,000
Liquors, malt	1	15,000	12	....	....	5,608	24,206	42,968
COTTONWOOD:								
Flouring- and grist-mill products	4	40,000	16	....	....	4,613	56,136	73,114

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MINNESOTA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
DAKOTA:								
Carriages and wagons	2	$10,000	20			$6,600	$13,000	$27,000
Flouring- and grist-mill products	8	277,000	101			34,220	637,850	716,475
Lumber, sawed	2	64,000	36			8,500	50,700	65,000
Saddlery and harness	2	5,750	9			4,500	13,000	24,000
DODGE:								
Flouring- and grist-mill products	7	59,000	12			3,400	112,905	124,442
DOUGLAS:								
Flouring- and grist-mill products	4	26,000	12			5,763	102,180	115,820
FARIBAULT:								
Cooperage	2	2,200	21			7,000	12,000	24,600
Flouring- and grist-mill products	8	80,500	32			14,710	343,115	364,932
Pumps, not including steam pumps	1	2,500	12			5,362	5,200	20,000
Vinegar	1	15,000	8			4,000	10,000	40,000
FILLMORE:								
Cooperage	7	5,900	58			19,690	59,000	87,300
Flouring- and grist-mill products	27	649,400	127			57,864	983,768	1,081,993
Saddlery and harness	9	9,875	10			4,915	14,775	28,470
FREEBORN:								
Flouring- and grist-mill products	4	31,000	11			5,460	115,500	134,492
GOODHUE:								
Boots and shoes	1	50,000	65	3		30,000	75,000	116,000
Carriages and wagons	2	30,000	24			11,240	13,000	29,000
Cooperage	3	11,300	32			15,500	20,500	47,000
Flouring- and grist-mill products	22	451,200	142			68,220	1,358,998	1,537,854
Furniture	2	58,500	29			9,775	8,500	21,000
Leather, curried	3	18,300	18			9,160	92,020	110,985
Leather, tanned	3	18,300	18			9,160	70,438	87,000
Lime	4	22,500	26			8,752	11,500	28,100
Liquors, malt	4	69,000	15			4,875	18,479	32,852
Lumber, sawed	4	158,000	70		8	18,450	71,397	105,225
Saddlery and harness	12	20,150	22			10,375	26,450	46,500
Sash, doors, and blinds	2	27,500	35		2	15,700	4,000	29,000
Stone- and earthen-ware	1	25,000	20			10,000	8,300	26,000
Tinware, copperware, and sheet-iron ware	8	21,300	17			8,700	18,500	36,500
HENNEPIN:								
Agricultural implements	3	463,657	245			98,000	200,000	550,500
Bags, other than paper	1	2,000	4	1		1,200	20,000	24,000
Bookbinding and blank-book making	2	6,500	12	10		9,700	15,500	30,000
Boots and shoes	1	140,000	50	4		38,600	96,500	160,000
Bread and other bakery products	7	38,300	44	10	1	19,250	139,960	185,355
Brick and tile	11	36,900	155			49,700	18,400	96,300
Carriages and wagons	13	40,100	102			56,930	78,300	174,700
Clothing, men's	25	105,675	190	40	5	118,150	197,750	386,700
Coffee and spices, roasted and ground	2	7,000	5			2,375	20,700	27,000
Cooperage	12	69,000	307		35	157,614	245,954	470,932
Cotton goods	1	5,000	4	12	6	6,400	30,000	40,000
Fertilizers	1	50,000	18			8,424	89,500	100,000
Flavoring extracts	1	6,000	3	1		2,500	14,000	20,000
Flouring- and grist-mill products	41	4,051,500	792			580,804	19,769,672	21,330,272
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	17	514,700	408			212,000	468,140	861,283
Furnishing goods, men's	1	75,000	50	160		50,000	100,000	175,000
Furniture (see also Mattresses and spring beds)	14	126,300	190	2	1	88,450	125,000	273,000
Furs, dressed	4	7,700	3	16		3,960	15,200	25,800
Gloves and mittens (see also Woolen goods)	2	11,500	10	26	1	14,250	16,000	35,000
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	1	8,000	15			6,000	15,000	50,000
Leather, dressed skins	1	10,000	18			4,500	50,000	60,000
Liquors, malt	4	205,000	64	1		28,083	120,870	215,678
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	6	66,500	81			32,742	49,950	131,577
Lumber, sawed	18	2,445,000	885	13	30	376,100	1,662,005	2,762,348
Marble and stone work	5	16,300	40			17,050	22,300	53,000
Mattresses and spring beds (see also Furniture)	3	9,000	17	3		7,000	17,500	37,000
Mineral and soda waters	5	10,600	14			5,400	12,300	23,200
Oil, linseed	1	60,000	30			15,000	150,000	200,000
Paper	2	310,000	61	22		34,000	118,150	183,900
Printing and publishing	14	142,000	196	10	13	123,900	140,000	321,500
Pumps, not including steam pumps	3	5,500	17			7,500	12,000	24,500
Saddlery and harness	14	36,950	71			33,560	55,100	118,400
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	5	201,000	246		35	112,746	374,000	601,193
Shirts	2	9,000	6	31		11,000	24,000	45,000
Slaughtering and meat-packing, not including retail butchering establishments.	5	45,000	41		2	15,200	225,983	312,785
Soap and candles	2	70,000	19	9		9,250	62,000	102,500
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	10,000	10			10,000	10,000	30,000
Tinware, copperware, and sheet-iron ware	21	37,200	88			42,870	87,175	174,300
Tobacco, cigars and cigarettes	5	12,650	28			16,350	19,400	52,700
Trunks and valises	2	12,500	14			7,500	15,000	26,000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	2	10,150	21			6,150	11,000	21,000
Woolen goods	2	141,000	66	60	49	38,058	106,171	182,317
HOUSTON:								
Flouring- and grist-mill products	22	247,050	35			13,771	608,532	716,536
Lumber, sawed	3	11,600	9	2		4,100	18,550	29,400

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MINNESOTA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
LE SUEUR:								
Flouring- and grist-mill products	10	$82, 500	30	....	....	$11, 075	$266, 825	$[illegible]04, 725
Lumber, sawed	22	58, 900	65	....	....	13, 8[illegible]0	74, 210	127, 950
LYON:								
Flouring- and grist-mill products	4	24, 500	7	....	....	2, 430	77, 385	81, 669
Saddlery and harness	3	4, 700	8	....	....	2, 800	14, 000	24, 000
McLEOD:								
Flouring- and grist-mill products	6	43, 500	9	....	....	3, 550	84, 200	101, 219
MEEKER:								
Flouring- and grist-mill products	8	155, 500	35	....	....	14, 850	275, 597	31[illegible], 791
Lumber, sawed	6	12, 800	15	....	....	2, 470	15, 525	25, 800
MORRISON:								
Flouring- and grist-mill products	3	20, 500	5	....	....	1, 518	36, 288	44, 633
Lumber, sawed	10	57, 300	30	2	3	8, 456	39, 875	70, 565
MOWER:								
Flouring- and grist-mill products	9	127, 000	28	....	....	13, 443	224, 581	264, 059
NICOLLET:								
Flouring- and grist-mill products	5	38, 000	19	....	....	7, 005	181, 109	214, 177
OLMSTED:								
Agricultural implements	3	29, 000	30	....	....	9, 800	5, 160	25, 100
Carriages and wagons	2	28, 000	23	....	....	8, 000	12, 000	30, 000
Clothing, men's	3	7, 000	12	2	....	6, 680	12, 890	23, 568
Flouring- and grist-mill products	12	174, 900	52	....	....	15, 975	376, 515	415, 798
Foundery and machine-shop products	5	46, 000	26	....	....	8, 300	8, 750	26, 000
Saddlery and harness	7	12, 651	15	....	....	6, 250	21, 100	36, 200
Tinware, copperware, and sheet-iron ware	3	8, 000	13	....	....	7, 100	17, 500	33, 000
Woolen goods	1	4, 000	7	....	....	1, 500	13, 972	20, 000
OTTER TAIL:								
Flouring- and grist mill products	9	110, 862	28	....	....	13, 065	237, 595	295, 234
Lumber, sawed	12	157, 100	64	....	4	16, 080	91, 835	131, 905
PINE:								
Lumber, sawed	6	55, 500	78	....	....	18, 900	87, 800	143, 000
POLK:								
Flouring- and grist-mill products	3	30, 500	17	....	....	7, 152	102, 025	114, 600
RAMSEY:								
Agricultural implements	3	803, 000	220	1	....	94, 616	145, 807	630, 190
Awnings and tents	3	11, 750	8	19	4	7, 760	96, 000	129, 900
Bookbinding and blank-book making	4	43, 500	32	17	8	25, 541	17, 769	68, 941
Boot and shoe uppers	1	10, 000	2	3	....	2, 650	25, 000	40, 000
Boots and shoes	2	265, 000	236	17	21	136, 118	396, 144	646, 192
Brass castings	2	13, 000	13	....	....	7, 006	28, 178	40, 25[illegible]
Bread and other bakery products	20	64, 800	52	1	4	28, 095	171, 990	246, 80[illegible]
Brick and tile	5	13, 000	74	....	2	15, 322	8, 027	32, 200
Brooms and brushes	4	6, 500	12	1	....	7, 100	13, 600	29, 600
Carriages and wagons	6	103, 000	105	....	....	57, 760	82, 500	200, 0[illegible]
Clothing, men's	22	264, 500	154	485	3	210, 490	553, 050	974, 200
Clothing, women's	9	31, 200	1	80	....	24, 100	93, 350	147, 900
Coffee and spices, roasted and ground	4	106, 500	11	6	9	11, 350	107, 750	153, 500
Confectionery	9	63, 000	41	5	1	23, 010	108, 459	156, 970
Drugs and chemicals (see also Patent medicines and compounds)	5	13, 050	9	....	....	3, 800	16, 500	35, 300
Flouring- and grist-mill products	7	143, 500	40	....	....	17, 464	461, 018	540, 927
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	9	104, 650	213	....	....	119, 750	239, 700	416, 500
Furnishing goods, men's	1	75, 000	24	276	10	88, 350	218, 090	324, 250
Furniture	13	75, 050	54	....	....	30, 096	60, 775	132, 150
Furs, dressed	5	120, 600	27	50	2	36, 810	163, 550	344, 000
Housefurnishing goods	5	108, 000	44	25	1	35, 740	321, 467	510, 270
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	2	11, 599	45	....	....	21, 500	26, 000	58, 117
Liquors, malt	11	371, 500	95	4	2	38, 960	1[illegible]7, 542	298, 972
Lithographing (see also Printing and publishing)	3	14, 000	14	1	1	9, 785	19, 657	37, 525
Lumber, planed (see also Sash, doors, and blinds)	4	48, 000	44	....	....	24, 150	80, 000	128, 500
Malt	4	30, 500	18	....	....	9, 485	49, 300	74, 000
Marble and stone work	12	37, 500	67	....	....	39, 100	32, 555	90, 975
Millinery and lace goods	3	13, 500	....	34	....	9, 500	33, 000	60, 500
Mineral and soda waters	3	7, 000	12	....	....	4, 436	7, 500	2[illegible], 0[illegible]
Patent medicines and compounds (see also Drugs and chemicals)	5	14, 900	6	5	2	3, 038	6, 000	24, 0[illegible]0
Printing and publishing (see also Lithographing)	19	502, 000	261	13	82	222, 384	146, 959	527, 764
Saddlery and harness	11	31, 193	54	....	2	28, 783	83, 760	147, 191
Sash, doors, and blinds (see also Lumber, planed)	2	33, 000	31	1	3	10, 600	25, 800	4[illegible], 690
Shirts	4	4, 700	4	32	...	10, 800	4, 700	22, 500
Slaughtering and meat-packing, not including retail butchering establishments.	5	165, 000	31	....	2	17, 100	371, 050	429, 747
Soap and candles	2	21, 000	11	....	....	4, 800	9, 500	24, 840
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	6, 000	22	....	....	15, 000	25, 000	60, 000
Tinware, copperware, and sheet-iron ware	20	30, 356	62	....	4	36, 5[illegible]9	91, 464	167, 593
Tobacco, cigars and cigarettes	27	79, 212	116	2	32	[illegible]4, 778	147, 600	258, 674
Trunks and valises	2	10, 000	27	....	5	19, 000	24, 000	70, 000
RENVILLE:								
Flouring- and grist mill products	5	48, 400	27	....	....	6, 700	178, 540	209, 847

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MINNESOTA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
RICE:								
Carriages and wagons	2	$10, 000	12			$7, 800	$10, 120	$27, 417
Clothing, men's	8	9, 000	21	4	5	6, 433	14, 247	23, 897
Cooperage	7	59, 600	57			25, 322	49, 175	83, 603
Flouring- and grist-mill products	18	638, 000	130			61, 471	1, 912, 345	2, 313, 054
Foundery and machine-shop products	4	22, 200	23			15, 850	28, 200	67, 400
Furniture	3	35, 600	51			22, 900	11, 600	40, 500
Liquors, malt	4	37, 100	11		5	4, 664	20, 170	35, 726
Lumber, sawed	9	27, 000	25			4, 718	23, 330	43, 690
Saddlery and harness	11	13, 450	19			6, 595	18, 950	32, 500
Sash, doors, and blinds	2	12, 000	17			7, 750	11, 000	24, 000
Tinware, copperware, and sheet-iron ware	10	8, 900	19			7, 638	15, 200	36, 744
SAINT LOUIS:								
Leather, curried	1	6, 000	5			3, 000	20, 600	25, 200
Lumber, sawed	4	65, 000	51			16, 200	56, 300	105, 200
SCOTT:								
Cooperage	4	51, 700	28		4	16, 675	47, 800	71, 800
Flouring- and grist-mill products	10	191, 000	78			40, 220	836, 125	959, 770
Liquors, malt	6	62, 000	23	1		7, 886	33, 968	60, 529
SHERBURNE:								
Flouring- and grist-mill products	1	50, 000	10			5, 000	100, 000	150, 000
Lumber, sawed	3	36, 000	20		11	4, 900	18, 500	31, 000
SIBLEY:								
Flouring- and grist-mill products	2	40, 000	17			9, 950	156, 884	192, 617
STEARNS:								
Carriages and wagons	3	14, 600	17			8, 900	9, 900	30, 500
Flouring- and grist-mill products	15	189, 800	65			23, 415	492, 332	571, 819
Foundery and machine-shop products	2	25, 000	24			10, 500	11, 000	30, 000
Liquors, malt	8	58, 500	29	1		7, 281	31, 159	55, 526
Lumber, sawed	14	48, 850	55		2	13, 290	66, 500	123, 200
Printing and publishing	3	17, 000	12			4, 300	6, 800	20, 500
Saddlery and harness	6	9, 200	14			5, 700	11, 800	24, 000
Sash, doors, and blinds	4	40, 200	34			15, 400	20, 500	50, 200
STEELE:								
Cooperage	4	5, 600	20			8, 440	14, 860	26, 400
Flouring- and grist-mill products	7	123, 000	34			19, 460	393, 812	477, 880
Saddlery and harness	7	13, 450	13			5, 990	17, 450	27, 200
SWIFT:								
Flouring- and grist-mill products	4	48, 000	15			4, 280	116, 650	140, 282
TODD:								
Flouring- and grist-mill products	4	23, 000	11			4, 200	67, 350	81, 210
Lumber, sawed	9	23, 575	21	2		3, 642	18, 415	31, 275
WABASHA:								
Carriages and wagons	4	34, 000	29			14, 550	24, 500	54, 000
Flouring- and grist-mill products	14	268, 000	85			36, 760	954, 840	1, 117, 814
Liquors, malt	6	38, 000	12			3, 210	13, 774	24, 548
Lumber, sawed	2	22, 000	23			7, 566	38, 413	56, 069
WASECA:								
Cooperage	4	8, 800	24		2	8, 888	10, 435	24, 838
Flouring- and grist-mill products	6	160, 000	53			17, 848	406, 955	459, 054
WASHINGTON:								
Agricultural implements	2	910, 000	607			267, 800	556, 000	990, 000
Brick and tile	2	7, 500	29			7, 100	4, 800	20, 500
Carriages and wagons	3	21, 000	24			10, 500	25, 500	49, 000
Clothing, men's	6	13, 500	20	1		10, 100	18, 400	38, 700
Cooperage	3	10, 700	36			18, 540	32, 450	56, 700
Flouring- and grist-mill products	9	246, 500	78			47, 781	904, 910	1, 054, 320
Foundery and machine-shop products	4	55, 000	36			18, 800	54, 000	87, 000
Liquors, malt	3	66, 500	14			6, 280	27, 136	48, 279
Lumber, planed (see also Sash, doors, and blinds)	4	82, 000	110			56, 800	106, 000	176, 000
Lumber, sawed	9	1, 505, 000	518		35	176, 500	1, 031, 250	1, 533, 780
Printing and publishing	4	24, 500	12	4	1	5, 670	10, 520	27, 500
Saddlery and harness	5	14, 500	24			12, 050	21, 400	44, 000
Sash, doors, and blinds (see also Lumber, planed)	1	50, 000	18		2	15, 000	40, 000	60, 000
Slaughtering and meat-packing, not including retail butchering establishments.	2	20, 000	20			9, 400	119, 120	145, 000
Tinware, copperware, and sheet-iron ware	4	14, 500	20			13, 800	24, 000	51, 500
WINONA:								
Brick and tile	6	34, 450	55		3	9, 850	5, 325	24, 800
Carriages and wagons	5	79, 100	64			13, 300	10, 500	31, 600
Clothing, men's	7	8, 350	26	1	1	8, 850	8, 775	30, 300
Cooperage	4	50, 200	56			24, 850	41, 000	77, 550
Flouring- and grist-mill products	20	340, 000	106			44, 700	866, 830	925, 829
Liquors, malt	4	67, 500	19		1	7, 880	33, 992	60, 587
Lumber, planed (see also Sash, doors, and blinds)	1	150, 000	35			12, 000	150, 000	200, 000
Lumber, sawed	3	1, 003, 500	181			70, 100	452, 520	750, 800
Printing and publishing	3	22, 845	25	1	8	15, 200	6, 625	29, 000
Saddlery and harness	11	34, 350	27			10, 480	25, 950	51, 500
Sash, doors, and blinds (see also Lumber, planed)	4	142, 500	142			67, 000	235, 000	478, 000
Tobacco, cigars and cigarettes	4	21, 700	22		4	15, 580	10, 000	43, 500

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MINNESOTA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
WRIGHT:								
Flouring- and grist-mill products	7	$81,600	24			$10,595	$315,241	$382,483
Lumber, sawed	20	45,245	47	2	1	7,223	41,989	66,946
YELLOW MEDICINE:								
Flouring- and grist-mill products	3	56,000	9			4,400	109,230	165,970

MISSISSIPPI.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ADAMS:								
Bread and other bakery products	3	$11,000	28	2	2	$8,760	$12,215	$36,450
Cotton goods	2	255,000	34	50	20	24,509	96,482	145,488
Lumber, sawed	2	51,800	15		4	4,200	44,400	63,500
Oil, cottonseed and cake	1	32,000	70			18,000	76,000	105,000
Printing and publishing	3	12,800	24			9,400	6,450	24,500
Tinware, copperware, and sheet-iron ware	4	10,600	16			7,800	16,150	31,500
ALCORN:								
Lumber, planed	2	5,200	6		5	1,560	20,200	25,600
Lumber, sawed	7	11,700	31		3	4,300	27,887	40,500
ATTALA:								
Flouring- and grist-mill products	24	31,020	44			5,445	57,038	66,764
Lumber, sawed	12	22,350	31			2,800	18,000	30,750
CHICKASAW:								
Flouring- and grist-mill products	10	24,950	30			4,355	77,285	85,987
CLARKE:								
Cotton goods	1	79,140	26	47	27	14,023	47,587	68,309
Flouring- and grist-mill products	11	20,100	17			2,508	36,534	44,417
Lumber, sawed	6	18,000	31			4,940	33,930	54,400
COPIAH:								
Cotton goods	1	700,000	86	178	137	78,755	158,928	400,000
Flouring- and grist-mill products	18	21,450	24			1,920	28,981	32,289
Lumber, sawed	12	34,500	51		2	9,365	52,174	91,200
Woolen goods	1	230,000	54	54	34	35,000	139,866	211,825
HARRISON:								
Lumber, sawed	12	76,450	84		8	17,700	122,910	197,150
HINDS:								
Foundery and machine-shop products	2	95,000	54		1	13,183	17,276	50,000
Oil, cottonseed and cake	1	60,000	33		2	6,250	35,000	50,000
Printing and publishing	2	35,000	33		2	12,000	12,000	29,000
JACKSON:								
Lumber, sawed	9	64,000	73		2	32,000	219,300	308,960
LAUDERDALE:								
Agricultural implements	1	6,700	18			5,200	12,750	20,450
Flouring- and grist-mill products	17	33,000	32			5,623	118,018	130,164
Lumber, sawed	7	18,000	24			2,850	18,065	28,695
Oil, cottonseed and cake	1	70,000	100			9,000	70,000	110,000
Sash, doors, and blinds	1	10,000	25			9,150	10,000	25,000
Woolen goods	1	25,000	14	7	2	3,300	33,900	38,830
LINCOLN:								
Lumber, sawed	15	129,300	93			16,360	103,745	167,465
LOWNDES:								
Carriages and wagons	2	23,000	25			8,000	13,000	28,000
Flouring- and grist-mill products	15	36,600	38			3,554	55,223	71,436
Oil, cottonseed and cake	1	75,000	68	2		12,860	40,000	65,000
Saddlery and harness	2	11,000	10			3,500	10,000	22,000
MARSHALL:								
Carriages and wagons	3	68,500	32		5	14,280	17,200	53,000
Flouring- and grist-mill products	16	36,175	22			3,515	55,682	61,517
MONROE:								
Flouring- and grist-mill products	17	45,800	38			6,325	69,435	79,525
Lumber, sawed	3	19,500	8			2,900	15,200	28,000
NOXUBEE:								
Cotton goods	1	30,000	6	6	5	2,500	16,300	35,650
Flouring- and grist-mill products	17	47,800	39			4,740	98,795	111,372
Lumber, sawed	6	17,000	23		4	3,024	16,662	26,270
PIKE:								
Lumber, sawed	5	37,500	28		8	7,050	36,910	80,200
WARREN:								
Brick and tile	3	9,000	29		7	12,240	2,350	21,080
Carriages and wagons	2	7,000	19			11,160	14,000	34,000
Foundery and machine-shop products	4	13,800	37		5	31,935	33,400	79,500
Lumber, sawed	2	30,000	27			8,500	63,500	79,199
Marble and stone work	3	1,900	7			4,600	7,600	20,500
Printing and publishing	4	44,700	64			36,696	16,361	80,000
Saddlery and harness	4	29,700	11			7,145	21,900	50,000
Tinware, copperware, and sheet-iron ware	2	29,000	16		2	13,330	21,000	45,000

Table V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MISSISSIPPI—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Washington:								
Lumber, sawed	3	$8,000	24	...	...	$6,700	$21,710	$48,000
Oil, cottonseed and cake	2	130,000	80	...	60	30,000	79,080	128,563
Wayne:								
Flouring- and grist-mill products	6	5,400	9	...	...	1,200	32,230	36,733
Lumber, sawed	5	13,300	34	...	...	9,500	31,825	55,500
Tar and turpentine, not including farm products	11	18,500	47	6	...	13,510	59,650	97,000
Yazoo:								
Flouring- and grist-mill products	6	7,500	15	...	...	1,476	16,563	20,000
Lumber, sawed	1	10,000	10	...	...	4,000	14,000	21,500
Oil, cottonseed and cake	1	45,000	39	1	...	3,750	26,000	36,000

MISSOURI.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Adair:								
Flouring- and grist-mill products	3	$19,300	12	...	...	$3,390	$64,420	$85,155
Lumber, sawed	13	34,600	69	...	11	11,630	60,195	96,980
Saddlery and harness	2	8,000	8	...	2	4,000	10,500	22,000
Andrew:								
Flouring- and grist-mill products	12	90,000	31	...	...	7,954	236,389	258,783
Lumber, sawed	12	16,950	42	...	...	5,150	33,250	64,535
Slaughtering and meat-packing, not including retail butchering establishments.	1	9,000	30	...	3	400	19,800	20,200
Audrain:								
Flouring- and grist-mill products	3	47,000	19	...	...	6,000	118,720	140,955
Saddlery and harness	3	11,200	12	...	...	4,620	11,000	20,000
Woolen goods	1	35,000	25	4	7	7,500	73,900	90,000
Atchison:								
Flouring- and grist-mill products	6	34,300	14	...	...	3,779	64,441	74,836
Lumber, sawed	9	11,400	28	...	...	3,400	18,215	31,250
Barton:								
Flouring- and grist-mill products	2	12,000	10	...	...	3,200	62,100	74,100
Lumber, sawed	4	5,600	16	...	...	2,170	15,812	22,724
Bates:								
Flouring- and grist-mill products	6	29,900	27	...	...	8,130	161,210	189,479
Lumber, sawed	17	24,450	57	...	...	10,672	51,394	84,562
Benton:								
Flouring- and grist-mill products	6	24,000	16	...	...	4,050	90,010	103,646
Bollinger:								
Flouring- and grist-mill products	9	20,600	23	...	...	4,408	72,920	84,470
Lumber, sawed	7	53,400	69	...	...	13,468	45,390	74,115
Boone:								
Carriages and wagons	2	2,150	17	...	...	6,133	12,855	20,072
Flouring- and grist-mill products	11	143,500	53	...	...	13,080	429,280	469,950
Lumber, sawed	11	24,400	54	...	...	7,430	47,570	80,225
Saddlery and harness	6	7,356	12	...	...	4,016	13,175	21,100
Buchanan:								
Baking and yeast powders (see also Drugs and chemicals)	1	3,000	4	...	...	2,000	7,500	20,000
Boots and shoes	3	47,000	54	10	...	35,000	80,930	136,200
Boxes, wooden, packing	3	13,500	22	...	1	13,825	36,300	68,000
Bread and other bakery products	2	43,000	57	6	...	26,760	173,000	255,000
Brick and tile	14	45,810	255	...	77	85,635	52,110	177,380
Carriages and wagons	9	22,800	52	...	3	26,716	25,500	67,850
Clothing, men's	14	17,350	39	14	...	19,350	46,000	88,150
Coffee and spices, roasted and ground	1	10,000	5	...	...	2,250	25,000	30,000
Confectionery	2	2,500	6	...	...	2,600	35,000	42,000
Cooperage	10	23,150	79	...	4	33,212	59,500	110,200
Drugs and chemicals (see also Baking and yeast powders)	3	22,850	9	5	2	5,190	11,625	46,500
Flouring- and grist-mill products	15	202,500	77	...	...	29,885	624,168	718,299
Foundery and machine-shop products	2	29,500	48	...	...	23,956	40,238	73,616
Fruits and vegetables, canned and preserved	1	12,500	23	...	...	4,000	25,000	32,006
Furniture	4	73,350	106	...	3	49,300	23,100	96,75[illegible]
Liquors, malt	5	200,000	44	...	...	21,492	92,582	165,325
Lumber, planed	1	10,000	50	...	1	21,329	150,000	200,000
Lumber, sawed	11	27,700	44	...	1	8,050	46,010	71,500
Marble and stone work	4	68,000	77	...	1	35,600	35,500	87,500
Mineral and soda waters	2	20,000	14	...	...	4,800	33,000	47,000
Printing and publishing	8	129,500	112	...	11	85,040	69,708	194,250
Saddlery and harness	9	81,550	84	...	5	52,096	164,585	276,400
Slaughtering and meat-packing, not including retail butchering establishments.	7	359,500	655	...	34	188,290	3,907,208	4,499,163
Tinware, copperware, and sheet-iron ware	10	37,700	63	...	...	30,925	83,200	139,700
Tobacco, cigars and cigarettes	12	20,950	53	5	5	27,397	60,291	118,340
Vinegar	2	13,000	8	...	5	4,700	9,500	35,000
Woolen goods	1	125,000	80	15	5	21,600	97,800	125,300
Butler:								
Flouring- and grist-mill products	3	9,100	2	...	...	374	25,640	29,624
Lumber, sawed	10	34,000	100	...	1	21,885	112,900	170,400

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MISSOURI—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
CALDWELL:								
Flouring- and grist-mill products	5	$47, 000	19			$5, 615	$103, 375	$117, 590
Lumber, sawed	11	22, 800	38			6, 320	30, 390	50, 050
CALLOWAY:								
Flouring- and grist-mill products	13	50, 050	27			8, 690	162, 585	195, 356
Lumber, sawed	12	25, 700	26			3, 912	23, 292	36, 804
CAPE GIRARDEAU:								
Cooperage	22	18, 225	53			19, 275	20, 375	53, 820
Flouring- and grist-mill products	17	242, 150	110			29, 539	646, 366	713, 904
Liquors, malt	4	34, 000	12			2, 943	12, 676	22, 635
Lumber, sawed	21	67, 700	72		10	11, 095	48, 765	84, 554
Slaughtering and meat-packing, not including retail butchering establishments.	6	6, 300	10			1, 055	31, 358	36, 652
Woolen goods	2	72, 000	28	3	7	9, 500	36, 577	63, 577
CARROLL:								
Flouring- and grist-mill products	9	77, 500	29			9, 078	178, 480	209, 626
Lumber, sawed	8	15, 400	31			3, 313	18, 640	31, 530
CASS:								
Flouring- and grist-mill products	11	97, 500	66			25, 240	304, 632	389, 776
Woolen goods	2	40, 000	12	8		3, 000	27, 124	31, 512
CHARITON:								
Flouring- and grist-mill products	9	41, 200	22			3, 986	62, 905	80, 813
Lumber, sawed	13	32, 150	45		1	5, 692	34, 090	55, 700
CLAY:								
Flouring- and grist-mill products	10	42, 400	37			6, 668	174, 339	203, 873
Lumber, sawed	11	20, 150	54			9, 220	55, 997	85, 000
Woolen goods	2	39, 000	19	11	1	4, 775	22, 142	29, 300
CLINTON:								
Carriages and wagons	4	8, 000	26			10, 945	6, 200	25, 000
Flouring- and grist-mill products	7	33, 200	18			2, 883	57, 791	69, 361
Lumber, sawed	6	9, 800	20		2	2, 550	16, 740	31, 250
Saddlery and harness	3	7, 000	8			3, 235	8, 000	21, 300
COOPER:								
Carriages and wagons	4	15, 500	20			8, 820	17, 980	43, 000
Flouring- and grist-mill products	10	103, 000	38			9, 171	233, 040	271, 693
Lumber, sawed	7	64, 700	92		25	15, 550	89, 390	143, 395
Stone- and earthen-ware	3	10, 600	31		2	12, 900	5, 400	30, 500
Tobacco, chewing, smoking, and snuff	1	35, 500	14		8	8, 900	16, 500	32, 000
COLE:								
Boots and shoes	3	93, 400	365			75, 050	380, 831	548, 778
Brooms and brushes	1	5, 000	40			6, 000	10, 000	20, 000
Flouring- and grist-mill products	7	103, 000	33			12, 727	416, 030	454, 323
Leather, curried	1	10, 000	23			5, 300	22, 500	35, 000
Leather, tanned	1	5, 000	17			2, 700	13, 250	21, 000
Liquors, malt	2	52, 000	12			3, 579	16, 999	29, 822
Printing and publishing	3	22, [illegible]00	54	25		19, 940	34, 250	62, 500
Saddlery and harness	5	76, 200	328	5		55, 390	295 000	395, 500
CRAWFORD:								
Flouring- and grist-mill products	10	17, 600	21			2, 255	58, 567	64, 662
Iron and steel	2	400, 000	675		25	54, 000	275, 000	510, 000
DAVIESS:								
Flouring- and grist-mill products	6	67, 000	23			7, 160	146, 548	160, 078
Lumber, sawed	16	22, 040	56		1	11, 740	75, 288	131, 270
Saddlery and harness	8	4, 722	13			3, 580	8, 990	20, 260
FRANKLIN:								
Boxes, wooden, packing	1	10, 000	22		2	9, 000	20, 000	30, 000
Flouring- and grist-mill products	18	172, 800	65			18, 970	577, 278	638, 981
Lumber, sawed	12	19, 400	24		1	2, 414	12, 967	22, 833
GASCONADE:								
Flouring- and grist-mill products	8	51, 000	16			1, 672	142, 486	159, 645
Liquors, vinous	2	76, 500	13			3, 700	40, 950	52, 000
GENTRY:								
Flouring- and grist-mill products	7	20, 050	19			3, 005	89, 485	97, 861
Lumber, sawed	23	34, 200	56		5	9, 745	58, 270	94, 989
GREENE:								
Agricultural implements	1	45, 000	23			10, 027	11, 448	25, 000
Carriages and wagons	4	38, 600	41		10	23, 800	57, 500	116, 400
Cotton goods	1	65, 000	17	36	19	12, 755	41, 750	71, 285
Flouring- and grist-mill products	13	59, 850	30			6, 915	133, 716	147, 341
Saddlery and harness	3	9, 700	13			7, 450	16, 000	30, 000
Tobacco, cigars and cigarettes	3	6, 000	26	1	2	14, 472	12, 993	44, 000
Woolen goods	1	40, 000	11	11	6	6, 000	29, 400	35, 000
GRUNDY:								
Flouring- and grist-mill products	7	45, 000	17			4, 147	97, 212	113, 012
Lumber, sawed	11	16, 000	36			6, 947	28, 391	60, 700
HARRISON:								
Flouring- and grist-mill products	7	37, 440	21			3, 788	56, 245	68, 035
Lumber, sawed	10	16, 075	25			3, 257	16, 532	30, 779

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MISSOURI—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
HENRY:								
Carriages and wagons	3	$12, 500	19	....	....	$10, 000	$13, 500	$28, 500
Flouring- and grist-mill products	9	84, 200	43	....	....	14, 280	189, 045	225, 381
Lumber, sawed	10	18, 500	21	....	1	3, 045	21, 776	31, 485
Saddlery and harness	5	8, 050	9	....	....	4, 550	17, 050	31, 025
Stone- and earthen-ware	4	9, 600	25	....	....	13, 000	2, 850	22, 450
Tobacco, cigars and cigarettes	3	17, 200	14	3	9	12, 300	8, 200	27, 000
HOLT:								
Flouring- and grist-mill products	9	52, 300	23	....	....	6, 859	137, 639	150, 350
Lumber, sawed	10	35, 500	35	....	2	7, 063	34, 812	55, 940
Woolen goods	1	12, 000	12	2	1	4, 000	10, 190	20, 000
HOWARD:								
Flouring- and grist-mill products	9	67, 500	34	....	....	11, 082	114, 490	140, 358
Lumber, sawed	8	12, 050	38	....	....	6, 400	24, 800	43, 450
IRON:								
Flouring- and grist-mill products	4	19, 800	9	....	....	3, 125	53, 621	62, 835
Lumber, sawed	7	15, 850	32	....	....	8, 700	57, 825	77, 125
JACKSON:								
Bags, other than paper	1	25, 000	8	....	....	5, 000	16, 000	30, 000
Baking and yeast powders	2	60, 000	17	2	8	14, 000	90, 000	115, 000
Bread and other bakery products	10	86, 600	81	24	5	59, 150	286, 600	373, 300
Brick and tile (see also Drain and sewer pipe)	17	78, 500	337	....	93	166, 820	53, 292	379, 500
Carriages and wagons	5	29, 000	44	....	....	25, 800	41, 900	105, 000
Clothing, men's	6	41, 744	73	4	....	49, 034	96, 420	167, 336
Clothing, women's	2	31, 311	....	63	....	21, 399	77, 443	103, 899
Confectionery	5	6, 200	10	4	4	8, 250	14, 800	27, 000
Drain and sewer pipe (see also Brick and tile)	1	50, 000	6	....	....	3, 000	16, 000	25, 000
Flouring- and grist-mill products	11	208, 700	91	....	....	40, 024	865, 530	1, 008, 284
Foundery and machine-shop products	8	221, 500	207	....	8	129, 770	243, 500	471, 000
Furniture (see also Mattresses and spring beds)	7	2, 825	13	....	....	8, 050	14, 200	30, 000
Furniture, chairs	1	10, 000	12	1	....	9, 000	30, 000	40, 000
Liquors, distilled	3	22, 500	7	....	....	2, 400	19, 000	30, 000
Liquors, malt	2	200, 000	26	....	....	12, 085	56, 130	100, 318
Lumber, planed	4	46, 000	71	....	....	43, 800	92, 000	206, 000
Lumber, sawed	8	19, 800	26	....	....	4, 402	28, 678	42, 310
Marble and stone work	4	16, 200	29	....	2	15, 300	26, 100	54, 000
Mattresses and spring beds (see also Furniture)	2	1, 700	8	3	3	7, 000	13, 600	30, 000
Paints	3	120, 000	41	....	....	20, 000	180, 000	255, 000
Patent medicines and compounds	2	14, 500	5	1	2	4, 300	14, 000	42, 000
Printing and publishing	4	255, 000	159	49	12	152, 800	130, 000	432, 000
Refrigerators	1	15, 000	20	....	....	12, 000	20, 000	35, 000
Saddlery and harness	14	39, 600	50	1	....	24, 256	58, 380	109, 500
Shirts	2	8, 000	4	78	1	24, 720	13, 100	44, 152
Slaughtering and meat-packing, not including retail butchering establishments.	3	437, 500	253	....	35	166, 500	739, 071	965, 000
Soap and candles	2	44, 000	15	....	1	7, 000	67, 175	86, 400
Tinware, copperware, and sheet-iron ware	7	17, 200	22	....	....	10, 250	22, 350	44, 600
Tobacco, cigars and cigarettes	13	70, 200	75	....	9	50, 860	109, 050	210, 600
Tools	2	20, 150	11	....	....	8, 500	8, 400	31, 500
Trunks and valises	2	13, 500	13	....	1	9, 330	15, 000	29, 500
Vinegar	2	13, 000	7	....	....	4, 900	20, 000	35, 000
Woolen goods	2	10, 000	17	....	15	5, 000	49, 650	58, 000
JASPER:								
Carriages and wagons	4	19, 900	43	....	....	20, 100	19, 500	48, 000
Flouring- and grist-mill products	15	216, 675	80	....	....	24, 395	477, 173	535, 860
Foundery and machine-shop products	4	42, 500	40	....	1	17, 156	21, 640	51, 546
Furniture	3	8, 100	17	....	....	7, 700	11, 600	29, 200
Lumber, sawed	10	16, 600	26	....	....	3, 808	13, 873	26, 275
Saddlery and harness	5	11, 200	13	....	....	5, 436	25, 600	36, 800
Slaughtering and meat-packing, not including retail butchering establishments.	3	32, 000	16	....	....	6, 300	51, 840	71, 155
Tinware, copperware, and sheet-iron ware	8	13, 600	13	....	....	8, 644	24, 000	41, 500
Woolen goods	1	46, 000	17	16	3	4, 500	45, 000	75, 000
JEFFERSON:								
Flouring- and grist-mill products	11	66, 500	21	....	....	5, 110	135, 290	156, 191
Glass	1	1, 150, 000	314	36	....	120, 000	112, 925	322, 550
Iron and steel	1	150, 000	150	....	15	60, 000	151, 500	200, 000
JOHNSON:								
Flouring- and grist-mill products	10	144, 000	55	....	....	16, 620	483, 340	521, 527
Saddlery and harness	6	11, 200	10	....	....	3, 540	8, 750	20, 550
Woolen goods	1	20, 000	11	5	....	2, 700	15, 480	22, 000
KNOX:								
Flouring- and grist-mill products	6	18, 825	7	....	....	1, 062	24, 247	30, 300
LACLEDE:								
Flouring- and grist-mill products	7	21, 900	18	....	....	3, 100	43, 753	53, 562
Lumber, sawed	3	9, 500	15	....	....	2, 634	14, 395	21, 945
Woolen goods	1	20, 000	10	6	1	5, 100	20, 850	28, 100
LA FAYETTE:								
Flouring- and grist-mill products	12	108, 000	34	....	....	9, 950	231, 762	261, 625
Foundery and machine-shop products	2	35, 000	29	....	....	9, 000	13, 000	27, 000
Furniture	1	35, 000	42	....	3	14, 000	12, 500	40, 000
Lumber, sawed	6	12, 900	37	....	1	9, 525	28, 600	56, 456

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MISSOURI—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Average number of hands employed. Females above 15 years.	Average number of hands employed. Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
LAWRENCE:								
Carriages and wagons	2	$16, 500	22			$7, 780	$12, 800	$30, 400
Flouring- and grist-mill products	11	58, 850	11			3, 147	54, 035	61, 479
LEWIS:								
Flouring- and grist-mill products	9	39, 250	10			2, 557	59, 654	72, 701
Lumber, planed	2	5, 000	12			5, 400	14, 000	20, 000
Lumber, sawed	8	26, 950	43		8	10, 790	45, 555	75, 510
Slaughtering and meat-packing, not including retail butchering establishments.	3	17, 000	48			2, 320	80, 235	85, 152
LINCOLN:								
Flouring- and grist-mill products	11	38, 500	30			4, 110	76, 459	95, 187
LINN:								
Flouring- and grist-mill products	12	32, 850	33			4, 796	138, 705	166, 930
Lumber, sawed	12	22, 800	31		1	4, 675	27, 335	44, 575
LIVINGSTON:								
Carriages and wagons	4	19, 500	24			11, 850	16, 000	39, 000
Flouring- and grist-mill products	10	61, 100	27			7, 636	185, 919	214, 361
Lumber, sawed	19	19, 530	54		4	8, 649	39, 400	67, 193
Slaughtering and meat-packing, not including retail butchering establishments.	1	20, 000	25			3, 000	68, 000	90, 000
Tobacco, chewing, smoking, and snuff	1	20, 000	20	8	22	15, 000	40, 000	75, 000
MACON:								
Carriages and wagons	1	30, 000	35			20, 000	30, 000	70, 000
Flouring- and grist-mill products	12	37, 200	32			4, 027	87, 237	101, 542
Lumber, sawed	19	25, 440	39			5, 300	24, 578	42, 450
Saddlery and harness	10	6, 750	11			4, 250	19, 820	30, 4[illegible]0
MADISON:								
Flouring- and grist-mill products	7	36, 500	17		1	3, 917	76, 740	90, 900
MARION:								
Carriages and wagons	2	10, 500	11			4, 300	14, 000	24, 000
Cooperage	9	7, 300	41			15, 650	44, 850	70, 350
Flouring- and grist-mill products	7	191, 000	75			35, 050	1, 212, 930	1, 474, 490
Foundery and machine-shop products	4	11, 500	49			22, 750	73, 900	98, 900
Lime	2	60, 000	47		7	21, 500	42, 500	77, 500
Liquors, malt	5	54, 000	11			5, 062	20, 810	37, 495
Lumber, planed	5	62, 500	62		15	19, 325	2, 800	62, 200
Lumber, sawed	8	257, 800	155			46, 650	161, 950	262, 250
Printing and publishing	6	44, 500	46		16	29, 655	26, 000	69, 617
Saddlery and harness	6	26, 300	13			5, 150	25, 200	46, 800
Slaughtering and meat-packing, not including retail butchering establishments.	2	115, 000	77			5, 000	131, 300	142, 000
Tinware, copperware, and sheet-iron ware	10	18, 325	16			5, 350	13, 030	23, 654
Tobacco, cigars and cigarettes	9	9, 100	29		12	10, 140	18, 080	41, 267
MERCER:								
Flouring- and grist-mill products	6	31, 600	10			2, 062	25, 705	30, 231
Lumber, sawed	17	21, 450	41		1	5, 610	29, 580	48, 700
MISSISSIPPI:								
Flouring- and grist-mill products	3	20, 500	18			3, 500	67, 500	80, 290
Lumber, sawed	6	16, 700	36		1	7, 365	34, 200	60, 3[illegible]0
MONROE:								
Flouring- and grist-mill products	12	65, 500	32			5, 366	96, 675	112, 747
Lumber, sawed	17	23, 100	59			8, 150	47, 070	74, 853
MONTGOMERY:								
Flouring- and grist-mill products	11	59, 000	39			6, 305	125, 145	143, 737
Lumber, sawed	10	24, 300	25			4, 000	22, 850	34, 110
Tobacco, chewing, smoking, and snuff	3	32, 000	21	10	22	6, 450	55, 258	70, 919
MORGAN:								
Flouring- and grist-mill products	8	40, 000	17			3, 145	96, 454	105, 824
NEWTON:								
Agricultural implements	1	8, 000	15		3	6, 000	13, 500	23, 521
Brick and tile	1	3, 000	15			6, 000	9, 000	24, 000
Flouring- and grist-mill products	10	45, 700	18			3, 178	100, 734	112, 177
Lumber, sawed	6	8, 800	20			3, 282	17, 019	29, 693
Sash, doors, and blinds	1	6, 000	10			2, 900	22, 000	30, 000
NODAWAY:								
Brick and tile	8	8, 400	41	3	8	6, 200	4, 721	20, 150
Flouring- and grist-mill products	11	82, 000	33			6, 860	186, 376	225, 237
Lumber, sawed	7	7, 900	15		2	2, 349	11, 850	20, 434
Saddlery and harness	8	10, 200	14	1	1	5, 550	11, 175	29, 550
Slaughtering and meat-packing, not including retail butchering establishments.	1	10, 000	6			900	39, 675	45, 000
OSAGE:								
Flouring- and grist-mill products	5	13, 600	12			1, 719	32, 050	36, 954
PERRY:								
Flouring- and grist-mill products	10	149, 500	54			20, 210	374, 211	437, 432
PETTIS:								
Carriages and wagons	3	7, 500	19			11, 000	7, 000	24, 000
Flouring- and grist-mill products	9	57, 400	34			8, 746	185, 555	209, 160
Foundery and machine-shop products	1	30, 000	30			12, 000	29, 800	53, 700
Liquors, malt	1	20, 000	5			2, 506	11, 622	21, 129

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MISSOURI—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths	Total amount paid in wages during the year.	Value of materials.	Value of products.
PHELPS:								
Flouring- and grist-mill products	7	$71, 500	26			$10, 565	$197, 603	$236, 043
PIKE:								
Clothing, men's	4	6, 700	10	1	1	5, 700	14, 200	23, 000
Cooperage	7	8, 250	18			6, 220	9, 140	28, 500
Flouring- and grist-mill products	11	85, 800	40			19, 400	349, 813	401, 320
Foundery and machine-shop products	3	20, 000	23			8, 000	13, 000	32, 500
Lumber, sawed	13	35, 200	50			12, 615	54, 330	89, 485
Saddlery and harness	8	11, 500	9			4, 815	17, 100	29, 500
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	6	150, 000	114	49	90	48, 750	157, 600	250, 300
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	1	4, 000	8			5, 000	25, 000	35, 000
Vinegar	2	31, 500	15	9	8	7, 300	19, 000	33, 000
Woolen goods	2	20, 100	10	3	5	2, 150	19, 700	22, 500
PLATTE:								
Flouring- and grist-mill products	10	78, 600	34			9, 540	266, 381	286, 543
Furniture	2	21, 500	53		1	16, 500	20, 000	49, 000
Lumber, sawed	17	36, 100	39			5, 205	23, 580	43, 700
POLK:								
Flouring- and grist-mill products	7	24, 400	23			4, 650	135, 402	149, 712
Lumber, sawed	10	15, 400	26			3, 107	17, 600	30, 239
PULASKI:								
Flouring- and grist-mill products	5	18, 300	6			779	40, 556	46, 226
PUTNAM:								
Cooperage	1	16, 000	30			12, 500	14, 000	50, 000
Lumber, sawed	16	23, 200	44			8, 594	39, 748	65, 980
RALLS:								
Flouring- and grist-mill products	5	15, 900	12			1, 688	49, 355	56, 676
Lumber, sawed	4	9, 600	16		1	2, 550	15, 300	25, 000
RANDOLPH:								
Flouring- and grist-mill products	12	59, 500	35			6, 621	171, 868	208, 158
Lumber, sawed	18	19, 950	46			5, 661	25, 220	46, 950
Slaughtering and meat-packing, not including retail butchering establishments.	1	5, 000	7			2, 940	50, 410	69, 640
RAY:								
Flouring- and grist-mill products	11	96, 700	26			5, 034	109, 020	122, 280
Lumber, sawed	11	16, 350	34		2	5, 710	28, 650	45, 575
REYNOLDS:								
Lumber, sawed	10	31, 800	58			12, 000	64, 900	101, 900
SAINT CHARLES:								
Cars, railroad, street, and repairs	1	110, 000	325		50	118, 207	673, 000	830, 800
Flouring- and grist-mill products	13	260, 800	66			21, 500	543, 280	599, 006
Liquors, malt	2	45, 000	12		2	4, 475	19, 276	34, 421
Slaughtering and meat-packing, not including retail butchering establishments.	2	57, 000	20		7	1, 800	40, 800	47, 060
Tobacco, chewing, smoking, and snuff	6	39, 500	53	17	44	7, 400	11, 600	24, 100
Woolen goods	1	40, 000	10	15	45	11, 000	33, 000	60, 000
SAINT FRANÇOIS:								
Agricultural implements	3	16, 500	25			8, 300	22, 185	34, 000
Flouring- and grist-mill products	12	80, 000	31			9, 002	165, 300	187, 604
SAINTE GENEVIEVE:								
Cooperage	2	4, 000	16			5, 800	11, 500	22, 500
Flouring- and grist-mill products	8	107, 900	56			25, 740	437, 076	514, 009
SAINT LOUIS CITY (see Table VI).								
SAINT LOUIS:								
Flouring- and grist-mill products	5	44, 000	17			5, 400	423, 027	479, 251
Lime	2	41, 000	31			12, 000	6, 000	26, 320
SALINE:								
Flouring- and grist-mill products	13	113, 300	44			9, 315	208, 347	243, 026
Lumber, sawed	14	20, 400	41			6, 490	35, 125	62, 250
SCHUYLER:								
Flouring- and grist-mill products	3	18, 100	5			462	27, 100	31, 063
Lumber, sawed	15	23, 050	42			7, 370	31, 250	61, 115
SCOTLAND:								
Carriages and wagons	3	13, 000	24			9, 800	17, 200	34, 400
Flouring- and grist-mill products	6	28, 725	14			4, 909	90, 067	113, 711
Lumber, sawed	9	15, 450	20			3, 184	9, 565	21, 225
SCOTT:								
Flouring- and grist-mill products	5	34, 500	14			1, 333	41, 105	46, 721
Lumber, sawed	12	77, 500	93		5	21, 380	112, 535	175, 980
SHELBY:								
Flouring- and grist-mill products	6	21, 200	18			3, 490	47, 614	56, 344
STODDARD:								
Flouring- and grist-mill products	6	21, 500	27			3, 791	55, 701	62, 577
Lumber, sawed	9	43, 000	76			14, 450	70, 075	109, 500

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

MISSOURI—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
SULLIVAN:								
Flouring- and grist-mill products	10	$22,500	21			$3,037	$67,485	$80,276
Lumber, sawed	19	101,600	60			13,729	94,220	135,585
VERNON:								
Flouring- and grist-mill products	6	51,500	23			7,475	167,360	195,302
Lumber, sawed	10	10,025	31			5,462	24,454	41,797
WARREN:								
Flouring- and grist-mill products	6	35,750	21			4,016	102,685	118,974
Lumber, sawed	6	20,900	19		1	3,025	15,200	26,200
Slaughtering and meat-packing, not including retail butchering establishments.	1	8,200	14			2,500	49,650	62,000
WASHINGTON:								
Flouring- and grist-mill products	12	61,740	16			4,280	99,875	115,705
Lumber, sawed	9	27,000	36			5,883	25,607	43,380
WAYNE:								
Flouring- and grist-mill products	6	16,500	14			5,253	58,816	70,912
Lumber, sawed	18	100,875	152			41,966	251,250	365,360
WEBSTER:								
Flouring- and grist-mill products	3	22,000	15			2,090	21,680	26,410
Slaughtering and meat-packing, not including retail butchering establishments.	1	5,000	6		4	7,000	55,086	68,294
MONTANA TERRITORY.								
DEER LODGE:								
Foundery and machine-shop products	2	$43,000	14			$12,425	$26,000	$44,050
Jewelry	2	1,200	2			4,800	16,000	26,000
Liquors, malt	5	63,000	8			3,546	12,750	23,100
Lumber, planed	2	10,000	10			8,500	10,000	22,000
Lumber, sawed	7	86,000	51			19,725	96,790	204,125
GALLATIN:								
Flouring- and grist-mill products	6	68,000	17			8,900	138,185	182,830
Lumber, sawed	6	24,500	20			5,675	37,410	66,700
JEFFERSON:								
Flouring- and grist-mill products	1	15,000	11			5,000	93,140	126,930
Lumber, sawed	5	42,000	19			8,360	58,955	119,640
LEWIS AND CLARKE:								
Carriages and wagons	2	20,000	20			15,000	13,000	42,000
Liquors, malt	4	72,000	11			4,860	18,870	32,870
Lumber, planed	2	33,000	23			16,499	16,900	37,515
Saddlery and harness	2	35,000	12			14,016	11,000	38,000
Tinware, copperware, and sheet-iron ware	2	2,200	7			9,128	30,000	45,000
MADISON:								
Flouring- and grist-mill products	2	16,000	8			6,570	70,380	96,557
Lumber, sawed	6	21,500	12			5,360	43,710	68,665
MISSOULA:								
Flouring- and grist-mill products	5	60,000	14			4,995	50,260	63,150
NEBRASKA.								
ADAMS:								
Flouring- and grist-mill products	3	$26,800	8			$3,400	$35,425	$41,967
Saddlery and harness	3	8,500	11			3,650	11,500	20,900
BUFFALO:								
Flouring- and grist-mill products	4	45,500	13			4,500	95,550	111,825
BURT:								
Flouring- and grist-mill products	3	16,000	9			2,065	38,700	44,690
Lumber, sawed	3	5,350	20			3,950	14,350	26,250
BUTLER:								
Flouring- and grist-mill products	2	15,000	7			1,800	27,700	32,450
CASS:								
Flouring- and grist-mill products	8	49,000	20			8,757	161,900	206,948
Saddlery and harness	3	3,550	9	1		5,177	13,700	23,239
Slaughtering and meat-packing, not including retail butchering establishments.	1	4,000	10			812	16,000	20,000
CLAY:								
Flouring- and grist-mill products	3	19,000	10			4,400	48,530	58,970
Saddlery and harness	7	8,300	14			4,900	11,932	22,310
COLFAX:								
Flouring- and grist-mill products	3	56,000	27			10,701	141,422	180,533
DODGE:								
Flouring- and grist-mill products	5	38,500	13			5,484	72,151	89,538
Foundery and machine-shop products	1	10,000	8			5,000	18,000	30,000
Liquors, malt	1	25,000	12			3,264	14,269	23,080

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEBRASKA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
DOUGLAS:								
Bread and other bakery products	5	$24, 800	36	3	4	$17, 050	$61, 300	$103, 400
Brick and tile	11	38, 100	96	1	45	46, 660	33, 090	110, 371
Carriages and wagons	2	55, 000	42			20, 000	70, 000	105, 000
Clothing, men's	4	26, 400	28		1	21, 918	26, 950	55, 268
Clothing, women's	1	12, 000		12	2	3, 800	30, 000	40, 000
Coffee and spices, roasted and ground	1	6, 000	2	1	1	1, 600	20, 000	30, 000
Cooperage	5	23, 000	41			25, 500	48, 387	78, 600
Drugs and chemicals (see also Patent medicines and compounds)	1	20, 000	10			6, 000	15, 000	160, 000
Flouring- and grist-mill products	9	71, 100	26			7, 113	140, 903	164, 872
Foundery and machine-shop products	4	43, 000	77			39, 543	26, 748	80, 000
Iron and steel	1	100, 000	90		10	50, 000	114, 500	82, 000
Jewelry	3	49, 000	25		2	14, 500	105, 000	210, 000
Liquors, distilled	1	200, 000	50			17, 775	150, 000	225, 000
Liquors, malt	4	285, 000	93			37, 595	133, 117	259, 460
Lumber, sawed	5	18, 500	21		4	5, 545	72, 930	94, 180
Oil, linseed	1	100, 000	19			10, 500	85, 000	125, 000
Paints	1	100, 000	40			17, 000	200, 000	350, 000
Patent medicines and compounds (see also Drugs and chemicals)	1	5, 000	3			1, 200	12, 000	26, 000
Printing and publishing	9	145, 750	127	22	51	112, 380	112, 300	284, 461
Saddlery and harness	6	70, 300	23		1	12, 313	35, 087	53, 623
Shirts	2	8, 600	12	14		8, 600	18, 000	33, 000
Slaughtering and meat-packing, not including retail butchering establishments.	8	300, 200	171		2	61, 620	1, 022, 406	1, 260, 140
Tinware, copperware, and sheet-iron ware	7	32, 000	51			22, 150	49, 300	94, 000
Tobacco, cigars and cigarettes	8	35, 450	43	2	14	28, 267	51, 200	113, 194
FILLMORE:								
Flouring- and grist-mill products	2	14, 500	7			2, 140	110, 370	130, 070
FRANKLIN:								
Flouring- and grist-mill products	4	24, 330	11			3, 240	103, 300	118, 750
GAGE:								
Flouring- and grist-mill products	3	50, 000	6			2, 350	104, 900	120, 525
HALL:								
Bridges	1	6, 000	16			20, 400	75, 000	107, 000
Flouring- and grist-mill products	3	42, 000	8			2, 481	52, 455	64, 432
Liquors, malt	1	15, 000	6			2, 831	12, 179	20, 540
HARLAN:								
Flouring- and grist-mill products	4	16, 000	20			3, 600	57, 574	69, 555
JEFFERSON:								
Flouring- and grist-mill products	4	50, 000	11			4, 189	71, 175	89, 242
JOHNSON:								
Flouring- and grist-mill products	4	33, 250	16			4, 765	135, 433	155, 005
LANCASTER:								
Brick and tile	4	8, 000	25			10, 800	7, 600	24, 920
Clothing, men's	5	12, 400	20	6		17, 468	31, 500	67, 500
Flouring- and grist-mill products	8	101, 000	32			12, 700	281, 695	346, 450
Marble and stone work	5	8, 300	32			16, 700	36, 500	64, 100
Printing and publishing	4	33, 100	71	7		48, 968	49, 500	113, 500
Saddlery and harness	7	23, 850	19			10, 467	39, 728	65, 574
Tinware, copperware, and sheet-iron ware	5	4, 100	9			5, 148	14, 700	28, 000
Tobacco, cigars and cigarettes	5	12, 200	15	2		10, 100	18, 000	43, 600
MADISON:								
Flouring and grist-mill products	3	54, 000	9			4, 700	211, 900	227, 430
NEMAHA:								
Flouring- and grist-mill products	6	27, 490	13			3, 180	87, 045	105, 833
OTOE:								
Brick and tile	4	7, 300	35		7	10, 700	8, 000	23, 280
Flouring- and grist-mill products	6	62, 000	19			6, 180	197, 743	234, 009
Liquors, malt	2	30, 000	8			3, 792	14, 140	25, 530
Saddlery and harness	6	17, 000	14			5, 100	22, 400	35, 400
Slaughtering and meat-packing, not including retail butchering establishments.	1	1, 500	3			1, 200	19, 200	29, 300
Tinware, copperware, and sheet-iron ware	2	7, 000	6			2, 300	17, 000	22, 000
RICHARDSON:								
Flouring- and grist-mill products	9	75, 500	18			4, 100	110, 337	123, 895
Saddlery and harness	8	4, 900	9			3, 850	21, 150	33, 500
SALINE:								
Brick and tile	3	6, 100	34		4	8, 602	6, 640	21, 050
Flouring- and grist-mill products	4	63, 000	15			5, 675	109, 250	126, 246
Lumber, sawed	1	3, 000	6			2, 000	12, 800	23, 000
SARPY:								
Flouring- and grist-mill products	4	55, 000	10			3, 700	89, 716	103, 456
SAUNDERS:								
Flouring- and grist-mill products	8	64, 000	24			7, 020	144, 190	165, 750
Saddlery and harness	6	8, 400	10			3, 750	12, 900	24, 000
SEWARD:								
Flouring- and grist-mill products	6	81, 000	15			4, 350	131, 240	155, 645
Slaughtering and meat-packing, not including retail butchering establishments.	1	20, 000	3			585	24, 138	30, 837

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEBRASKA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
THAYER:								
Flouring- and grist-mill products	5	$30,500	9	....	....	$4,129	$132,545	$150,340
WASHINGTON:								
Flouring- and grist-mill products	5	89,500	14	....	....	4,635	55,155	71,400
WEBSTER:								
Flouring- and grist-mill products	2	20,000	10	....	....	3,200	50,000	66,720
Tinware, copperware, and sheet-iron ware	4	39,750	8	....	....	1,725	22,100	27,900

NEVADA.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
DOUGLAS:								
Lumber, sawed	2	$110,000	23	....	....	$6,360	$138,940	$205,000
ESMERALDA:								
Drugs and chemicals	1	100,000	16	....	....	12,500	13,600	165,000
Flouring- and grist-mill products	1	8,000	2	....	....	700	42,562	50,196
Salt	2	5,000	9	....	....	4,088	....	62,500
EUREKA:								
Liquors, malt	5	53,000	12	....	....	5,707	21,815	38,470
HUMBOLDT:								
Flouring- and grist-mill products	1	80,000	13	....	....	4,000	105,512	113,610
STOREY:								
Bread and other bakery products	2	2,250	5	1	....	5,252	18,321	29,800
Foundery and machine-shop products	5	237,225	109	....	....	120,309	109,922	320,955
Liquors, malt	7	46,370	19	....	....	8,668	31,984	57,907
Printing and publishing	4	73,500	48	....	9	84,240	5,250	108,012
Saddlery and harness	2	12,000	5	....	....	6,244	6,500	25,200
Tinware, copperware, and sheet-iron ware	1	150,000	16	....	4	12,500	60,000	90,000
WASHOE:								
Carriages and wagons	1	25,000	13	....	....	14,850	15,000	35,000
Flouring- and grist-mill products	1	50,000	6	....	....	4,000	180,140	192,320
Sash, doors, and blinds	1	20,000	21	....	....	10,000	10,000	40,000

NEW HAMPSHIRE.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
BELKNAP:								
Boots and shoes	2	$8,500	55	20	....	$16,000	$25,000	$53,800
Cars, railroad, street, and repairs	1	10,000	200	....	....	55,000	125,000	201,659
Clothing, men's	2	4,000	3	20	....	6,500	16,500	27,000
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	5	263,000	151	181	80	78,268	148,008	270,000
Flouring- and grist-mill products	9	37,500	12	....	....	4,853	89,509	103,555
Foundery and machine-shop products	7	78,000	125	....	....	50,749	43,266	129,600
Hosiery and knit goods (see also Cotton goods; Woolen goods)	9	492,000	304	614	71	264,880	625,182	[illegible]
Iron forgings	1	12,000	8	....	....	5,500	19,500	32,000
Lumber, sawed	19	80,550	89	....	....	22,635	68,440	118,362
Mixed textiles (see also Cotton goods; Woolen goods)	1	28,000	18	14	....	9,600	37,020	70,516
Refrigerators	1	25,000	25	....	....	10,000	15,000	50,000
Spectacles and eyeglasses	1	25,000	35	....	....	15,000	30,000	50,000
Woolen goods (see also Mixed textiles)	4	259,000	185	96	40	75,400	294,855	525,966
CARROLL:								
Boot and shoe findings	2	46,000	52	36	3	25,400	24,200	64,000
Boots and shoes	2	38,000	110	30	....	54,710	130,949	225,000
Clothing, men's	3	1,450	12	4	....	8,200	157,500	175,150
Felt goods (see also Woolen goods)	1	12,000	18	4	19	7,000	29,420	50,000
Flouring- and grist-mill products	9	29,000	6	....	....	1,783	61,700	66,640
Leather, curried	5	63,800	29	....	....	12,137	279,471	[illegible]
Leather, tanned	5	64,800	40	....	....	14,163	213,400	[illegible]
Lumber, sawed	59	314,895	359	....	3	71,907	174,050	[illegible]
Mixed textiles (see also Woolen goods)	1	107,400	19	24	1	15,000	58,174	[illegible]
Wood, turned and carved	3	8,500	42	....	....	6,000	7,000	[illegible]
Woolen goods (see also Felt goods; Mixed textiles)	6	110,400	25	24	1	15,000	63,374	91,500
CHESHIRE:								
Agricultural implements	2	28,000	32	....	....	9,000	9,290	[illegible]
Boxes, fancy and paper	2	32,000	30	3	....	10,200	8,000	[illegible]
Boxes, wooden, packing	14	55,700	138	11	20	38,790	43,300	[illegible]
Carriages and wagons	4	35,000	45	1	....	17,500	21,040	[illegible]
Clothing, men's	3	12,500	7	36	....	10,500	19,000	31,500
Cotton goods (see also Mixed textiles)	2	186,000	48	49	5	24,346	90,412	[illegible]
Flouring- and grist-mill products	14	29,000	19	....	....	3,369	86,071	[illegible]
Foundery and machine-shop products	7	58,800	60	....	....	21,744	25,893	64,500
Furniture	1	10,000	60	....	....	20,500	50,000	80,000
Furniture, chairs	4	194,000	144	15	7	49,000	65,640	148,500
Handles, wooden	1	12,000	17	....	....	6,000	4,000	20,000
Hats and caps, not including wool hats	3	5,100	400	....	....	8,000	10,300	26,700
Leather, curried	8	96,000	62	....	....	27,478	535,560	586,915
Leather, tanned	11	288,600	138	....	....	64,142	685,600	942,257
Liquors, malt	1	70,000	23	....	....	10,649	52,830	95,422
Lumber, sawed	92	290,280	381	....	2	70,587	144,806	309,774
Marble and stone work	3	9,100	29	....	....	9,800	6,800	20,300
Mixed textiles (see also Cotton goods; Woolen goods)	7	388,000	335	233	76	220,775	603,481	[illegible]
Paper	3	101,000	30	8	....	15,242	71,550	123,000
Sash, doors, and blinds (see also Wood, turned and carved)	4	51,200	38	....	....	17,000	41,625	68,600

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW HAMPSHIRE—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
CHESHIRE—continued.								
Stone- and earthen-ware	3	$59, 000	58	2	4	$27, 900	$12, 000	$58, 000
Tinware, copperware, and sheet-iron ware	9	26, 050	41	1	....	13, 295	38, 851	71, 656
Wood, turned and carved (see also Sash, doors, and blinds)	1	20, 000	60	....	....	15, 000	7, 000	25, 000
Wooden ware	29	263, 550	329	2	24	106, 991	183, 048	357, 740
Woolen goods (see also Mixed textiles)	15	1, 313, 000	745	463	108	429, 324	1, 613, 237	2, 861, 811
COOS:								
Charcoal	1	25, 000	70	....	....	20. 000	30, 000	75, 000
Clothing, men's	5	6, 800	5	7	....	2, 975	12, 200	21, 300
Flouring- and grist-mill products	15	47, 950	18	....	....	3, 881	142, 583	154, 849
Lumber, sawed	64	1, 580, 800	604	....	14	139, 117	844, 256	1, 299, 047
Starch	17	49, 200	66	....	....	3, 949	46, 127	61, 650
Wood pulp	1	200, 000	269	....	11	115, 000	240, 000	672, 000
GRAFTON:								
Agricultural implements	4	47, 500	60	....	....	31, 220	30, 946	79, 600
Carriages and wagons	3	29, 300	22	....	....	9, 560	14, 000	30, 000
Clothing, men's	12	27, 900	27	47	....	17, 226	53, 004	92, 150
Drugs and chemicals	4	9, 200	9	....	....	578	22, 993	31, 691
Flouring- and grist-mill products	30	109, 855	35	....	....	10, 150	344, 948	397, 814
Foundery and machine-shop products	7	47, 000	29	....	....	11, 754	45, 277	71, 350
Furniture	6	52, 500	136	....	....	37, 250	47, 500	109, 600
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	25	187, 300	171	300	1	92, 574	302, 142	478, 825
Hones and whetstones	3	22, 600	41	....	....	9, 400	5, 700	19, 500
Hosiery and knit goods (see also Gloves and mittens; Woolen goods)	2	70, 000	18	24	1	15, 387	50, 733	87, 075
Leather board (see also Paper)	3	58, 000	29	....	....	11, 200	57, 995	79, 875
Leather, curried	8	48, 750	61	17	....	30, 425	386, 220	504, 496
Leather, tanned	13	58, 050	76	18	....	34, 650	297, 705	404, 937
Lumber, sawed	110	603, 690	527	....	9	91, 609	358. 852	630, 432
Marble and stone work	11	9, 375	23	....	....	7, 010	11, 205	27, 710
Paper (see also Leather board; Wood pulp)	6	178, 000	87	13	....	35, 600	178, 858	255, 540
Saddlery and harness	18	22, 300	20	....	....	6, 907	19, 940	39, 894
Tinware, copperware, and sheet-iron ware	13	28, 650	19	....	....	9, 334	15, 150	35, 220
Watch and clock materials	1	10, 000	10	10	35	4, 800	6, 500	36, 000
Wood pulp	3	66, 000	33	....	....	11, 850	9, 500	39, 275
Wood, turned and carved	12	30, 500	95	2	2	22, 438	28, 740	61, 600
Woolen goods (see also Gloves and mittens)	5	168, 000	73	87	13	26, 750	135, 471	193, 100
HILLSBOROUGH:								
Boots and shoes	5	51, 000	100	31	7	48. 511	146, 619	208, 102
Boxes, fancy and paper	4	14, 500	32	8	....	7, 700	17, 200	29, 500
Bread and other bakery products	11	27, 850	34	1	....	16, 911	112, 306	156, 502
Carriage and wagon materials	2	20, 600	12	....	....	5, 385	38, 500	55, 360
Carriages and wagons	3	44, 000	47	....	....	23, 600	28, 500	63, 000
Cheese and butter (factory)	2	10, 400	1	3	....	780	20, 683	27, 887
Clothing, men's	8	22, 100	16	187	....	23, 060	90, 900	131, 300
Confectionery	4	15, 800	19	9	5	11, 670	48, 050	73, 500
Cooperage	10	94, 550	151	....	....	47, 600	60, 250	127, 225
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	16	11, 137, 584	3, 218	5, 896	566	2, 674, 252	6, 550, 234	11, 345, 443
Cutlery and edge tools	5	223, 500	223	6	5	85, 045	100, 114	228, 804
Dyeing and finishing textiles	2	2, 412, 085	296	46	40	174, 873	428, 553	753, 100
Flouring- and grist-mill products	27	156, 150	46	....	....	18, 516	468, 271	541, 744
Foundery and machine-shop products	20	489, 185	698	19	10	269, 267	481, 877	957, 560
Furniture	14	101, 400	136	3	2	37, 483	70, 500	161, 491
Glass	1	50, 000	80	8	14	25, 600	34, 000	70, 000
Grease and tallow	1	7, 000	7	....	....	2, 300	12, 000	25, 000
Hosiery and knit goods (see also Cotton goods; Woolen goods)	2	275, 000	110	155	29	110, 000	237, 425	460, 000
Iron and steel	2	650, 000	289	....	1	127, 690	523, 355	807, 340
Leather, curried	6	76, 250	59	....	....	23, 700	239, 360	306, 600
Leather, tanned	8	93, 250	56	....	....	23, 350	233, 404	284, 702
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	6	32, 000	54	....	....	21, 700	47, 100	91, 500
Lumber, sawed	91	297, 000	354	....	6	55, 561	210, 715	369, 996
Marble and stone work	11	56, 306	104	....	....	44, 432	28, 385	130, 735
Mixed textiles (see also Cotton goods; Woolen goods)	2	43, 000	25	31	....	13, 600	64, 054	95, 000
Paper (see also Wood pulp)	5	282, 000	110	74	2	55, 950	343, 200	472, 000
Patent medicines and compounds	5	42, 050	15	9	....	13, 332	49, 155	129, 394
Printing and publishing	4	30, 000	21	2	....	7, 538	7, 725	23, 100
Saddlery and harness	13	14, 250	21	....	....	9, 851	15, 777	35, 157
Sash, doors, and blinds (see also Lumber, planed; Wood turned and carved).	7	142, 000	229	....	3	84, 950	134, 800	251, 700
Shoddy (see also Mixed textiles)	2	17, 000	11	8	2	5, 400	37, 900	47, 100
Soap and candles	6	18, 000	11	....	....	4, 820	18, 495	30, 966
Stationery goods	4	204, 800	62	18	3	37, 050	266, 897	355, 015
Tinware, copperware, and sheet-iron ware	20	61, 300	50	1	....	25, 500	47, 500	93, 500
Tobacco, cigars and cigarettes	13	13, 260	27	11	....	10, 896	16, 567	40, 360
Toys and games	6	20, 900	23	9	7	9, 574	11, 133	27, 528
Wood pulp	2	25, 600	24	....	....	8, 000	4, 400	38, 578
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	11	150, 700	221	....	115	94, 527	98, 979	241, 518
Woolen goods (see also Mixed textiles; Worsted goods)	6	263, 500	128	86	25	87, 234	343, 708	562, 220
Worsted goods (see also Woolen goods)	2	2, 628, 584	505	919	107	512, 881	1, 582, 226	2, 694, 232

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW HAMPSHIRE—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
MERRIMACK:								
Agricultural implements	3	$67,600	46			$23,050	$35,950	$70,500
Belting and hose, leather	2	215,000	97		5	48,310	290,000	425,000
Boots and shoes	1	125,000	204	80		150,000	296,250	500,000
Bread and other bakery products	4	9,850	21			9,706	35,000	76,600
Brick and tile	12	49,970	238			45,004	33,837	99,775
Carriage and wagon materials	3	31,500	27			9,700	26,300	19,500
Carriages and wagons	6	445,557	232	1		107,708	127,700	286,430
Clothing, men's	9	42,900	18	75		28,450	62,627	108,189
Cooperage	5	22,100	27			9,557	11,980	31,052
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	8	2,200,000	688	806	421	399,546	925,983	1,614,110
Flouring- and grist-mill products	27	160,750	46			20,975	601,137	662,689
Foundery and machine-shop products	12	177,050	121			58,335	75,068	177,820
Furniture	6	147,500	208		31	95,200	153,700	355,500
Hosiery and knit goods (see also Cotton goods; Woolen goods)	5	292,000	48	198	10	106,850	234,468	452,500
Leather, curried	4	20,750	16			4,860	92,870	110,726
Leather, tanned	7	32,750	32			10,605	91,850	125,220
Lumber, planed (see also Sash, doors, and blinds)	5	21,200	18			5,170	10,025	23,370
Lumber, sawed	71	180,775	185		7	34,056	177,938	292,750
Marble and stone work	20	55,250	159	1		81,571	27,849	151,288
Mixed textiles (see also Cotton goods; Woolen goods)	3	275,000	29	76	116	101,350	199,473	380,000
Musical instruments, organs and materials	1	14,000	25			11,148	9,441	23,913
Paper	3	390,000	176	62		96,832	337,330	523,230
Printing and publishing	6	112,050	43	8		32,414	28,125	87,850
Saddlery and harness	13	127,975	96	4	1	44,560	111,480	184,750
Sash, doors, and blinds (see also Lumber, planed)	4	13,000	30		2	10,360	10,722	29,589
Silverware	1	125,000	20			12,500	63,400	200,000
Tinware, copperware, and sheet-iron ware	15	27,600	27			11,472	26,226	60,016
Upholstering materials	3	17,000	21			9,300	3,950	20,125
Wooden ware	3	20,200	28			9,300	9,400	25,500
Woolen goods (see also Mixed textiles)	4	371,000	218	132	31	113,675	651,774	977,014
ROCKINGHAM:								
Boots and shoes	30	863,700	935	409	15	530,847	1,221,183	1,954,229
Boxes, fancy and paper	2	2,500	17	5		6,500	28,000	44,800
Boxes, wooden, packing	8	15,500	36			11,450	25,600	46,500
Brass castings	1	13,000	16			7,000	10,000	24,000
Bread and other bakery products	6	7,735	12	6		6,534	18,950	34,206
Brick and tile	20	28,450	196			39,200	28,900	98,275
Carriage and wagon materials	3	11,700	10			2,900	4,780	22,300
Carriages and wagons	5	17,000	32			10,400	33,000	53,500
Clothing, men's	8	21,600	22	18		11,5 0	29,050	49,700
Cooperage	7	14,550	38			18,252	10,003	39,734
Cotton goods (see also Hosiery and knit goods)	5	1,570,000	275	591	133	264,811	595,089	1,144,748
Flouring- and grist-mill products	29	45,900	43			5,662	200,569	219,327
Foundery and machine-shop products	5	268,500	220		42	108,050	196,696	367,592
Hosiery and knit goods (see also Cotton goods; Woolen goods)	3	21,500	28	21	3	11,300	24,940	55,400
Iron bolts, nuts, washers, and rivets	1	30,000	15			4,500	28,500	36,000
Leather, patent and enameled	1	15,000	15			9,000	55,000	150,000
Leather, tanned	2	15,000	7			2,250	14,750	20,500
Liquors, distilled	1	25,000	4			1,700	20,500	31,500
Liquors, malt	3	770,000	279			127,290	644,600	1,162,909
Lumber, sawed	106	221,700	377			44,493	201,402	338,994
Marble and stone work	5	17,150	26			11,050	13,180	32,471
Paper	1	52,000	21	4		9,200	48,700	60,200
Printing and publishing	7	30,000	28	8	3	14,304	16,801	45,000
Saddlery and harness	3	4,400	11			4,350	16,200	24,000
Shipbuilding	15	15,330	26			12,243	14,369	30,070
Soap and candles	6	13,800	15			6,700	16,700	32,525
Tinware, copperware, and sheet-iron ware	8	19,850	27			13,900	28,800	58,950
Woolen goods	2	53,800	15	9	2	10,700	37,030	56,400
STRAFFORD:								
Belting and hose, leather	1	68,294	27		1	11,514	136,985	172,444
Boots and shoes	17	595,000	1,967	403	37	981,264	2,915,267	4,258,173
Boxes, wooden, packing	2	8,500	18			7,220	11,000	21,000
Brick and tile	20	25,075	119			22,229	19,643	56,265
Carriages and wagons	4	15,000	37			19,299	15,535	41,902
Clothing, men's	7	39,400	14	55		21,250	44,800	77,000
Cotton goods (see also Mixed textiles)	3	4,350,000	658	1,883	502	804,134	1,883,955	3,468,965
Cutlery and edge tools	3	8,600	20			8,872	3,250	21,900
Dyeing and finishing textiles	2	575,000	341	65	66	198,000	367,000	815,000
Flouring- and grist-mill products	9	51,300	15			5,711	145,495	164,581
Foundery and machine-shop products	6	119,106	146	2		42,421	134,518	226,434
Leather, curried	1	20,000	22			12,500	175,000	200,000
Leather, tanned	2	20,100	69			37,575	100,505	150,700
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	2	10,000	14			6,381	12,726	23,859
Lumber, sawed	20	66,300	82		2	7,515	37,194	60,879
Mixed textiles (see also Cotton goods; Woolen goods)	2	302,000	163	158	66	96,000	384,982	603,000
Paper	1	28,000	10	5		5,900	28,750	45,000
Printing and publishing	6	83,500	42	14	2	22,712	18,825	66,100
Saddlery and harness	8	6,475	6	1		2,658	15,920	24,900
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	2	18,000	42			20,750	41,880	67,930
Tinware, copperware, and sheet-iron ware	10	18,400	32	1		15,647	28,347	54,230
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	1	5,000	12			3,600	10,000	20,000
Woolen goods (see also Mixed textiles)	6	1,647,071	708	367	128	342,290	1,431,127	2,248,218

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW HAMPSHIRE—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
SULLIVAN:								
Agricultural implements	1	$35,000	20			$6,500	$8,175	$21,200
Boots and shoes	2	15,000	19	12		11,500	16,700	31,500
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	2	287,000	100	225	42	77,265	135,503	228,487
Flouring- and grist-mill products	12	45,150	13			3,384	119,435	135,047
Hosiery and knit goods (see also Cotton goods; Woolen goods)	3	73,500	32	86	1	27,700	76,852	129,000
Leather, curried	4	25,300	11			3,729	115,016	127,347
Leather, tanned	4	25,900	25			11,611	89,750	110,500
Lumber, sawed	48	109,800	98		5	11,076	55,338	99,917
Mixed textiles (see also Cotton goods; Woolen goods)	4	178,000	64	45	25	38,620	109,463	255,000
Paper	3	122,000	43	36		27,800	119,900	243,000
Printing and publishing	1	3,500	6	8		6,000	15,000	27,000
Saddlery and harness	6	10,200	17			6,100	9,450	24,000
Tinware, copperware, and sheet-iron ware	4	23,500	38			13,600	25,500	60,500
Wood, turned and carved	4	38,200	42		5	21,425	35,625	81,800
Woolen goods (see also Mixed textiles)	8	320,500	188	94	30	80,865	414,096	585,760

NEW JERSEY.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ATLANTIC:								
Boots and shoes	3	$12,400	47	30	3	$25,000	$45,840	$82,500
Cotton goods	1	150,000	42	57	29	25,441	54,165	98,585
Flouring- and grist-mill products	4	11,500	8			2,600	53,820	61,863
Lumber, sawed	6	28,100	21			3,578	15,225	26,760
Paper	2	300,000	41	4		19,360	152,400	200,000
Sash, doors, and blinds	1	20,000	10			3,000	30,000	40,000
Tobacco, cigars and cigarettes	9	9,700	33	18	3	13,050	19,250	53,600
BERGEN:								
Boots and shoes	1	5,000	20	12		14,000	19,700	36,000
Brick and tile	4	118,000	186		2	44,000	38,300	107,250
Bronze castings	1	60,000	90	6	6	37,000	75,000	124,000
Carriages and wagons	6	27,000	40		1	13,750	21,975	49,437
Coal-tar	1	275,000	63			30,000	190,000	300,000
Cotton goods (see also Hosiery and knit goods)	4	134,018	66	80	38	27,231	87,341	152,049
Drugs and chemicals (see also Patent medicines and compounds)	1	300,000	105		2	62,400	390,000	500,000
Dyeing and finishing textiles	1	30,000	90	14	16	35,540	83,325	124,865
Flouring- and grist-mill products	25	160,400	41			12,822	217,425	263,214
Furniture, chairs	2	26,000	81	15	10	31,800	23,500	66,500
Hosiery and knit goods (see also Cotton goods; Woolen goods)	1	18,000	14	14	9	6,490	10,677	22,600
Jewelry	1	10,000	20	4	11	10,000	14,000	27,000
Lumber, sawed	22	53,220	49			8,590	34,726	63,623
Paper	1	20,000	8	4	2	3,600	11,100	20,000
Patent medicines and compounds (see also Drugs and chemicals)	2	20,500	25	6		6,250	20,400	37,200
Rubber and elastic goods	3	64,000	28		3	11,100	31,500	103,500
Silk and silk goods	2	195,000	135	173	30	110,000	194,875	413,515
Stereotyping and electrotyping	1	50,000	7			3,000	4,000	20,000
Tobacco, cigars and cigarettes	6	11,200	18		2	5,430	11,900	23,300
Watch cases	1	125,000	308	16	76	134,592	507,225	641,817
Woolen goods	2	11,000	9	3	1	2,640	18,060	25,200
BURLINGTON:								
Boots and shoes	23	80,320	367	170	21	207,144	407,452	702,106
Bread and other bakery products	3	6,550	3	2		1,575	16,050	20,925
Brick and tile	15	58,900	127		12	30,775	32,077	92,226
Carriages and wagons	8	53,800	72			36,580	62,100	127,000
Charcoal	18	14,075	40			8,925	8,825	23,075
Clothing, men's	9	29,350	21	33	1	10,600	34,800	57,950
Cotton goods	2	175,000	66	109	47	58,000	166,100	287,000
Engraving, steel	1	500,000	100		50	30,000	35,000	70,000
Fertilizers	4	119,000	79		1	18,820	69,650	120,400
Flouring- and grist-mill products	35	401,295	93			32,031	849,492	986,596
Foundery and machine-shop products	8	633,800	362		3	134,100	374,250	568,350
Fruits and vegetables, canned and preserved	11	270,500	157	399	124	73,600	349,959	534,679
Iron forgings	1	100,000	100			40,419	202,134	[illegible]
Lumber, sawed	26	100,100	65		3	15,950	73,753	121,370
Sash, doors, and blinds	4	43,000	35			13,750	26,000	47,500
Shipbuilding	12	12,200	21			10,878	12,770	25,620
Tinware, copperware, and sheet-iron ware	10	18,100	31		3	10,096	32,500	55,400
Tobacco, cigars and cigarettes	13	22,100	66			17,750	21,040	53,550
CAMDEN:								
Agricultural implements	1	17,000	22			7,200	17,000	30,500
Boots and shoes	14	59,850	173	79	4	91,595	139,962	290,600
Brass castings	1	30,000	14			6,000	15,000	22,500
Bread and other bakery products	29	64,900	37	1		13,291	74,672	122,284
Brick and tile	6	118,500	119		17	24,441	22,201	57,667
Carriages and wagons	9	190,000	209	2	7	68,528	62,100	208,700
Coffee and spices, roasted and ground	2	27,000	3	3		2,890	120,560	162,120
Confectionery	9	9,400	20	6	2	9,166	33,200	52,970
Cotton goods (see also Mixed textiles)	3	780,000	297	551	131	249,793	528,966	938,770
Drugs and chemicals	4	820,000	184		1	95,152	516,333	771,613

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW JERSEY—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
CAMDEN—continued.								
Dyeing and finishing textiles	2	$294, 400	382	93	49	$211, 928	$354, 269	$723, 321
Dyestuffs and extracts	2	107, 000	58			23, 668	193, 514	234, 952
Fertilizers	1	250, 000	50			20, 000	95, 000	200, 000
Flouring- and grist-mill products	7	103, 500	26			9, 468	282, 750	319, 109
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	8	1, 231, 200	1, 014		42	421, 091	882, 914	1, 552, 902
Fruits and vegetables, canned and preserved	2	110, 000	55	17	5	38, 080	260, 000	330, 000
Furnishing goods, men's	2	7, 000	4	68	4	7, 400	17, 500	62, 000
Furniture	7	13, 250	22			7, 588	7, 700	23, 280
Glass	4	290, 000	198		46	106, 622	104, 880	282, 385
Grease and tallow	3	28, 000	12			5, 818	87, 540	123, 587
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	1	6, 000	25			9, 000	18, 000	30, 000
Leather, curried	1	15, 000	2			240	17, 450	21, 250
Lumber, sawed	5	457, 000	54		3	21, 225	216, 570	319, 000
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	1	9, 000	8	41	9	10, 800	11, 425	26, 000
Oilcloth, floor	2	145, 000	145			68, 000	241, 000	352, 000
Paints	4	165, 000	77	7	10	32, 200	215, 171	282, 037
Paper	1	80, 000	28	4		12, 000	65, 000	96, 000
Pens, steel	1	150, 000	22	162	16	70, 000	27, 000	120, 000
Photographing materials	1	7, 000	8			1, 800	14, 500	21, 000
Printing and publishing	9	96, 225	70		11	26, 350	25, 914	75, 250
Roofing and roofing materials	8	20, 560	19			9, 610	26, 341	53, 350
Saddlery and harness	4	25, 350	15			7, 024	15, 946	28, 700
Sash, doors, and blinds	5	202, 000	152			56, 624	124, 464	219, 200
Shirts	1	40, 000	8	175	15	50, 000	90, 000	150, 000
Shipbuilding	13	484, 400	266			161, 355	209, 649	438, 576
Silk and silk goods (see also Mixed textiles)	1	9, 000	8	41	9	10, 800	11, 425	26, 000
Slaughtering and meat-packing, not including retail butchering establishments.	1	10, 000	7			3, 500	43, 000	50, 000
Soap and candles	2	304, 000	17	8		12, 116	183, 100	238, 700
Straw goods	1	34, 000	25	150		26, 500	120, 000	170, 000
Tinware, copperware, and sheet-iron ware	6	38, 950	74	1	6	46, 893	81, 100	156, 421
Tobacco, cigars and cigarettes	17	24, 575	40		2	16, 478	17, 937	56, 448
Woolen goods (see also Mixed textiles; Worsted goods)	3	570, 000	235	91	43	116, 909	401, 084	754, 500
Worsted goods (see also Woolen goods)	1	35, 000	40	25	55	2, 200	30, 267	54, 000
CAPE MAY:								
Flouring- and grist-mill products	7	21, 100	9			2, 040	47, 035	56, 716
Lumber, sawed	4	6, 800	9			1, 190	10, 500	20, 645
Shipbuilding	7	2, 700	24			11, 110	17, 870	30, 200
CUMBERLAND:								
Boots and shoes	7	67, 900	246	147	11	139, 420	297, 127	527, 578
Bread and other bakery products	14	23, 900	23	3	1	7, 589	30, 541	53, 278
Buttons	5	12, 000	67	12	9	25, 100	29, 800	70, 825
Carriages and wagons	9	16, 100	30			11, 775	14, 025	34, 550
Clothing, men's	6	7, 850	12	173		18, 100	59, 000	146, 450
Cotton goods	1	600, 000	84	243	90	77, 100	201, 600	383, 000
Dyeing and finishing textiles	1	150, 000	65	5	5	30, 000	80, 000	240, 000
Flouring- and grist-mill products	21	241, 646	46			18, 135	393, 095	455, 187
Foundery and machine-shop products	4	82, 000	63		10	24, 261	36, 730	88, 813
Fruits and vegetables, canned and preserved	8	165, 700	174	282	44	57, 538	203, 987	316, 537
Glass	10	805, 021	1, 232	45	506	586, 632	407, 335	1, 132, 450
Iron and steel	1	500, 000	311			124, 000	292, 700	441, 000
Lime	4	23, 500	21			5, 938	9, 745	20, 400
Lumber, sawed	15	50, 300	29			5, 556	35, 922	56, 965
Printing and publishing	8	26, 600	32	2	6	11, 062	6, 908	31, 060
Saddlery and harness	13	15, 350	18			4, 500	13, 018	27, 298
Sash, doors, and blinds	5	72, 000	64	1		24, 280	55, 400	91, 360
Shipbuilding	7	83, 400	85			39, 510	86, 670	131, 700
Shirts	3	8, 200	7	450	19	24, 100	129, 220	163, 300
Tinware, copperware, and sheet-iron ware	9	9, 800	24		1	9, 575	16, 960	34, 200
Tobacco, cigars and cigarettes	5	14, 850	18		1	6, 905	9, 984	26, 911
Tools	1	31, 000	45			23, 000	10, 000	36, 000
Woolen goods	1	116, 625	47	47	6	30, 080	118, 092	175, 000
ESSEX:								
Belting and hose, leather	2	4, 000	7		4	3, 900	16, 600	22, 200
Bookbinding and blank-book making	2	15, 300	25	3	18	18, 104	30, 050	50, 850
Boot and shoe uppers	4	18, 100	11	6	2	10, 072	30, 940	51, 000
Boots and shoes	18	457, 075	800	229	68	564, 086	1, 160, 620	1, 954, 403
Boxes, fancy and paper	11	109, 800	94	351	58	125, 874	152, 850	412, 450
Brass and copper, rolled	3	366, 000	91		45	49, 600	223, 000	304, 500
Brass castings	11	135, 000	197	4	6	94, 630	100, 468	273, 110
Bread and other bakery products	85	183, 460	254	9	16	141, 215	682, 948	1, 008, 211
Brooms and brushes	12	36, 375	69	25	11	40, 658	48, 617	118, 442
Buttons	17	188, 100	376	199	158	258, 510	224, 500	613, 380
Carriage and wagon materials	5	128, 475	105			57, 219	98, 461	212, 506
Carriages and wagons	20	295, 950	282	1	10	163, 513	210, 450	482, 817
Celluloid and celluloid goods	5	1, 209, 000	452	174	109	242, 498	388, 262	1, 251, 540
Cement	4	215, 300	76			34, 045	79, 650	140, 700
Clocks	1	30, 000	35	25	5	30, 000	10, 000	47, 000
Clothing, men's	45	475, 144	473	565	27	455, 298	1, 160, 644	2, 090, 551
Clothing, women's	4	21, 500	10	23		10, 525	34, 800	59, [illegible]
Coffee and spices, roasted and ground	3	50, 000	19			11, 289	49, 350	77, 784
Coffins, burial cases, and undertakers' goods	3	95, 000	33		6	29, 880	35, 000	9[illegible], 500
Confectionery	13	87, 100	129	14	6	62, 277	367, 905	521, 350

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW JERSEY—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
ESSEX—continued.								
Corsets	8	$103,800	53	340	61	$113,698	$213,080	$368,133
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	4	1,322,000	298	897	155	435,455	583,938	1,610,097
Cutlery and edge tools (see also Hardware)	22	274,211	433	1	78	242,132	195,172	548,705
Drugs and chemicals	16	1,690,150	456	25	22	223,406	841,982	1,380,329
Electric lights	1	200,000	60	....	15	35,000	50,000	150,000
Engraving and die-sinking	12	71,800	65	7	8	46,555	16,082	93,954
Fancy articles	12	178,000	337	31	162	287,351	158,015	542,499
Fertilizers	2	475,000	480	40	20	245,000	1,108,400	1,416,250
Files (see also Saws)	6	50,900	139	8	29	74,150	72,250	169,145
Flouring- and grist-mill products	13	89,500	40	....	....	17,738	346,260	418,073
Foundery and machine-shop products	56	1,515,350	1,288	4	61	692,782	933,822	2,002,416
Furniture	24	165,850	146	3	15	78,820	100,020	240,753
Furs, dressed	3	23,200	13	9	5	10,285	42,315	78,495
Gas machines and meters	1	40,000	11	....	1	5,000	20,000	37,500
Glass, cut, stained, and ornamented	6	45,000	44	....	5	27,090	41,212	84,893
Gold and silver, reduced and refined (not from the ore)	4	60,000	20	....	1	9,350	368,386	424,500
Hammocks	1	10,000	19	1	....	7,800	30,000	50,000
Hardware (see also Cutlery and edge tools)	28	292,350	279	22	41	139,863	376,743	672,736
Hardware, saddlery	36	790,200	816	133	150	420,294	764,579	1,554,008
Hat and cap materials	4	19,500	41	7	1	24,300	15,300	57,530
Hats and caps, not including wool hats	74	1,310,700	4,002	1,245	196	2,065,796	1,975,132	5,973,656
Hosiery and knit goods (see also Cotton goods; Woolen goods)	1	104,570	95	68	63	55,391	69,919	201,631
Ink	3	12,700	13	1	4	5,500	16,500	29,000
Iron and steel	3	600,000	281	....	....	126,144	471,946	771,078
Jewelry	65	2,517,899	1,726	259	178	1,087,416	1,931,054	4,002,677
Labels and tags	1	90,000	70	....	50	70,000	100,000	300,000
Lamps and reflectors	3	42,500	29	1	20	19,550	11,860	48,600
Lapidary work	6	5,400	25	....	4	9,900	8,200	29,506
Leather, curried	32	1,863,183	1,207	25	77	729,112	6,744,728	8,300,722
Leather, tanned	27	1,652,350	1,142	3	66	680,973	4,952,176	6,345,856
Liquors, malt	19	1,612,800	689	....	....	305,933	1,592,798	2,812,300
Looking-glass and picture frames	7	17,530	18	....	8	11,156	26,750	47,650
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	4	44,000	66	....	16	31,589	61,830	114,785
Lumber, sawed	7	130,000	36	....	....	11,250	40,540	82,670
Marble and stone work	16	191,435	221	....	34	179,659	111,110	371,775
Mineral and soda waters	8	35,200	46	....	6	22,669	53,970	93,147
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	1	104,570	8	68	63	55,390	69,920	201,630
Musical instruments, organs and materials	1	250,000	225	....	....	94,000	130,000	275,000
Oilcloth, enameled	2	190,000	130	....	30	71,627	603,200	722,000
Paints (see also Varnish)	3	48,000	21	1	....	10,904	86,994	119,301
Paper	8	255,000	126	23	9	57,657	283,678	427,724
Printing and publishing	27	276,450	281	25	28	178,963	163,900	446,105
Rubber and elastic goods	3	175,000	54	48	3	46,650	245,000	343,000
Saddlery and harness	45	501,225	638	69	25	279,577	681,380	1,200,004
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	16	260,375	316	30	21	148,125	204,189	419,496
Saws	1	35,000	90	6	50	60,000	70,000	150,000
Sewing machines and attachments	6	203,300	1,009	....	....	430,654	602,100	1,062,150
Shipbuilding	2	2,000	18	....	....	5,780	11,000	22,500
Shirts	11	171,900	60	513	21	164,549	264,094	507,806
Silk and silk goods (see also Mixed textiles)	3	328,500	95	158	61	105,140	280,390	468,250
Silversmithing	2	108,000	41	4	....	30,000	13,000	60,000
Slaughtering and meat-packing, not including retail butchering establishments.	7	232,000	88	....	....	53,822	1,368,288	1,527,660
Smelting and refining (base scrap metal, not from the ore)	2	151,800	300	....	2	156,000	8,137,500	8,370,100
Springs, steel, car, and carriage	3	66,393	87	....	1	44,050	125,250	191,100
Stationery goods	6	42,000	44	4	14	20,748	17,040	58,200
Stone- and earthen-ware	6	38,700	42	1	3	24,138	10,694	53,750
Sugar and molasses, refined	1	10,000	12	....	....	2,900	35,000	41,644
Tinware, copperware, and sheet-iron ware	15	222,750	280	37	72	130,450	369,884	54 ,613
Tobacco, cigars and cigarettes	68	189,345	249	48	38	129,767	465,606	726,282
Trunks and valises	13	786,800	1,106	90	167	549,322	1,059,855	2,013,923
Upholstering materials	3	62,500	45	76	15	39,600	75,000	126,000
Varnish (see also Paints)	16	390,000	78	....	3	52,262	521,007	792,774
Wirework	4	257,500	168	33	2	77,248	152,000	297,000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	10	26,050	27	....	7	16,090	30,716	52,800
Woolen goods (see also Mixed textiles)	4	541,000	296	117	115	171,537	580,597	869,837
GLOUCESTER:								
Carriages and wagons	3	9,000	18	....	2	8,700	10,000	28,500
Flouring- and grist-mill products	20	209,950	31	....	....	11,165	367,813	427,065
Glass	5	1,175,000	854	1	196	426,900	373,900	947,805
Lumber, sawed	15	44,550	42	....	....	8,978	39,300	66,533
Patent medicines and compounds	1	250,000	70	27	....	40,000	75,000	500,000
Woolen goods	1	18,000	110	27	9	35,000	64,425	128,000
HUDSON:								
Boxes, wooden, packing	3	170,000	94	....	18	54,824	157,952	280,070
Brass castings	4	180,600	111	....	4	47,729	89,781	157,886
Bread and other bakery products	65	123,050	146	20	8	80,963	421,814	608,938
Bridges	1	15,000	15	....	....	4,000	20,000	28,000
Buttons	1	500	25	....	....	1,200	30,000	35,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW JERSEY—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
HUDSON—continued.								
Carriages and wagons	7	$23,300	54		2	$26,000	$30,400	$77,000
Clothing, men's	32	67,765	119	44	5	65,076	194,525	331,900
Confectionery	9	28,000	20	8	16	13,616	50,540	85,290
Cooperage	10	178,900	298		13	112,648	386,346	653,529
Coppersmithing (see also Tinware, copperware, and sheet-iron ware).	1	30,000	27		3	20,000	100,000	175,000
Cotton goods (see also Hosiery and knit goods)	1	55,000	20	320	10	89,586	76,844	200,000
Crucibles	2	950,000	575			211,000	482,000	800,000
Drugs and chemicals (see also Patent medicines and compounds)	10	838,900	310	2	4	155,995	1,451,202	1,864,863
Explosives and fireworks	2	65,000	39	40	30	34,000	37,400	88,000
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	31	964,300	874	12	9	430,602	658,921	1,359,327
Furniture (see also Mattresses and spring beds; Upholstering)	5	11,600	28			10,400	19,700	42,840
Hosiery and knit goods (see also Cotton goods; Woolen goods)	2	16,000	101	150	4	27,800	54,064	108,750
Ink	1	40,000	25			18,200	40,000	100,000
Iron and steel	5	1,100,000	498		12	245,634	1,044,826	1,847,687
Iron bolts, nuts, washers, and rivets	2	110,000	75		12	60,863	294,403	379,562
Iron doors and shutters	1	10,000	90		12	40,000	75,000	150,000
Iron forgings	1	6,000	10			4,881	11,550	21,087
Iron railing, wrought	4	22,200	18		3	11,745	51,175	74,337
Ivory and bone work	1	1,500	25	6	19	12,000	10,000	30,000
Lard, refined	1	25,000	28			15,000	150,000	175,000
Leather, curried	2	42,500	27	1	1	15,595	143,162	176,700
Leather, tanned	3	35,500	25		1	12,495	112,724	143,742
Liquors, malt	15	912,500	255			113,153	581,140	1,032,772
Looking-glass and picture frames	3	102,800	179	26	8	71,500	176,500	259,700
Marble and stone work	14	39,350	95		3	42,015	52,700	131,200
Mattresses and spring beds (see also Furniture)	6	26,000	58	5	7	17,142	48,476	84,000
Mineral and soda waters	3	23,500	22			5,750	13,600	36,000
Oil, castor	1	250,000	30			15,000	200,000	300,000
Oilcloth, floor	1	135,000	63		14	31,032	167,888	217,218
Paints (see also Varnish)	3	530,000	51			22,500	114,000	165,000
Paper	2	120,000	63	18	4	33,000	94,000	163,300
Patent medicines and compounds (see also Drugs and chemicals)	2	30,000	11	10	3	11,750	29,000	80,000
Pencils, lead	1	100,000	47	24	99	35,000	35,000	100,000
Printing and publishing	9	82,700	109	3	9	54,549	34,436	127,674
Rubber and elastic goods	1	70,000	35			12,098	111,430	142,172
Sash, doors, and blinds (see also Wood, turned and carved)	9	36,200	61		1	36,124	84,008	146,372
Shipbuilding	27	269,500	364			239,392	226,289	543,766
Shirts	6	10,300	6	51	4	10,100	29,400	48,925
Silk and silk goods	17	753,300	911	813	281	615,560	1,089,685	2,045,000
Slaughtering and meat packing, not including retail butchering establishments.	20	1,272,200	423		10	303,800	17,404,689	18,551,783
Soap and candles	3	783,000	190		175	158,122	807,250	1,340,000
Sporting goods	1	15,000	24	11		15,000	7,000	45,000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	40,000	72			24,300	22,000	60,000
Stone- and earthen-ware	1	30,000	77	1	7	30,000	25,000	65,000
Sugar and molasses, refined	3	2,100,000	680		5	473,316	20,759,961	22,799,614
Taxidermy	1	10,000	5	100	20	9,000	10,000	25,000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	27	66,900	83		4	39,374	69,900	146,714
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	1,000,000	929	1,966	136	893,040	3,033,327	4,478,675
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	66	112,475	162	2	12	74,328	125,807	270,148
Trunks and valises	2	205,000	207	70	83	101,500	290,000	440,000
Umbrellas and canes	3	100,150	193		40	61,400	63,684	170,000
Upholstering (see also Furniture)	8	4,450	11		3	5,237	11,476	23,150
Varnish (see also Paints)	1	40,000	6			4,368	30,000	48,000
Vinegar	1	10,600	6			3,000	27,000	35,000
Wheelbarrows	1	100,000	48			17,000	14,000	36,000
Window blinds and shades	3	151,300	55	3	20	28,300	102,000	214,500
Wirework	2	31,300	57	5	6	24,401	27,380	63,000
Wood, turned and carved (see also Sash, doors, and blinds)	6	20,000	59		7	24,750	35,700	75,500
Zinc	1	125,000	29			45,373	141,548	200,000
HUNTERDON:								
Brick and tile	6	25,100	36	2	1	8,550	7,462	27,020
Carriage and wagon materials	5	68,800	79			31,650	32,000	127,000
Clothing, men's	13	24,900	10	43		8,790	20,750	44,500
Cordage and twine	1	50,000	10	26	19	8,145	20,002	35,189
Cotton goods	1	40,000	9	33	7	9,947	37,000	56,317
Cutlery and edge tools	1	36,000	12			6,000	12,000	26,000
Flouring- and grist-mill products	63	363,800	85			27,028	666,810	778,586
Foundery and machine-shop products	3	254,300	142		5	66,913	249,176	377,600
Fruits and vegetables, canned and preserved	1	16,000	18	42		4,500	13,800	21,000
Iron forgings	1	175,000	85		4	40,124	210,000	301,000
Liquors, malt	2	20,000	9			3,293	17,249	30,270
Looking-glass and picture frames	1	20,000	15	5	4	7,000	15,000	25,000
Lumber, sawed	32	167,350	70			19,209	113,810	179,749
Paper	4	288,000	136	8	5	45,430	276,212	422,754
Rubber and elastic goods	1	150,000	110	35		45,551	151,022	215,554
Saddlery and harness	15	13,225	14			3,225	12,375	28,600
Tinware, copperware, and sheet-iron ware	13	21,000	16			6,095	17,900	30,800

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW JERSEY—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
MERCER:								
Agricultural implements	4	$64,000	43	...	...	$14,100	$20,850	$66,500
Bags, paper	4	13,550	15	22	...	7,679	26,050	46,825
Boots and shoes	6	110,200	457	12	...	83,304	390,860	507,899
Bread and other bakery products	39	132,800	108	3	69	66,139	264,754	444,010
Brick and tile	10	219,500	316	...	45	101.250	58,125	214,800
Bridges	1	170,709	160	...	...	48,484	278,448	387,291
Carriage and wagon materials	1	9,000	13	...	2	5,000	2,500	20,000
Carriages and wagons	8	52,500	66	...	2	27,500	44,800	92,100
Clothing, men's	20	96,150	95	118	2	67,360	156,200	284,900
Coffins, burial cases, and undertakers' goods	4	10,300	8	1	...	4,334	9,200	21,100
Confectionery	8	11,750	15	7	7	7,908	31,017	47,225
Cotton goods	2	102,000	52	165	49	48,753	110,039	190,781
Cutlery and edge tools (see also Hardware)	1	21,700	70	...	5	30,793	41,296	91,535
Drugs and chemicals	3	12,700	11	...	...	4,568	17,300	32,000
Flouring- and grist-mill products	24	243,000	57	...	...	18,654	505,117	585,324
Foundery and machine-shop products	11	115,200	307	...	1	124,554	196,856	399,718
Furniture (see also Upholstering)	8	25,300	28	...	5	16,012	12,700	39,500
Hardware (see also Cutlery and edge tools)	2	200,000	98	10	10	71,827	155,000	275,000
Iron and steel	3	1,945,550	1,361	...	30	518,325	1,371,245	2,340,381
Iron forgings	6	110,941	154	...	29	64,766	100,668	201,302
Jewelry	2	28,000	35	1	...	17,500	22,000	50,000
Kaolin and ground earths	1	50,000	32	2	...	20,800	21,216	72,000
Lime	2	38,000	16	...	...	6,000	35,000	45,000
Lumber, planed (see also Sash, doors, and blinds)	3	28,000	15	...	7	7,050	15,900	33,000
Lumber, sawed	9	93,900	54	...	...	12,904	79,657	112,700
Marble and stone work	14	72,225	61	...	3	37,359	42,208	110,190
Printing and publishing	9	149,800	139	6	22	83,444	87,618	230,594
Roofing and roofing materials	4	2,800	14	...	...	4,600	13,900	27,800
Rubber and elastic goods	4	305,000	251	...	22	114,575	892,844	1,120,776
Saddlery and harness	13	16,900	17	...	1	7,545	22,272	43,896
Sash, doors, and blinds (see also Lumber, planed)	4	14,700	24	...	...	6,571	13,200	27,200
Saws	1	150,000	70	...	5	30,643	34,462	89,909
Shipbuilding	1	6,000	27	...	...	16,360	9,000	31,000
Shirts	2	6,800	2	47	3	8,840	42,500	75,800
Slaughtering and meat-packing, not including retail butchering establishments.	3	261,000	54	...	...	13,156	533,458	590,197
Soap and candles	3	34,200	13	...	...	6,335	44,640	54,700
Stone- and earthen-ware	29	1,902,500	1,792	441	634	983,177	950,243	2,341,337
Tinware, copperware, and sheet-iron ware	17	21,050	46	...	...	21,744	51,483	94,990
Tobacco, cigars and cigarettes	27	16,600	48	1	4	18,947	23,853	66,471
Upholstering (see also Furniture)	3	8,500	9	5	2	4,950	19,500	29,000
Wire	1	200,000	400	...	100	255,000	700,000	1,020,000
Woolen goods	5	559,000	226	232	127	177,150	607,035	896,297
MIDDLESEX:								
Boots and shoes	8	103,000	160	73	4	78,045	219,075	330,600
Boots and shoes, rubber	3	600,000	546	438	15	275,997	1,419,849	2,366,465
Boxes, wooden, packing	2	8,000	9	15	2	6,300	24,000	38,600
Bread and other bakery products	13	32,100	33	1	...	17,500	62,295	96,275
Brick and tile	21	930,200	1,203	24	58	334,468	280,587	850,710
Carriages and wagons	8	39,200	51	...	1	21,548	13,450	45,270
Clothing, men's	12	90,700	79	374	35	67,518	528,100	638,850
Coffee and spices, roasted and ground	1	35,000	9	...	...	3,500	70,000	77,000
Confectionery	2	3,500	5	...	...	2,440	16,000	23,640
Cork cutting	1	50,000	40	...	20	15,000	50,000	75,000
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	1	15,000	4	10	...	4,680	15,600	25,000
Drugs and chemicals	1	80,000	61	...	...	20,000	175,000	250,000
Flouring- and grist-mill products	16	74,400	29	...	...	8,398	234,849	273,337
Foundery and machine-shop products	9	96,000	167	...	...	74,790	70,900	170,200
Fruit-jar trimmings	1	150,000	230	93	25	104,501	318,708	485,503
Hosiery and knit goods (see also Cotton goods)	1	662,500	100	360	60	145,280	114,083	510,000
Kaolin and ground earths	1	30,000	24	...	...	7,500	40,000	70,000
Lumber, sawed	5	60,800	8	...	...	2,275	22,395	33,800
Marble and stone work	5	18,700	29	...	...	11,450	14,400	36,550
Mixed textiles (see also Cotton goods)	1	662,500	100	360	60	145,280	114,083	510,000
Paperhangings	2	250,000	145	13	10	51,698	245,688	424,469
Printing and publishing	5	46,000	41	14	11	26,480	13,115	56,064
Rubber and elastic goods	1	120,000	219	197	65	111,350	150,000	275,000
Saddlery and harness	6	11,100	27	...	2	8,175	14,290	27,045
Shipbuilding	6	44,400	39	...	...	21,815	33,321	63,750
Shirts	5	165,450	155	481	117	198,372	390,615	640,934
Stone- and earthen-ware	3	35,500	47	...	9	19,946	13,336	59,670
Tobacco, chewing, smoking, and snuff	4	270,000	49	25	30	24,600	408,372	517,774
MONMOUTH:								
Bread and other bakery products	6	19,800	17	3	...	6,050	20,910	34,400
Brick and tile	11	34,700	92	...	3	13,291	11,504	40,125
Carriages and wagons	9	43,950	78	...	1	32,618	44,998	104,460
Clothing, men's	5	19,000	32	33	...	17,100	40,760	65,000
Fertilizers	1	50,000	40	...	...	12,000	250,000	265,000
Flouring- and grist-mill products	37	315,200	63	...	...	16,669	455,230	517,118
Foundery and machine-shop products	2	16,000	30	...	18	17,424	21,194	43,500
Fruits and vegetables, canned and preserved	4	39,000	54	135	28	11,400	35,500	60,000
Leather, tanned	2	13,500	7	...	...	2,360	16,850	21,750
Lumber, sawed	25	75,075	48	...	...	8,929	54,349	93,770

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW JERSEY—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
MONMOUTH—continued.								
Pickles, preserves, and sauces	1	$10,000	9		3	$4,281	$36,410	$45,112
Saddlery and harness	12	19,050	14			3,931	11,150	21,950
Sash, doors, and blinds	7	31,700	47			14,200	52,400	78,700
Shipbuilding	6	20,900	33			14,700	14,800	36,800
Tinware, copperware, and sheet-iron ware	7	19,000	19		1	6,755	11,336	23,300
MORRIS:								
Agricultural implements	3	17,000	22			5,290	12,600	33,200
Brick and tile	3	18,800	48		2	8,700	6,100	21,000
Buttons	1	10,000	75	50		45,320	12,000	75,000
Carriages and wagons	5	34,000	48		1	20,000	20,831	55,163
Flouring- and grist-mill products	38	247,100	57			14,733	406,684	464,933
Foundery and machine-shop products	2	46,500	46		2	20,750	30,300	91,225
Hat and cap materials	1	12,000	6			1,664	16,366	24,960
High explosives	1	21,000	35	1		17,821	179,312	274,000
Iron and steel	13	1,140,500	472		2	111,103	491,833	704,229
Lumber, sawed	28	72,000	49			8,340	53,105	85,020
Paper	7	124,000	90	17	4	22,466	85,069	147,721
Rubber, vulcanized	3	226,200	335	150	10	154,700	391,200	767,200
Tinware, copperware, and sheet-iron ware	4	11,000	12		1	6,700	14,500	26,463
OCEAN:								
Bagging, flax, hemp, and jute	1	50,000	44	20	8	15,007	55,874	86,525
Flouring- and grist-mill products	8	42,500	15			4,015	88,724	101,813
Lumber, sawed	17	71,500	49		1	11,281	44,022	87,503
PASSAIC:								
Bagging, flax, hemp, and jute	2	330,000	237	252	131	180,000	279,686	488,310
Belting and hose, leather	4	36,500	27			12,434	57,196	82,345
Boxes, fancy and paper	2	13,000	6	42	8	14,300	24,200	45,500
Boxes, wooden, packing	1	45,000	14			6,500	25,200	38,000
Brass castings	3	152,000	234			112,250	14,500	183,500
Bread and other bakery products	32	71,690	41			14,770	74,889	135,140
Brick and tile	5	48,600	130			14,975	7,989	33,250
Carpets, other than rag (see also Woolen goods)	1	100,000	114	60	58	46,000	102,425	169,500
Carriages and wagons	4	40,000	43			21,340	11,700	48,718
Clothing, men's	5	18,800	46	13		22,800	21,800	55,900
Cotton goods (see also Mixed textiles)	3	548,877	324	344	209	284,011	423,226	1,097,020
Drugs and chemicals	3	37,000	32		1	14,322	128,137	144,660
Dyeing and finishing textiles	13	996,600	1,227	137	91	640,644	1,118,399	2,262,583
Felt goods (see also Woolen goods)	4	113,000	74	11	14	23,420	98,845	152,156
Files	2	20,200	58		21	26,200	10,512	42,406
Flouring- and grist-mill products	11	54,100	24			9,640	96,448	123,540
Foundery and machine-shop products	28	1,673,000	2,601	86	124	1,056,522	1,696,874	3,034.789
Furniture	2	7,000	8			5,676	11,000	20,300
Gunpowder	1	55,000	30			11,442	70,216	91,560
Iron and steel	5	560,000	656			302,660	519,029	927,803
Iron bolts, nuts, washers, and rivets	2	50,050	121		1	24,400	40,450	73,300
Liquors, malt	6	592,000	138			59,611	311,265	546,510
Liquors, vinous	1	50,000	27			7,000	50,000	60,000
Lumber, planed (see also Wood, turned and carved)	1	75,000	34		4	14,000	60,000	80,000
Marble and stone work	6	21,500	31			12,567	12,365	42,475
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	6	799,500	402	431	211	313,050	631,600	1,164,050
Paper	2	480,000	107	55	8	59,269	224,611	380,760
Printing and publishing	4	61,500	45	26	10	33,891	29,517	92,522
Printing materials	1	12,000	12			5,500	6,300	30,000
Saddlery and harness	4	10,800	15			9,100	20,000	38,551
Shirts	2	110,000	250	375	25	193,600	225,000	480,204
Shoddy (see also Mixed textiles)	1	35,000	10	5	15	25,000	80,734	137,500
Silk and silk goods (see also Mixed textiles)	82	5,660,525	3,543	4,169	2,097	3,335,045	8,099,161	14,164,465
Soap and candles	1	40,000	9			4,200	60,000	75,000
Thread, linen	1	500,000	200	730		260,000	750,000	1,200,000
Tinware, copperware, and sheet-iron ware	15	72,100	108			42,049	68,373	143,680
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	23,000	12	3	15	5,710	51,250	67,500
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	18	19,450	46	1	4	18,110	33,030	71,280
Whips	1	70,000	32	11		24,000	25,000	90,000
Wood, turned and carved (see also Lumber, planed)	6	44,800	82		10	30,598	23,950	64,600
Woolen goods (see also Carpets, other than rag; Felt goods; Mixed textiles; Worsted goods).	3	428,000	411	138	222	146,927	435,580	707,075
Worsted goods (see also Woolen goods)	1	10,000	50	10		20,000	40,150	65,000
SALEM:								
Clothing, men's	6	8,500	15	14		7,375	16,100	30,350
Flouring- and grist mill products	18	191,400	51		2	14,805	475,696	548,773
Foundery and machine-shop products	4	50,500	34			11,278	18,060	34,650
Fruits and vegetables, canned and preserved	3	144,606	132	251	15	23,250	89,000	124,500
Glass	3	298,000	478		22	179,884	202,231	447,530
Leather, tanned	3	29,000	9			3,171	21,989	31,589
Lumber, sawed	18	46,700	54		1	12,640	51,480	88,684
Oilcloth, floor	1	65,000	75			31,000	190,000	225,000
Saddlery and harness	6	7,850	19			5,325	10,850	20,500
Shirts	2	900		85		11,850	24,000	41,000
Tinware, copperware, and sheet-iron ware	8	17,450	18			7,100	8,400	23,300

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW JERSEY—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products
SOMERSET:								
Agricultural implements	1	$15, 000	25			$8, 400	$6, 200	$20, 400
Brick and tile	3	20, 000	67			12, 240	7, 440	26, 250
Cheese and butter (factory)	2	4, 000	4			1, 012	16, 161	27, 270
Flouring- and grist-mill products	31	356, 800	73			20, 780	651, 854	756, 583
Foundery and machine-shop products	2	34, 000	35			15, 296	26, 225	79, 200
Tobacco, cigars and cigarettes	3	5, 300	8			2, 952	11, 200	27, 800
Woolen goods	2	225, 000	457	328		294, 766	892, 010	1, 333, 000
SUSSEX:								
Boots and shoes	1	30, 000	85	43	5	50, 300	110, 000	172, 500
Cheese and butter (factory)	9	38, 170	26	1	1	7, 383	69, 330	95, 793
Flouring- and grist-mill products	40	231, 200	68			14, 401	378, 986	435, 865
Iron and steel	2	700, 000	249		7	106, 872	714, 515	1, 130, 480
Leather, tanned	4	25, 300	9			2, 200	21, 960	32, 750
Lime	2	36, 000	27			7, 310	17, 200	33, 294
Lumber, sawed	16	27, 050	28			3, 800	22, 830	40, 865
Tinware, copperware, and sheet-iron ware	7	17, 900	13			4, 695	8, 914	20, 029
Woolen goods	1	30, 000	15	12	10	18, 000	11, 087	50, 000
UNION:								
Boots and shoes	2	25, 500	21	7		16, 640	35, 360	61, 000
Bread and other bakery products	20	34, 050	52	1		22, 088	102, 095	157, 400
Brick and tile	4	80, 000	108		1	46, 750	71, 700	143, 000
Carriage and wagon materials	5	79, 000	56			32, 600	34, 500	84, 000
Carriages and wagons	20	140, 840	213	12		96, 850	161, 900	358, 700
Clothing, men's	16	205, 950	248	507	4	217, 524	580, 050	885, 624
Clothing, women's	1	700	1	18	1	3, 000	13, 000	20, 000
Confectionery	5	35, 300	15	7	4	9, 700	69, 500	107, 600
Cordage and twine	1	325, 000	100	40	20	60, 000	600, 000	700, 000
Cutlery and edge tools	1	3, 000	53			18, 000	5, 000	35, 000
Drugs and chemicals	2	47, 000	49			20, 500	3, 250	42, 5[illegible]
Felt goods	1	150, 000	170	10	1	60, 000	408, 300	514, 630
Fertilizers	4	122, 000	91			35, 300	302, 500	378, 000
Flouring- and grist-mill products	9	67, 700	27			5, 757	108, 345	130, 320
Foundery and machine-shop products	8	371, 000	348		45	155, 700	144, 871	447, 500
Grease and tallow	1	3, 000	6			2, 000	50, 000	60, 000
Hardware, saddlery	1	80, 000	40	6		21, 678	15, 379	55, 547
Hats and caps, not including wool hats	2	30, 000	86	23	6	45, 000	125, 000	170, 000
Iron and steel	1	25, 000	57		3	15, 000	50, 750	72, 009
Leather, curried	2	19, 000	24	1		11, 300	133, 800	156, 000
Leather, tanned	2	17, 000	19	1	2	10, 300	106, 000	130, 300
Liquors, malt	3	89, 500	18			7, 568	40, 101	69, 825
Lumber, sawed	3	40, 400	20			7, 350	14, 500	29, 300
Oilcloth, floor	2	275, 000	95			48, 000	276, 000	370, 000
Paper	3	35, 500	26			9, 400	38, 500	58, 400
Paperhangings	1	20, 000	16			5, 000	25, 000	30, 000
Paving materials	1	3, 000	6			3, 000	6, 000	30, 000
Printing and publishing	11	77, 800	105	6	17	45, 930	44, 600	121, 400
Roofing and roofing materials	1	10, 000	12			3, 640	24, 000	30, 000
Saddlery and harness	8	8, 200	13			6, 550	12, 150	25, 230
Sash, doors, and blinds	5	56, 550	21			8, 700	9, 560	29, 500
Saws	1	50, 000	37		3	30, 000	10, 000	40, 000
Sewing machines and attachments	1	948, 655	1, 825	75	400	1, 088, 593	882, 502	3, 576, 702
Shipbuilding	6	15, 370	44			23, 441	21, 205	49, 017
Stone- and earthen-ware	3	28, 000	78	15	15	37, 000	27, 300	70, 000
Straw goods	1	20, 000	8	2		2, 500	25, 000	75, 000
Tinware, copperware, and sheet-iron ware	6	16, 400	29			15, 065	19, 179	44, 945
Tobacco, cigars and cigarettes	20	24, 250	28		4	12, 924	34, 830	68, 950
Upholstering	8	11, 200	13	1		7, 350	18, 700	32, 200
WARREN:								
Agricultural implements	7	20, 900	26			7, 775	11, 725	27, 457
Carriage and wagon materials	5	34, 500	16			4, 950	15, 225	26, 500
Carriages and wagons	10	48, 100	69		1	29, 950	36, 200	71, 700
Clothing, men's	10	34, 800	29	41		23, 875	38, 350	74, 050
Flouring- and grist-mill products	53	448, 992	89			23, 747	666, 811	743, 929
Foundery and machine-shop products	4	309, 871	399		37	176, 393	785, 682	1, 002, 115
Furniture	6	46, 000	25			11, 143	14, 200	42, 500
Iron and steel	7	2, 528, 000	826		27	258, 710	1, 599, 439	2, 107, 238
Lime	5	8, 200	30			7, 200	9, 900	34, 200
Looking-glass and picture frames	1	12, 000	20	8	17	10, 000	10, 000	36, 000
Lumber, sawed	20	97, 500	47			12, 080	52, 160	89, 559
Musical instruments, organs and materials	4	104, 022	184	2		66, 900	85, 168	192, 000
Paper	1	28, 000	15	2	1	6, 754	45, 462	80, 000
Saddlery and harness	13	27, 300	15		1	4, 530	15, 960	27, 850
Woolen goods	1	12, 000	6		6	1, 575	29, 000	35, 759

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW MEXICO TERRITORY.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
SANTA FÉ:								
Flouring- and grist-mill products	3	$6,500	5			$1,600	$35,250	$42,050
Jewelry	3	13,000	16			11,000	14,000	35,000
Lumber, sawed	2	4,500	20			6,000	18,000	29,000
SAN MIGUEL:								
Carriages and wagons	1	20,000	12			9,500	30,000	48,000
Flouring- and grist-mill products	6	32,000	15			3,973	35,580	44,271
Lumber, sawed	8	25,000	81			8,400	56,050	78,300
Tinware, copperware, and sheet-iron ware	1	15,000	5			4,100	20,000	30,000
TAOS:								
Flouring- and grist-mill products	12	18,050	20			3,810	95,560	109,014

NEW YORK.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
ALBANY:								
Agricultural implements	3	$359,000	280			$70,788	$146,000	$336,586
Axle-grease	2	30,500	5			2,100	38,600	54,000
Baking and yeast powders (see also Drugs and chemicals)	3	57,000	16	16		10,095	126,383	164,514
Bells	1	70,000	7			3,250	42,560	65,000
Billiard tables and materials	1	30,000	15		1	9,350	60,500	92,100
Bone-, ivory-, and lamp-black	1	35,000	10		2	3,063	70,503	82,826
Bookbinding and blank-book making	7	47,100	52	22	8	35,589	48,112	103,407
Boots and shoes	11	595,000	1,087	453	39	512,619	1,252,647	2,124,214
Boxes, cigar	5	15,500	15	14	3	6,175	24,183	40,639
Boxes, fancy and paper	12	36,535	40	213	8	40,820	72,918	133,070
Boxes, wooden, packing	2	22,500	12		3	4,613	15,858	29,067
Brass castings	5	76,800	56		2	13,658	87,685	119,245
Bread and other bakery products	63	569,566	350	56	29	227,791	855,955	1,244,489
Brick and tile	12	175,000	278		42	78,305	48,007	186,800
Brooms and brushes	5	37,874	42		26	13,800	38,057	99,768
Cars, street, railroad, and repairs	1	200,000	400		25	160,000	500,000	700,000
Carriage and wagon materials	2	13,000	17			5,317	14,082	28,608
Carriages and wagons	10	153,708	150		1	54,701	80,508	175,025
Clothing, men's	51	413,841	704	264	9	273,826	499,107	954,896
Coffee and spices, roasted and ground	5	167,775	39	1	2	25,389	467,800	557,126
Coffins, burial cases, and undertakers' goods	9	62,300	22	4		10,279	22,668	52,295
Collars and cuffs, paper	1	50,000	4	46		15,000	60,000	125,000
Confectionery	21	62,600	54	20	16	31,577	92,394	172,421
Cooperage	13	53,800	68		4	22,711	63,350	103,500
Cork cutting	1	20,000	16	14		4,500	30,000	40,000
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	7	5,205,000	1,302	1,654	1,157	851,096	2,162,805	3,506,821
Cutlery and edge tools (see also Hardware)	4	183,000	224		2	92,072	110,319	238,042
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	3	109,235	27	3		12,472	60,166	90,792
Electroplating	4	14,000	25		6	13,477	5,300	29,563
Engraving and die-sinking	3	7,300	9	1	1	6,666	8,600	23,700
Fancy articles	1	70,000	55	3	25	20,800	16,000	65,000
Flouring- and grist-mill products	21	339,325	70			23,025	490,631	575,607
Food preparations (see page 39)	1	4,500	6			2,700	35,600	42,000
Foundery and machine-shop products	28	3,070,959	2,156		59	974,145	1,159,617	2,656,635
Furniture (see also Upholstering)	22	261,300	248	5	11	96,689	130,706	315,073
Furniture, chairs	1	50,000	57	43		15,500	41,500	65,000
Furs, dressed	2	102,000	19	21	2	20,149	64,700	115,700
Gas machines and meters	1	50,000	31	2		14,368	14,519	36,387
Hardware (see also Cutlery and edge tools)	1	150,000	60	2	140	45,000	100,000	180,000
Hardware, saddlery	1	25,000	35			9,100	32,693	49,750
Hosiery and knit goods (see also Cotton goods; Woolen goods)	19	1,947,090	883	1,631	298	771,995	1,683,201	3,398,232
Iron and steel	3	1,816,967	526		15	185,957	599,674	1,167,158
Iron pipe, wrought	1	40,000	53		7	19,500	149,350	234,000
Jewelry	7	24,100	23	1	1	13,650	10,250	33,260
Lasts	1	30,000	24			12,000	15,000	44,000
Leather, curried	6	46,100	21			7,844	76,786	98,490
Leather, tanned	7	183,600	86	2	3	34,630	136,960	202,375
Lime	1	3,000	20			3,600	1,500	25,000
Liquors, malt	19	1,975,000	668			294,987	1,501,176	2,680,655
Looking-glass and picture frames	4	19,400	28		3	15,295	14,862	37,507
Lumber, planed (see also Sash, doors, and blinds)	6	157,000	176		25	72,997	162,250	294,261
Lumber, sawed	24	133,700	40			6,030	87,747	112,956
Malt	13	1,322,688	155			52,622	1,111,656	1,348,858
Marble and stone work	17	60,900	120			36,677	38,400	111,860
Mineral and soda waters	6	47,800	48			16,571	62,956	111,196
Mixed textiles (see also Cotton goods; Woolen goods)	12	1,276,000	483	1,026	208	561,379	958,994	2,147,155
Musical instruments, pianos and materials	7	227,200	169		1	77,757	129,117	248,000
Oil, linseed	1	150,000	22			12,000	250,000	300,000
Oilcloth, enameled	1	100,000	50	1	9	32,000	165,000	220,000
Paper (see also Collars and cuffs, paper)	5	151,000	58	7	5	19,428	49,960	103,810
Patent medicines and compounds (see also Drugs and chemicals)	5	47,000	21	7	7	13,700	47,075	85,126
Plated and britannia ware	1	140,000	30	23		18,000	60,000	90,000
Printing and publishing	23	1,057,100	565	148	26	360,083	355,017	917,791
Roofing and roofing materials	5	22,000	55			23,650	50,000	85,695
Saddlery and harness	36	43,188	66		1	24,905	39,841	104,799

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ALBANY—continued.								
Safes, doors, and vaults, fire-proof	1	$55, 000	60			$22, 378	$40, 000	$85, 000
Sash, doors, and blinds (see also Lumber, planed)	8	74, 000	113		4	43, 500	85, 200	160, 035
Shipbuilding	5	20, 300	86			59, 360	42, 032	112, 800
Shirts	11	693, 894	25	93		35, 525	149, 318	206, 788
Slaughtering and meat-packing, not including retail butchering establishments.	10	193, 000	70			18, 182	750, 645	804, 773
Soap and candles	9	71, 400	17			7, 750	48, 511	82, 552
Stationery goods	3	275, 000	67	92		40, 494	278, 459	366, 046
Tinware, copperware, and sheet-iron ware	38	102, 800	106		7	39, 698	92, 001	167, 197
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	2	155, 000	63	8	10	43, 000	370, 000	536, 000
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	57	226, 675	301	49	40	124, 607	277, 916	563, 711
Upholstering (see also Furniture)	4	15, 450	16	6	1	10, 568	28, 526	47, 302
Wirework	6	11, 575	13	1	3	4, 907	52, 700	67, 533
Woolen goods (see also Mixed textiles)	2	967, 000	244	292	101	194, 280	426, 368	750, 370
ALLEGANY:								
Carriages and wagons	7	33, 250	51			19, 539	31, 750	63, 141
Cheese and butter (factory)	88	194, 715	143	56	1	46, 299	512, 197	682, 819
Flouring- and grist-mill products	32	226, 350	48			15, 408	422, 470	491, 900
Foundery and machine-shop products	9	180, 000	142		16	37, 791	45, 982	104, 121
Furniture	8	34, 500	34			13, 550	16, 140	37, 200
Leather, curried	6	31, 600	14			5, 175	119, 463	146, 700
Leather, tanned	10	395, 600	185	2	1	58, 810	678, 711	994, 550
Lumber, sawed	74	209, 175	244		17	36, 526	150, 893	241, 734
Paper	1	25, 000	16	3		7, 500	36, 000	55, 000
Saddlery and harness	16	25, 850	28			11, 929	19, 367	55, 470
Sash, doors, and blinds	5	30, 500	23			11, 000	17, 850	35, 100
Tinware, copperware, and sheet-iron ware	8	11, 100	21			5, 761	15, 100	27, 650
BROOME:								
Agricultural implements	4	64, 500	42			16, 200	27, 575	74, 080
Bluing	1	53, 000	20	8		9, 500	45, 250	72, 800
Boots and shoes	4	275, 000	242	21	8	152, 648	310, 750	563, 000
Boxes, cigar	3	8, 000	12	15		5, 200	26, 350	38, 640
Bread and other bakery products	4	44, 200	31	2		14, 476	79, 906	112, 037
Carriage and wagon materials	2	21, 000	18			8, 650	17, 396	32, 800
Carriages and sleds, children's	1	39, 000	65	1		22, 316	28, 000	60, 000
Carriages and wagons	8	72, 700	71		3	31, 880	46, 780	101, 800
Cheese and butter (factory)	9	17, 400	19	6		3, 990	39, 669	53, 458
Clothing, men's	5	226, 500	162	321	11	95, 602	240, 100	395, 300
Coffee and spices, roasted and ground	1	50, 000	9	2		6, 800	82, 000	100, 000
Combs	1	40, 000	18		1	9, 600	8, 700	30, 000
Confectionery	4	12, 500	17	1	1	6, 825	20, 300	38, 000
Cooperage	13	89, 045	51			23, 400	36, 855	84, 585
Drugs and chemicals	3	50, 000	26			15, 200	51, 100	120, 000
Flouring- and grist-mill products	28	264, 700	61			19, 283	749, 333	838, 912
Foundery and machine-shop products	8	123, 100	71			35, 885	72, 380	125, 787
Furniture (see also Upholstering)	8	53, 500	30		1	11, 575	35, 300	67, 700
Gunpowder	1	75, 000	15	10		12, 600	140, 000	200, 000
Hardware	3	12, 000	7	1		4, 270	9, 218	20, 795
Leather, curried	4	157, 800	55			26, 250	457, 509	495, 275
Leather, dressed skins	1	400, 000	17		2	4, 987	118, 134	167, 832
Leather, tanned	10	410, 862	249		4	100, 129	713, 781	961, 159
Liquors, malt	3	20, 000	8			3, 324	16, 521	29, 486
Looking-glass and picture frames	2	13, 000	6			2, 200	10, 500	23, 520
Lumber, sawed	66	239, 550	264		3	43, 910	185, 170	294, 560
Marble and stone work	5	45, 800	28			13, 790	28, 800	54, 400
Oil, lubricating	1	35, 000	40			36, 000	30, 000	76, 000
Paper	1	25, 000	6	2		3, 500	14, 500	23, 900
Printing and publishing	4	59, 500	68		4	29, 082	21, 785	75, 493
Saddlery and harness	12	14, 667	21	2		9, 600	19, 906	41, 100
Sash, doors, and blinds	4	96, 000	116		2	46, 800	101, 000	173, 500
Scales and balances	2	65, 000	36		5	12, 106	17, 521	39, 244
Slaughtering and meat-packing, not including retail butchering establishments.	3	58, 000	22			2, 300	53, 800	67, 200
Soap and candles	2	21, 000	8		1	3, 580	37, 500	57, 000
Tinware, copperware, and sheet-iron ware	16	61, 900	57	20		30, 136	51, 764	118, 690
Tobacco, cigars and cigarettes	22	318, 100	389	234	73	208, 276	611, 410	965, 415
Upholstering (see also Furniture)	2	32, 000	31			10, 000	24, 000	45, 000
Whips	3	76, 000	37	18		29, 820	30, 000	85, 000
CATTARAUGUS:								
Agricultural implements	2	30, 000	65		5	22, 800	23, 465	57, 870
Brick and tile	6	9, 300	60		14	12, 872	4, 800	22, 560
Carriage and wagon materials	3	14, 000	16			4, 675	8, 920	30, 450
Carriages and wagons	5	60, 000	70			23, 800	49, 620	101, 000
Cheese and butter (factory)	116	237, 645	206	52	3	47, 455	672, 311	913, 578
Clothing, men's	8	29, 500	31	19		16, 336	38, 000	71, 000
Cooperage	10	17, 380	50			14, 260	26, 875	60, 500
Flouring and grist-mill products	35	174, 000	49			12, 388	459, 029	520, 437
Foundery and machine-shop products	10	45, 775	49		1	20, 275	20, 659	61, 200
Furniture	9	22, 200	18			5, 085	7, 525	22, 900

Table V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Cattaraugus—continued.								
Handles, wooden	4	$58, 600	72	....	....	$17, 712	$36, 950	$73, 100
Leather, curried	4	84, 000	71	....	3	29, 870	351, 965	406, 985
Leather, tanned	12	881, 009	284	....	3	105, 530	1, 268, 208	1, 620, 077
Lumber, planed (see also Sash, doors, and blinds)	5	15, 518	29	....	2	10, 772	28, 800	49, 950
Lumber, sawed	128	903, 325	650	....	12	138, 425	744, 644	1, 071, 440
Saddlery and harness	19	25, 200	28	....	....	7, 929	35, 910	59, 361
Sash, doors, and blinds (see also Lumber, planed)	3	51, 000	79	....	....	33, 356	42, 300	98, 750
Tinware, copperware, and sheet-iron ware	14	20, 177	29	....	....	6, 446	14, 180	30, 013
Woolen goods	4	33, 000	8	2	....	2, 400	14, 810	24, 213
Cayuga:								
Agricultural implements	9	1, 267, 000	1, 128	....	8	552, 564	897, 350	2, 422, 323
Bookbinding and blank-book making	1	10, 000	18	12	10	13, 000	15, 000	40, 000
Boots and shoes	2	125, 000	328	....	....	66, 493	464, 855	578, 598
Boxes, fancy and paper	1	5, 000	2	15	10	9, 000	14, 000	25, 000
Bread and other bakery products	5	7, 900	20	2	1	11, 090	45, 706	69, 006
Brick and tile	8	29, 300	80	....	2	12, 941	21, 282	51, 970
Buttons	1	200, 000	100	200	30	100, 000	150, 000	300, 000
Carpets, other than rag (see also Woolen goods)	1	225, 000	41	58	25	26, 758	70, 500	152, 345
Carriage and wagon materials	2	36, 000	32	....	....	8, 200	13, 000	28, 000
Carriages and wagons	6	15, 900	21	....	....	8, 200	9, 900	25, 450
Cheese and butter (factory)	12	19, 150	9	6	....	1, 780	16, 400	23, 527
Clothing, men's	5	81, 600	23	86	....	26, 206	62, 834	107, 800
Clothing, women's	2	26, 000	3	55	....	4, 500	70, 000	94, 000
Flouring- and grist-mill products	38	464, 200	85	....	1	23, 561	724, 776	845, 377
Foundery and machine-shop products	8	227, 300	330	....	1	118, 350	173, 433	370, 994
Furniture	7	84, 500	25	....	....	12, 725	20, 750	44, 799
Gloves and mittens (see also Woolen goods)	1	10, 000	30	8	....	15, 000	30, 000	50, 000
Hardware, saddlery	2	85, 000	123	....	....	16, 800	35, 100	57, 000
Iron and steel	2	120, 000	68	....	2	29, 871	196, 288	255, 660
Iron forgings	1	300, 000	300	....	....	120, 000	425, 000	600, 000
Leather, tanned	4	12, 500	7	....	....	2, 089	18, 673	27, 980
Liquors, malt	5	182, 000	22	....	6	13, 310	66, 934	119, 362
Lumber, sawed	45	125, 830	71	....	1	21, 410	118, 106	176, 795
Malt	2	57, 000	21	....	....	5, 800	121, 400	164, 500
Marble and stone work	6	23, 500	25	....	....	11, 535	16, 487	37, 648
Printing and publishing	3	42, 500	25	24	25	22, 167	34, 490	77, 600
Saddlery and harness	17	42, 150	88	....	....	24, 054	48, 350	93, 329
Sash, doors, and blinds	3	10, 500	16	....	....	6, 645	8, 870	23, 210
Starch	1	15, 000	20	2	5	8, 500	16, 000	37, 500
Tinware, copperware, and sheet-iron ware	17	35, 975	29	8	4	13, 304	32, 550	62, 550
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	30, 000	5	5	6	8, 000	25, 000	40, 000
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	22	31, 025	60	2	7	27, 418	49, 946	99, 178
Tools	2	250, 000	225	....	15	100, 290	84, 000	278, 000
Washing-machines and clothes-wringers	1	64, 000	30	3	10	20, 000	30, 000	80, 000
Woolen goods (see also Carpets, other than rag; Gloves and Mittens)	5	966, 000	364	335	26	211, 245	814, 347	1, 326, 201
Chautauqua:								
Boots and shoes	1	50, 000	63	8	....	35, 000	85, 000	132, 500
Bread and other bakery products	4	40, 500	13	3	....	5, 331	54, 368	64, 000
Brick and tile	5	30, 800	61	....	7	8, 600	6, 315	21, 590
Carriages and wagons	11	98, 000	74	....	....	33, 484	40, 150	87, 100
Cheese and butter (factory)	52	114, 900	91	20	1	18, 178	272, 956	368, 488
Clothing, men's	14	74, 000	91	63	....	61, 747	105, 400	218, 200
Coffee and spices, roasted and ground	1	22, 000	4	1	....	3, 000	23, 000	30, 000
Cooperage	22	41, 610	69	....	5	18, 075	31, 444	76, 330
Cutlery and edge tools	1	60, 000	35	....	....	18, 000	30, 097	60, 000
Flouring- and grist-mill products	44	438, 300	96	....	....	32, 247	849, 229	980, 383
Foundery and machine-shop products	13	644, 700	679	....	21	294, 467	747, 852	951, 661
Furniture (see also Mattresses and spring beds; Upholstering)	23	290, 200	392	....	21	137, 093	181, 661	425, 185
Furniture, chairs	10	124, 875	90	....	4	33, 800	35, 150	94, 100
Leather, curried	4	20, 000	9	....	....	2, 450	32, 337	38, 050
Leather, tanned	6	266, 300	66	....	....	24, 895	291, 900	375, 607
Liquors, malt	4	44, 100	14	....	....	5, 978	29, 992	53, 445
Lumber, planed (see also Sash, doors, and blinds)	5	36, 500	32	....	....	10, 700	20, 300	38, 500
Lumber, sawed	96	678, 350	270	....	3	93, 575	561, 867	768, 896
Mattresses and spring beds (see also Furniture)	4	8, 450	22	1	....	5, 200	11, 550	24, 100
Musical instruments, organs and materials	2	2, 000	24	....	....	10, 500	5, 500	20, 000
Musical instruments, pianos and materials	2	15, 000	15	....	....	12, 600	10, 422	29, 520
Patent medicines and compounds	2	123, 000	30	23	5	21, 420	27, 000	109, 000
Printing and publishing	8	40, 050	48	5	13	24, 248	17, 735	56, 700
Saddlery and harness	17	29, 150	27	....	....	10, 470	21, 970	41, 964
Sash, doors, and blinds (see also Lumber, planed)	4	57, 000	54	....	1	16, 945	15, 700	46, 600
Shirts	1	6, 000	....	20	....	5, 100	11, 900	20, 000
Tinware, copperware, and sheet-iron ware	17	69, 500	35	....	....	15, 550	28, 380	56, 500
Tobacco, cigars and cigarettes	6	17, 500	29	....	....	12, 100	17, 745	39, 145
Upholstering (see also Furniture)	2	58, 000	69	7	7	30, 000	95, 755	144, 766
Vinegar	4	18, 550	18	....	....	3, 250	16, 225	22, 750
Woolen goods (see also Worsted goods)	5	80, 500	33	23	....	10, 920	38, 061	64, 020
Worsted goods (see also Woolen goods)	2	558, 000	187	229	147	133, 881	347, 448	637, 095

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
CHEMUNG:								
Agricultural implements	3	$31, 000	16			$5, 750	$9, 530	$20, 605
Boots and shoes	9	361, 000	387	75	15	202, 525	461, 760	742, 105
Bread and other bakery products	6	5, 200	6	2	1	3, 525	12, 700	20, 060
Brick and tile	4	64, 000	194	5		32, 400	12, 815	73. 200
Carriages and wagons	8	167, 300	71			29, 885	41, 425	88, 500
Cheese and butter (factory)	8	33, 300	16	3		4, 616	60, 609	82, 582
Clothing, men's	8	135, 000	82	127	3	63, 670	170, 212	260, 250
Cutlery and edge tools	1	40, 000	48		2	19, 166	17, 453	54, 756
Flouring- and grist-mill products	22	188, 250	70			22, 787	527, 152	595, 562
Foundery and machine-shop products	5	112, 500	87		2	18, 521	37, 245	88, 365
Furniture	4	98, 000	68	2	3	37, 140	63, 200	167, 000
Iron and steel	2	500, 000	404		6	182, 648	870, 541	1, 124, 764
Leather, tanned	9	503, 070	147		2	53, 900	841, 152	1, 046, 500
Liquors, malt	3	139, 922	18			7, 664	38, 959	69, 506
Lumber, planed (see also Sash, doors, and blinds)	7	180, 000	42			14, 312	171, 000	211, 400
Lumber, sawed	46	225, 100	258			42, 276	190, 432	292, 340
Marble and stone work	9	81, 150	52	2		21, 393	52, 613	95, 998
Printing and publishing	6	140, 000	120	5	41	69, 100	38, 662	138, 908
Saddlery and harness	9	24, 200	32			15, 351	22, 103	46, 820
Sash, doors, and blinds (see also Lumber, planed)	2	56, 200	55		5	22, 131	50, 594	78, 076
Tinware, copperware, and sheet-iron ware	13	41, 200	110	56	4	45, 839	68, 018	132, 400
Tobacco, cigars and cigarettes	24	87, 850	128	24	14	47, 017	115, 922	220, 100
Woolen goods	2	47, 000	38	21	3	3, 965	18, 803	20, 867
CHENANGO:								
Agricultural implements	4	20, 500	32			7, 460	6, 075	26, 550
Boxes, wooden, packing	5	9, 300	17			4, 048	10, 100	21, 700
Cheese and butter (factory)	75	145, 000	139	33		28, 549	379, 472	533, 772
Clothing, men's	8	32, 400	29	29	1	19, 975	58, 700	96, 000
Cooperage	22	34, 450	65		2	19, 341	25, 056	61, 460
Cotton goods	1	100, 000	37	36	20	21, 800	49, 500	77, 000
Flouring- and grist-mill products	36	127, 650	44			9, 984	307, 467	353, 064
Foundery and machine-shop products	4	52, 800	19			6, 125	12, 261	26, 878
Furniture	10	28, 300	33			7, 125	16, 350	34, 950
Hardware	1	35, 000	73		3	25, 919	25, 657	91, 117
Leather, tanned	9	46, 800	26			7, 056	85, 000	119, 700
Lumber, sawed	83	187, 960	186		4	30, 550	153, 435	238, 842
Marble and stone work	3	18, 000	14			3, 925	8, 800	21, 400
Saddlery and harness	13	21, 850	24			5, 386	13, 550	27, 650
Sash, doors, and blinds	3	5, 800	61			15, 202	43, 918	73, 023
Tinware, copperware, and sheet-iron ware	14	41, 100	25			7, 518	19, 300	35, 200
Tobacco, cigars and cigarettes	3	7, 000	18	3		6, 200	19, 048	30, 200
Woolen goods	4	59, 000	20	4	5	4, 473	20, 122	28, 536
CLINTON:								
Agricultural implements	4	57, 000	33			8, 321	12, 631	35, 750
Carriages and wagons	4	95, 000	97		4	22, 400	46, 500	97, 000
Cheese and butter (factory)	7	21, 600	9	6		1, 711	16, 896	23, 259
Clothing, men's	6	29, 900	21	99		26, 175	69, 050	132, 700
Flouring- and grist-mill products	20	226, 500	70			19, 981	729, 407	827, 264
Food preparations (see page 39)	1	10, 000	4			700	4, 800	20, 000
Foundery and machine-shop products	4	79, 000	51			15, 750	38, 300	65, 900
Furniture	6	104, 300	129			32, 700	39, 300	100, 600
Iron and steel	17	1, 499, 000	717		34	267, 773	869, 076	1, 202, 419
Iron nails and spikes, cut and wrought	2	220, 000	184	22	19	84, 795	168, 000	324, 000
Leather, tanned	8	89, 500	65			20, 465	196, 345	251, 226
Lumber, planed	1	50, 000	25			4, 500	90, 000	95, 000
Lumber, sawed	53	396, 500	363		19	62, 876	201, 318	337, 499
Paper	1	50, 000	30			11, 000	18, 000	40, 000
Sewing machines and attachments	1	30, 000	140	10		40, 000	110, 000	160, 000
Shipbuilding	2	1, 700	14			5, 700	15, 800	24, 600
Starch	13	73, 700	70			5, 680	47, 138	67, 315
Stereotyping and electrotyping	1	50, 000	70	15	6	20, 000	25, 000	50, 000
Tinware, copperware, and sheet-iron ware	6	14, 500	14		2	5, 638	11, 110	22, 500
COLUMBIA:								
Agricultural implements	7	39, 500	33		1	5, 745	13, 380	32, 300
Brick and tile	2	7, 000	45		1	13, 167	3, 775	25, 500
Carriages and wagons	7	27, 200	32			11, 350	14, 525	35, 923
Cars, railroad, street, and repairs	1	150, 000	40			25, 000	300, 000	375, 000
Clothing, men's	9	44, 458	32	49		15, 130	52, 484	81, 525
Cooperage	5	19, 975	21			7, 770	27, 900	45, 200
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	7	1, 124, 000	374	545	183	236, 108	533, 923	1, 098, 575
Drugs and chemicals (see also Patent medicines and compounds)	1	23, 000	27	26	4	18, 000	100, 000	125, 000
Flouring- and grist-mill products	32	204, 200	54			13, 594	359, 162	427, 242
Foundery and machine-shop products	10	325, 500	179		1	75, 197	79, 151	205, 655
Hosiery and knit goods (see also Cotton goods; Woolen goods)	5	260, 750	130	176	41	82, 685	216, 618	494, 020
Iron and steel	4	887, 462	186			73, 024	427, 153	569, 016
Liquors, malt	3	310, 000	53			24, 651	125, 140	223, 287
Lumber, sawed	21	42, 800	24			4, 550	47, 305	65, 975
Marble and stone work	6	27, 500	20			8, 950	8, 350	28, 000
Mixed textiles (see also Cotton goods; Woolen goods)	5	1, 787, 000	310	222	103	231, 414	759, 359	1, 438, 196
Paper	21	719, 000	296	28	27	100, 310	363, 885	636, 878
Patent medicines and compounds (see also Drugs and chemicals)	1	50, 000	4	5	21	9, 000	22, 000	44, 000
Printing and publishing	5	24, 400	27			9, 421	7, 500	22, 400
Saddlery and harness	20	24, 200	30			7, 550	16, 960	36, 950

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
COLUMBIA—continued.								
Tinware, copperware, and sheet-iron ware	16	$47, 900	37	....	....	$11, 087	$25, 400	$53, 700
Tobacco, cigars and cigarettes	4	31, 300	51	1	13	18, 240	35, 265	92, 662
Upholstering materials	3	25, 500	25	....	....	3, 300	16, 500	24, 500
Woolen goods (see also Mixed textiles)	2	1, 572, 000	239	89	74	166, 214	598, 409	1, 050, 196
CORTLAND:								
Agricultural implements	2	87, 000	26	....	....	12, 640	15, 100	41, 825
Carriage and wagon materials	2	40, 000	51	....	1	18, 875	23, 000	57, 000
Carriages and wagons	7	154, 500	280	13	5	120, 532	491, 952	668, 500
Cheese and butter (factory)	27	52, 100	36	18	....	7, 382	103, 541	153, 904
Clothing, men's	4	8, 600	9	11	....	9, 200	14, 000	28, 600
Cooperage	6	38, 100	51	....	1	11, 210	26, 200	43, 100
Corsets	1	25, 000	55	266	12	30, 000	50, 000	85, 000
Flouring- and grist-mill products	25	183, 550	41	....	....	11, 536	296, 063	347, 090
Furniture, chairs	4	32, 000	75	1	4	20, 864	43, 000	91, 600
Iron nails and spikes, cut and wrought	1	30, 000	20	....	10	10, 000	15, 000	32, 000
Leather, curried	4	178, 300	46	....	....	16, 300	529, 140	656, 163
Leather, tanned	6	203, 700	57	....	....	20, 175	409, 150	555, 410
Lumber, planed	2	18, 000	11	....	....	7, 900	17, 500	30, 475
Lumber, sawed	42	153, 733	76	....	1	22, 675	143, 666	212, 893
Saddlery and harness	10	13, 700	19	....	....	6, 936	12, 943	27, 203
Tinware, copperware, and sheet-iron ware	7	22, 100	18	....	....	6, 669	13, 000	25, 700
Wirework	1	75, 000	80	....	20	19, 752	70, 000	125, 000
DELAWARE:								
Carriages and sleds, children's	1	6, 500	40	....	....	12, 000	8, 300	22, 000
Carriages and wagons	9	27, 500	33	....	....	10, 034	16, 900	38, 300
Clothing, men's	7	11, 150	6	21	....	3, 170	10, 740	21, 250
Cooperage	38	40, 400	55	....	....	13, 650	27, 630	61, 875
Drugs and chemicals	2	50, 000	55	....	....	16, 718	13, 200	47, 000
Flouring- and grist-mill products	43	171, 300	47	....	....	11, 364	349, 511	397, 008
Furniture	16	48, 500	24	....	....	6, 140	14, 075	35, 400
Leather, curried	6	15, 500	7	....	....	2, 425	22, 646	31, 365
Leather, tanned	13	286, 100	96	....	3	33, 575	349, 998	498, 110
Lumber, sawed	113	205, 200	355	....	1	51, 035	237, 101	378, 287
Marble and stone work	6	17, 800	14	....	....	5, 099	8, 945	22, 400
Saddlery and harness	15	19, 024	21	....	....	4, 500	12, 175	24, 900
Tinware, copperware, and sheet-iron ware	17	34, 860	29	....	....	8, 745	23, 320	45, 350
Tobacco, cigars and cigarettes	1	34, 200	16	1	....	6, 000	11, 500	23, 000
Woolen goods	7	33, 700	16	4	4	3, 840	18, 230	30, 129
DUCHESS:								
Agricultural implements	6	554, 625	192	....	....	87, 450	180, 160	342, 100
Bags, paper	2	50, 000	11	13	4	7, 500	58, 250	87, 000
Boots and shoes	1	500, 000	140	80	76	42, 500	131, 501	195, 000
Bread and other bakery products	9	52, 000	40	1	15	20, 850	80, 600	121, 900
Brick and tile	11	110, 500	324	....	23	58, 105	60, 472	176, 500
Carpets, other than rag (see also Woolen goods)	3	1, 243, 000	298	208	106	189, 325	367, 483	484, 028
Carriages and wagons	15	106, 000	159	....	....	67, 917	94, 055	206, 509
Cheese and butter (factory)	2	64, 000	26	4	....	13, 840	308, 031	424, 111
Clothing, men's	11	116, 500	130	248	17	93, 880	296, 000	498, 500
Combs	1	100, 000	100	150	....	80, 000	30, 000	150, 000
Confectionery	4	53, 000	21	27	14	7, 750	33, 700	59, 000
Cooperage	10	70, 800	146	....	1	58, 950	113, 900	225, 600
Cotton goods (see also Mixed textiles)	2	270, 000	51	89	32	45, 700	83, 350	151, 000
Dyeing and finishing textiles	1	750, 000	550	150	141	350, 000	400, 000	750, 000
Dyestuffs and extracts	1	500, 000	100	....	....	66, 400	802, 000	976, 883
Flouring- and grist-mill products	48	322, 100	88	....	....	21, 134	484, 065	545, 269
Foundery and machine-shop products	4	43, 725	79	....	....	30, 707	47, 041	108, 871
Furniture (see also Mattresses and spring beds)	5	32, 700	28	2	1	8, 052	11, 450	27, 000
Furniture, chairs	1	10, 000	45	92	8	25, 475	23, 732	52, 480
Glass	1	50, 000	68	....	36	11, 625	13, 755	27, 145
Hardware	1	25, 000	34	....	1	12, 000	10, 000	28, 000
Hats and caps, not including wool hats	1	30, 000	25	50	34	13, 073	37, 000	69, 360
Iron and steel	7	1, 446, 549	407	....	2	198, 003	876, 902	1, 323, 857
Liquors, malt	7	78, 000	34	....	....	15, 426	77, 760	138, 761
Lumber, sawed	16	17, 650	21	....	....	2, 206	13, 310	20, 438
Marble and stone work	7	26, 000	26	....	1	10, 635	12, 691	47, 668
Mattresses and spring beds (see also Furniture)	2	11, 000	19	....	....	7, 750	9, 500	23, 500
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	1	414, 000	199	101	41	113, 972	348, 878	528, 260
Paper	2	20, 150	9	....	....	2, 860	15, 604	22, 500
Printing and publishing	7	96, 500	101	....	6	44, 373	16, 755	85, 720
Saddlery and harness	18	19, 300	28	....	....	8, 320	17, 320	39, 615
Sash, doors, and blinds	4	49, 200	52	....	8	7, 341	30, 800	61, 050
Shirts	2	97, 300	18	190	7	25, 800	98, 500	193, 200
Silk and silk goods (see also Mixed textiles)	1	50, 000	22	47	15	30, 000	55, 500	92, 000
Soap and candles	3	38, 000	9	....	....	2, 636	27, 322	42, 073
Stone- and earthen-ware	1	40, 000	30	....	....	14, 000	16, 000	52, 000
Tinware, copperware, and sheet-iron ware	20	363, 200	161	35	3	63, 104	221, 125	444, 851
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	60, 000	21	13	....	7, 000	150, 000	170, 000
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	18	47, 570	59	....	7	24, 374	26, 928	71, 382
Wool hats (see also Woolen goods)	3	663, 005	457	270	198	439, 805	1, 173, 492	1, 888, 761
Woolen goods (see also Carpets, other than rag; Mixed textiles; Wool hats).	4	598, 000	296	135	50	142, 472	452, 063	676, 975

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
ERIE:								
Agricultural implements	12	$406, 700	315	....	1	$105, 423	$167, 493	$510, 865
Baking and yeast powders (see also Drugs and chemicals)	7	38, 200	13	1	1	6, 950	61, 800	79, 400
Belting and hose, leather	3	120, 000	39	....	21	18, 500	285, 000	322, 000
Bookbinding and blank-book making	6	73, 800	37	44	3	30, 600	53, 900	104, 100
Boots and shoes	12	355, 000	386	79	30	196, 400	460, 469	785, 435
Boxes, fancy and paper	4	10, 500	10	72	12	15, 100	44, 190	72, 225
Boxes, wooden, packing	8	32, 590	47	....	1	14, 933	35, 950	65, 212
Brass castings	7	40, 600	37	....	4	18, 990	36, 378	71, 400
Bread and other bakery products	63	360, 550	240	43	27	126, 039	616, 193	939, 420
Brick and tile (see also Drain and sewer pipe)	18	169, 180	257	....	79	104, 210	47, 515	211, 070
Bridges	1	150, 000	60	....	....	20, 000	90, 000	125, 000
Brooms and brushes	11	16, 215	22	7	4	10, 216	25, 279	48, 615
Carriages and sleds, children's	3	47, 800	29	4	....	14, 000	37, 500	75, 400
Carriages and wagons	30	321, 900	317	....	7	155, 969	195, 331	443, 331
Cars, railroad, street, and repairs	2	150, 000	145	....	5	34, 185	238, 734	290, 588
Cheese and butter (factory)	56	99, 562	80	48	1	21, 715	358, 410	498, 409
Clothing, men's	63	1, 113, 600	670	866	12	588, 675	1, 837, 817	2, 812, 225
Coffee and spices, roasted and ground	5	120, 300	22	4	3	11, 706	187, 000	230, 500
Confectionery	10	173, 700	121	75	17	77, 770	262, 680	433, 800
Cooperage	27	264, 357	375	....	26	142, 546	260, 321	475, 904
Cordage and twine	2	30, 600	14	....	6	5, 400	37, 593	54, 671
Cutlery and edge tools (see also Hardware)	7	113, 400	103	....	14	55, 039	65, 075	143, 100
Dentists' materials	1	3, 500	18	....	....	10, 454	11, 493	28, 108
Drain and sewer pipe (see also Brick and tile)	2	44, 000	25	....	....	8, 345	6, 401	31, 709
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	5	314, 600	54	14	1	25, 000	137, 635	204, 900
Engraving, wood	5	6, 600	10	....	....	16, 100	1, 825	30, 550
Envelopes	1	5, 000	3	38	1	7, 296	21, 150	30, 271
Fertilizers	3	265, 400	65	....	....	26, 375	291, 340	386, 655
Files	5	12, 400	32	....	1	13, 625	6, 000	29, 500
Flouring- and grist-mill products	62	1, 402, 900	201	....	....	80, 895	2, 953, 400	3, 250, 487
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	44	3, 121, 518	2, 048	....	152	945, 593	1, 964, 838	3, 624, 029
Fruits and vegetables, canned and preserved	7	188, 500	177	305	178	71, 331	438, 686	561, 743
Furniture (see also Mattresses and spring beds)	49	650, 350	417	15	53	234, 001	406, 533	839, 571
Furniture, chairs	3	58, 000	45	30	14	21, 382	24, 410	59, 000
Furs, dressed	5	85, 000	19	37	3	14, 378	86, 500	136, 750
Glass	1	30, 000	42	....	18	22, 166	16, 974	42, 909
Glucose	3	1, 750, 000	775	5	17	485, 000	2, 000, 000	3, 075, 000
Glue	1	40, 000	19	1	....	8, 500	16, 900	30, 000
Grease and tallow	1	20, 000	11	....	....	4, 680	25, 000	39, 680
Hardware (see also Cutlery and edge tools)	9	230, 000	223	3	41	106, 025	174, 844	382, 003
Hats and caps, not including wool hats	6	17, 950	12	11	2	6, 150	17, 050	30, 200
Iron and steel	4	1, 790, 000	688	....	25	212, 278	635, 353	887, 012
Iron bolts, nuts, washers, and rivets	2	150, 000	131	....	35	60, 551	256, 295	388, 628
Iron forgings	3	255, 000	180	....	5	69, 000	225, 000	400, 000
Iron pipe, wrought	1	10, 000	41	....	11	29, 978	23, 278	64, 680
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	1	10, 000	8	....	....	5, 000	18, 000	25, 000
Jewelry	2	17, 000	33	5	....	17, 360	58, 000	98, 000
Lasts	1	25, 882	25	....	....	15, 000	8, 047	26, 266
Lead, bar, pipe, sheet, and shot	1	20, 000	4	....	1	1, 813	15, 000	20, 000
Leather, curried	13	154, 750	93	....	2	35, 237	608, 633	715, 350
Leather, tanned	22	1, 235, 260	449	....	3	166, 497	1, 760, 752	2, 162, 252
Lime	6	20, 150	41	....	....	8, 100	29, 230	44, 300
Liquors, distilled	2	255, 000	70	....	....	31, 850	300, 000	455, 600
Liquors, malt	39	1, 986, 475	376	5	9	193, 017	972, 763	1, 737, 028
Lithographing (see also Printing and publishing)	4	190, 000	128	6	9	99, 400	185, 910	381, 800
Looking-glass and picture frames	8	39, 700	40	3	8	13, 205	45, 780	86, 700
Lumber, planed (see also Wood, turned and carved)	23	1, 217, 000	581	....	62	249, 820	797, 741	1, 244, 206
Lumber, sawed	79	442, 700	287	....	36	85, 130	345, 518	555, 661
Malt	35	1, 362, 000	279	....	....	93, 340	1, 538, 152	2, 037, 893
Mantels, slate, marble, and marbleized	2	8, 500	19	....	....	8, 200	7, 000	23, 000
Marble and stone work	28	282, 750	485	7	2	192, 379	189, 329	452, 848
Mattresses and spring beds (see also Furniture)	8	27, 298	12	3	4	6, 574	32, 945	67, 032
Musical instruments, pianos and materials	3	46, 000	44	....	....	22, 450	13, 114	42, 679
Oil, linseed	1	75, 000	25	....	1	10, 500	225, 000	243, 000
Oil, lubricating	1	100, 000	15	....	1	7, 500	250, 000	300, 000
Paints	1	100, 000	20	1	1	9, 064	105, 000	130, 000
Paperhangings	1	200, 000	170	....	....	60, 000	107, 425	182, 950
Patent medicines and compounds (see also Drugs and chemicals)	12	1, 098, 100	78	47	2	60, 471	261, 345	654, 027
Printing and publishing (see also Lithographing)	33	824, 300	435	80	97	265, 403	373, 618	980, 522
Pumps, not including steam pumps	9	26, 400	26	....	1	11, 560	11, 990	34, 967
Refrigerators	4	125, 000	212	13	25	88, 700	113, 500	264, 500
Roofing and roofing materials	5	19, 321	38	....	....	13, 951	36, 791	62, 728
Saddlery and harness	59	114, 414	114	....	4	46, 312	108, 653	218, 093
Scales and balances	2	81, 000	110	....	2	53, 500	52, 000	157, 000
Shipbuilding	37	669, 900	809	....	....	407, 440	634, 622	1, 166, 956
Shirts	7	20, 800	10	61	2	21, 760	24, 300	66, 500
Slaughtering and meat-packing, not including retail butchering establishments.	6	872, 500	289	....	....	170, 433	3, 023, 924	3, 441, 280
Soap and candles	7	579, 000	153	4	48	81, 095	881, 114	1, 176, 840
Stamped ware (see also Tinware, copperware, and sheet-iron ware)	1	150, 000	166	29	55	66, 300	169, 576	290, 000
Starch	3	245, 000	184	40	15	77, 691	378, 170	625, 390

Table V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Erie—continued.								
Stereotyping and electrotyping (see also Type founding)	4	$42, 200	35		1	$27, 900	$12, 100	$62, 500
Tinware, copperware, and sheet-iron ware (see also Stamped ware)	82	259, 650	253		22	128, 317	302, 870	562, 192
Tobacco, cigars and cigarettes	44	203, 229	264	11	42	119, 726	253, 998	467, 887
Toys and games	1	4, 500	6		2	3, 500	8, 000	20, 000
Trunks and valises	6	38, 600	43		1	16, 596	43, 500	79, 800
Type founding (see also Stereotyping and electrotyping)	2	19, 000	13	5	2	9, 200	8, 100	29, 000
Vinegar	8	55, 700	20			10, 114	54, 806	88, 700
Window blinds and shades	2	11, 000	14		13	7, 400	57, 700	69, 820
Wirework	5	119, 800	93	10	42	55, 305	114, 614	203, 500
Wood, turned and carved (see also Lumber, planed)	5	46, 000	86	6	19	35, 910	56, 630	115, 526
Woolen goods	3	65, 000	25	12	2	8, 350	50, 868	79, 296
Essex:								
Clothing, men's	5	13, 600	18	8		6, 530	27, 350	40, 100
Cotton goods	1	100, 000	45	59	37	28, 950	93, 200	159, 300
Drugs and chemicals	2	24, 000	33			8, 000	3, 000	22, 500
Flouring- and grist-mill products	22	155, 750	40			12, 058	214, 889	261, 182
Furniture	4	21, 600	59			21, 024	46, 500	75, 044
Iron and steel	13	3, 205, 000	894			274, 853	1, 118, 007	1, 867, 756
Leather, curried	2	6, 000	7			2, 000	62, 700	67, 100
Leather, tanned	3	8, 000	12			3, 450	50, 900	65, 250
Lumber, sawed	43	128, 700	140			20, 995	83, 643	134, 455
Shipbuilding	3	10, 700	43			19, 950	28, 900	54, 800
Wood pulp	4	57, 500	47			11, 800	11, 700	45, 000
Woolen goods	3	27, 000	11	8		3, 554	22, 451	33, 552
Franklin:								
Cheese and butter (factory)	33	61, 200	33	18	1	7, 410	113, 561	157, 482
Clothing, men's	6	14, 400	10	35	1	13, 151	28, 433	52, 516
Flouring- and grist-mill products	18	213, 735	42			11, 290	321, 141	369, 797
Iron and steel	1	300, 000	237			114, 885	128, 281	213, 195
Leather, curried	4	70, 000	82		1	28, 000	373, 610	437, 750
Leather, tanned	8	206, 500	105			33, 967	549, 365	649, 210
Lumber, sawed	52	214, 000	250		13	33, 489	93, 442	104, 442
Paper	1	69, 000	25	14	4	17, 400	26, 250	46, 303
Starch	25	109, 500	111			7, 696	64, 885	98, 423
Tinware, copperware, and sheet-iron ware	7	19, 000	27			7, 940	23, 300	41, 900
Woolen goods	4	47, 000	21	26	2	11, 200	43, 196	68, 350
Fulton:								
Boxes, fancy and paper	9	47, 000	47	10	3	15, 439	35, 231	70, 535
Cheese and butter (factory)	14	20, 950	16	2	1	2, 748	51, 637	74, 728
Flouring- and grist-mill products	10	79, 500	23			5, 239	204, 750	246, 775
Foundery and machine-shop products	4	48, 500	28			11, 820	13, 000	33, 000
Gloves and mittens (see also Hosiery and knit goods; Woolen goods)	174	2, 144, 398	1, 454	3, 386	109	1, 127, 113	2, 734, 737	4, 607, 051
Hosiery and knit goods (see also Gloves and mittens; Woolen goods)	2	22, 000	8	22	7	4, 835	15, 950	29, 348
Leather, curried	3	25, 550	29			12, 013	132, 423	154, 470
Leather, dressed skins	39	583, 890	463		8	171, 411	431, 619	833, 676
Leather, tanned	8	75, 150	64			21, 196	342, 665	416, 778
Lumber, planed	3	30, 900	12			4, 050	18, 000	26, 700
Lumber, sawed	51	152, 400	174		2	27, 354	120, 333	190, 435
Paper	12	89, 750	70	3	1	18, 100	40, 820	91, 660
Tinware, copperware, and sheet-iron ware	7	21, 600	21			8, 597	13, 855	27, 377
Woolen goods (see also Gloves and mittens)	2	58, 000	18	7	4	5, 300	27, 505	44, 750
Genesee:								
Agricultural implements	7	137, 500	99			48, 400	75, 320	152, 640
Carriages and wagons	9	20, 500	53			14, 900	22, 850	48, 750
Cheese and butter (factory)	13	27, 800	16	4	1	3, 496	49, 666	67, 550
Clothing, men's	9	35, 600	28	38	1	19, 000	46, 900	88, 300
Cooperage	34	38, 397	100		1	15, 118	43, 486	81, 889
Flouring- and grist-mill products	24	214, 800	35			11, 876	349, 340	389, 861
Foundery and machine-shop products	4	29, 200	19			9, 141	2, 967	20, 665
Fruits and vegetables, canned and preserved	3	52, 000	90	43	25	14, 993	47, 033	82, 900
Furniture	5	6, 450	13	1		2, 250	23, 200	31, 300
Leather, tanned	3	12, 200	5			2, 000	17, 885	22, 313
Lumber, sawed	16	55, 630	64		5	7, 113	28, 620	48, 216
Marble and stone work	3	16, 300	9		1	3, 700	10, 500	21, 000
Patent medicines and compounds	6	32, 200	21	10	4	17, 315	28, 200	113, 132
Saddlery and harness	19	21, 950	23			6, 700	19, 506	42, 960
Tinware, copperware, and sheet-iron ware	12	29, 000	24			7, 870	24, 700	44, 750
Greene:								
Bread and other bakery products	3	30, 500	9			2, 396	34, 500	41, 700
Brick and tile	10	93, 200	188		20	40, 550	23, 225	83, 600
Clothing, men's	6	21, 400	24	13		9, 300	18, 400	35, 000
Cooperage	12	14, 375	35			9, 115	13, 800	31, 000
Cotton goods	2	208, 000	20	66	11	21, 003	151, 699	224, 084
Cutlery and edge tools (see also Hardware)	1	25, 000	15			7, 500	10, 000	25, 000
Flouring- and grist-mill products	25	115, 300	43			5, 795	211, 501	245, 573
Foundery and machine-shop products	6	73, 300	85		20	27, 412	18, 700	67, 929
Furniture, chairs	3	54, 000	77	165	368	34, 980	15, 670	63, 300
Hardware (see also Cutlery and edge tools)	2	44, 400	68	2		11, 500	20, 000	70, 000
Leather, curried	2	20, 200	6		2	3, 647	50, 203	60, 295
Leather, tanned	3	26, 300	14		2	5, 667	55, 430	79, 258
Lumber, sawed	40	80, 600	77			9, 735	57, 279	91, 513
Paper	2	35, 000	17		2	3, 900	32, 800	42, 320
Saddlery and harness	10	12, 975	16			4, 498	16, 206	27, 581

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
GREENE—continued.								
Sash, doors, and blinds	2	$27, 000	30	....	....	$8, 000	$15, 000	$26, 500
Shipbuilding	4	20, 800	109	....	....	58, 980	162, 937	232, 300
Tinware, copperware, and sheet-iron ware	9	28, 300	20	....	....	6, 425	15, 975	31, 500
Woolen goods	5	533, 275	278	148	55	140, 190	385, 447	607, 948
HAMILTON:								
Leather, tanned	5	150, 300	93	....	....	27, 000	287, 425	440, 580
Lumber, sawed	9	22, 200	45	....	....	4, 995	17, 040	29, 680
HERKIMER:								
Agricultural implements	3	388, 000	205	....	....	112, 000	173, 050	402, 000
Boxes, wooden, packing	11	20, 300	46	10	1	11, 375	49, 560	75, 850
Carriages and wagons	9	80, 700	59	....	....	25, 650	33, 200	74, 000
Cheese and butter (factory)	117	261, 968	187	45	3	44, 058	800, 641	1, 086, 529
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	3	164, 320	31	30	22	20, 165	28, 812	62, 274
Felt goods (see also Woolen goods)	1	87, 500	58	17	3	13, 517	89, 980	155, 865
Fire-arms	1	700, 000	380	....	20	350, 000	60, 000	700, 000
Flouring- and grist-mill products	25	179, 800	39	....	....	11, 690	417, 610	498, 336
Foundery and machine-shop products	5	59, 500	60	....	6	22, 500	11, 725	39, 000
Furniture	8	59, 250	62	....	....	19, 850	17, 700	50, 300
Hardware	2	30, 000	25	....	....	16, 600	6, 100	43, 500
Hosiery and knit goods (see also Cotton goods; Woolen goods)	3	260, 000	135	235	70	83, 785	296, 807	513, 838
Leather, curried	6	104, 750	42	....	2	18, 254	277, 910	331, 643
Leather, tanned	10	222, 750	100	....	2	53, 466	389, 061	494, 097
Liquors, malt	3	46, 000	[illegible]	....	....	2, 751	13, 842	24, 685
Lumber, planed (see also Sash, doors, and blinds)	4	43, 000	53	....	....	19, 340	17, 275	44, 820
Lumber, sawed	55	249, 600	171	....	....	41, 326	161, 261	252, 093
Malt	2	85, 000	19	....	....	4, 483	85, 700	101, 800
Marble and stone work	4	14, 600	8	....	....	3, 300	11, 400	27, 000
Matches	1	150, 000	40	70	10	36, 000	40, 000	90, 000
Mixed textiles (see also Cotton goods; Woolen goods)	2	160, 000	75	150	60	54, 000	186, 625	335, 000
Musical instruments, pianos and materials	1	75, 000	50	22	3	19, 867	50, 574	75, 817
Paper	3	148, 000	57	14	....	20, 508	119, 021	174, 330
Sash, doors, and blinds (see also Lumber, planed)	4	33, 500	21	....	....	7, 860	19, 700	35, 500
Sewing machines and attachments	1	300, 000	245	30	25	167, 359	40, 317	309, 000
Shipbuilding	3	36, 000	32	....	....	16, 160	11, 700	31, 400
Sporting goods	2	22, 500	32	2	5	20, 600	15, 800	48, 300
Starch	1	90, 000	18	....	....	5, 400	56, 500	76, 000
Tinware, copperware, and sheet-iron ware	12	18, 000	31	....	....	11, 600	31, 538	61, 758
Woolen goods (see also Felt goods; Mixed textiles)	3	63, 000	47	48	10	20, 300	99, 700	127, 500
JEFFERSON:								
Agricultural implements	3	43, 500	31	....	....	9, 650	9, 600	28, 240
Bread and other bakery products	6	30, 700	25	4	5	9, 350	37, 400	56, 900
Carriages and wagons	11	110, 000	130	....	....	37, 097	84, 500	170, 947
Cheese and butter (factory)	161	239, 325	203	68	2	44, 562	590, 893	814, 370
Clothing, men's	11	74, 100	39	115	....	32, 878	82, 730	154, 402
Flouring- and grist-mill products	53	471, 850	99	....	....	27, 921	1, 083, 967	1, 232, 993
Foundery and machine-shop products	10	426, 500	250	....	2	114, 892	127, 794	393, 020
Furniture	14	75, 200	54	....	1	21, 319	40, 485	86, 500
Furniture, chairs	3	41, 000	37	17	11	10, 540	10, 000	29, 130
Hosiery and knit goods (see also Woolen goods)	1	45, 000	12	24	9	12, 000	15, 000	54, 000
Ink	1	4, 000	8	8	....	8, 000	15, 000	24, 000
Iron and steel	2	70, 000	40	....	....	9, 857	57, 338	116, 900
Lamps and reflectors	1	75, 000	25	....	....	12, 000	24, 000	50, 000
Leather, curried	5	15, 500	9	....	....	2, 725	25, 363	32, 700
Leather, tanned	14	225, 500	133	1	....	42, 781	452, 878	624, 621
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	4	21, 500	32	....	....	9, 750	5, 900	24, 500
Lumber, sawed	64	186, 355	226	....	14	33, 093	127, 417	214, 121
Malt	3	111, 400	21	....	....	5, 370	84, 550	105, 570
Marble and stone work	2	20, 800	9	....	....	4, 980	27, 641	44, 381
Mixed textiles (see also Woolen goods)	1	45, 000	6	24	9	12, 000	178, 433	254, 000
Paper	7	373, 400	151	53	2	72, 814	481, 863	677, 150
Printing and publishing	7	85, 600	66	22	6	27, 852	28, 260	96, 761
Saddlery and harness	26	22, 850	31	....	....	9, 521	25, 175	50, 750
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	13	68, 900	81	....	1	23, 670	60, 500	107, 900
Sewing machines and attachments	1	500, 000	347	3	....	145, 000	156, 500	390, 000
Shipbuilding	6	5, 800	27	....	....	10, 570	23, 055	35, 800
Tinware, copperware, and sheet-iron ware	22	115, 400	98	10	....	32, 454	75, 726	140, 063
Windmills	1	60, 000	15	....	....	7, 000	20, 000	40, 000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	1	10, 000	25	....	....	7, 200	10, 000	25, 000
Woolen goods (see also Mixed textiles)	4	35, 900	9	6	....	2, 300	15, 145	26, 790
KINGS:								
Agricultural implements	1	15, 000	33	....	....	15, 418	16, 600	36, 000
Artificial feathers and flowers (see also Millinery and lace goods)	9	11, 550	2	106	5	16, 170	16, 321	45, 240
Awnings and tents	12	7, 200	15	7	....	9, 319	14, 559	35, 843
Baking and yeast powders (see also Drugs and chemicals)	2	163, 500	91	81	4	105, 506	992, 581	1, 255, 046
Baskets, rattan and willow ware	13	10, 325	25	3	12	11, 533	14, 506	36, 438
Belting and hose, leather	1	80, 000	18	....	....	12, 866	180, 904	219, 887
Boot and shoe findings	1	25, 000	27	33	....	12, 200	32, 000	61, 200
Boots and shoes	38	175, 375	449	204	28	298, 314	536, 439	960, 559
Boxes, cigar	3	28, 000	49	[illegible]	2	27, 083	42, 100	77, 700
Boxes, fancy and paper	12	49, 050	50	88	8	45, 089	79, 066	158, 826

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
KINGS—continued.								
Boxes, wooden, packing	7	$998, 500	540	....	62	$243, 812	$1, 286, 630	$1, 767, 640
Brass and copper, rolled	1	39, 600	85	....	3	52, 031	470, 610	583, 709
Brass castings	18	151, 350	117	....	4	59, 540	244, 747	364, 875
Brass ware	7	38, 800	62	25	15	33, 122	57, 843	112, 759
Bread and other bakery products	537	1, 029, 325	1, 028	7	16	599, 205	3, 712, 799	5, 619, 475
Brick and tile	6	113, 000	134	....	1	72, 774	69, 326	201, 084
Brooms and brushes	37	150, 875	276	65	81	146, 180	184, 386	441, 992
Buttons	5	33, 000	23	120	15	30, 537	16, 363	54, 813
Carpets, rag	13	2, 850	14	2	....	4, 543	11, 333	21, 741
Carriages and wagons	94	513, 350	522	....	8	301, 399	343, 425	869, 992
Cars, railroad, street, and repairs	7	61, 774	92	....	....	65, 329	59, 266	137, 055
Cleansing and polishing preparations	6	112, 000	44	1	4	24, 935	36, 919	114, 750
Clocks	2	525, 000	740	300	215	369, 520	463, 650	985, 750
Clothing, men's	330	966, 445	993	314	23	707, 011	1, 723, 374	3, 139, 762
Clothing, women's	25	157, 425	44	561	10	189, 480	390, 223	711, 249
Coffee and spices, roasted and ground	5	70, 000	42	....	1	28, 998	183, 242	280, 874
Coffins, burial cases, and undertakers' goods	3	47, 000	41	....	....	22, 362	24, 503	63, 269
Confectionery	105	237, 275	167	22	4	81, 677	504, 766	829, 843
Cooperage	43	914, 200	1, 113	5	243	595, 710	1, 585, 087	2, 515, 141
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	10	18, 900	27	....	....	11, 365	24, 455	47, 629
Cordage and twine	12	2, 566, 700	665	503	361	380, 223	3, 206, 319	3, 915, 566
Cork cutting	8	102, 800	50	31	16	31, 220	100, 443	161, 853
Cotton goods (see also Mixed textiles)	1	26, 000	11	12	....	8, 000	40, 580	50, 000
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	38	3, 449, 650	808	129	24	473, 353	3, 446, 549	4, 900, 338
Dyeing and finishing textiles	1	27, 500	40	3	....	21, 524	11, 275	48, 752
Dyestuffs and extracts	2	315, 200	156	10	6	83, 700	496, 526	673, 554
Electroplating	6	10, 650	11	4	15	9, 371	3, 630	21, 632
Explosives and fireworks	3	65, 000	54	24	55	39, 100	69, 451	160, 622
Fancy articles	14	81, 400	63	3	14	34, 827	27, 535	90, 739
Felt goods	1	50, 000	60	25	....	16, 772	48, 253	74, 225
Fertilizers	6	1, 092, 000	287	5	....	118, 500	1, 345, 667	1, 835, 756
Files (see also Saws)	12	25, 750	58	3	15	29, 192	21, 978	68, 509
Flouring- and grist-mill products	10	667, 500	139	5	....	98, 655	2, 615, 270	2, 896, 503
Food preparations (see page 39)	0	155, 250	63	12	4	33, 853	192, 882	268, 823
Foundery and machine-shop products	121	4, 079, 250	3, 750	....	140	2, 283, 934	3, 146, 992	6, 984, 832
Furniture (see also Mattresses and spring beds; Upholstering)	88	405, 680	608	6	18	315, 439	439, 135	952, 472
Furniture, chairs	11	41, 110	88	....	2	50, 658	49, 195	121, 703
Furs, dressed	22	416, 265	251	199	23	137, 374	565, 154	830, 804
Gas and lamp fixtures	1	100, 000	100	8	19	60, 000	50, 500	140, 000
Glass	12	930, 600	1, 158	36	660	630, 857	489, 593	1, 318, 081
Glass, cut, stained, and ornamented	8	22, 150	14	....	6	9, 614	15, 698	33, 461
Glue	2	760, 000	242	8	20	113, 289	579, 073	805, 080
Gold and silver leaf and foil	6	10, 200	9	6	3	9, 022	35, 574	60, 366
Gold and silver, reduced and refined (not from the ore)	1	50, 000	7	....	....	3, 600	504, 624	505, 000
Grease and tallow	3	51, 070	11	....	....	6, 869	304, 740	338, 215
Hairwork	22	44, 150	17	82	1	23, 683	44, 043	101, 395
Hardware	34	432, 550	391	28	22	193, 186	401, 251	750, 297
Hat and cap materials	1	5, 000	6	1	....	3, 237	12, 590	21, 783
Hats and caps, not including wool hats	33	545, 915	945	378	109	634, 504	1, 009, 218	2, 001, 145
Ink	3	220, 000	23	....	....	18, 750	124, 000	189, 410
Instruments, professional and scientific	12	116, 200	108	2	10	65, 515	35, 018	144, 611
Iron and steel	1	300, 000	30	....	....	10, 000	47, 060	135, 000
Iron bolts, nuts, washers, and rivets	12	114, 899	91	....	12	43, 456	103, 552	185, 245
Iron railing, wrought	15	73, 147	79	....	1	53, 468	56, 748	141, 897
Ivory and bone work	8	10, 842	54	....	14	23, 949	22, 571	61, 355
Jewelry	2	40, 000	10	....	....	8, 599	112, 331	131, 898
Jute and jute goods	3	390, 000	197	282	....	132, 621	415, 788	650, 560
Leather, dressed skins	20	691, 650	511	21	31	248, 932	1, 258, 407	1, 755, 144
Leather, tanned	1	50, 000	10	....	....	5, 863	150, 278	186, 500
Lime and cement	7	77, 000	49	....	....	20, 914	45, 192	98, 608
Liquors, distilled	1	50, 000	20	....	....	9, 000	85, 000	122, 000
Liquors, malt	41	3, 838, 500	1, 082	....	....	538, 594	2, 729, 792	4, 871, 772
Lithographing (see also Printing and publishing)	2	165, 000	59	1	....	33, 453	26, 259	77, 461
Looking-glass and picture frames	17	32, 050	39	....	7	23, 866	56, 725	106, 056
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	12	676, 500	492	....	38	230, 827	1, 271, 317	1, 707, 821
Lumber, sawed	1	17, 000	13	....	....	4, 498	17, 325	29, 500
Malt	4	262, 000	37	....	....	24, 375	323, 915	433, 290
Marble and stone work	97	782, 800	755	....	1	532, 458	569, 084	1, 365, 234
Mats and matting	7	193, 650	183	12	70	116, 029	203, 427	385, 340
Mattresses and spring beds (see also Furniture)	7	31, 100	24	....	....	13, 265	67, 640	137, 670
Millinery and lace goods (see also Artificial feathers and flowers)	13	140, 700	33	84	10	48, 710	339, 634	476, 262
Mineral and soda waters	21	107, 800	63	....	5	29, 475	63, 196	155, 177
Mixed textiles (see also Cotton goods; Silk and silk goods)	11	338, 300	98	122	39	99, 430	263, 097	423, 238
Models and patterns	9	11, 250	25	....	....	18, 530	5, 643	37, 536
Musical instruments and materials, not specified	9	13, 500	39	1	6	20, 543	56, 483	102, 724
Musical instruments, pianos and materials	12	199, 775	116	1	8	69, 534	123, 410	254, 783
Oil, essential	1	3, 500	4	....	....	1, 872	40, 000	45, 000
Oil, linseed	2	750, 000	163	6	5	98, 747	2, 746, 202	3, 158, 737
Oil, lubricating	3	22, 000	7	....	....	3, 941	31, 221	43, 645
Oil, resin	3	82, 523	23	....	....	14, 590	189, 622	238, 471

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
KINGS—continued.								
Oilcloth, floor	1	$250,000	150	....	....	$62,000	$286,700	$425,400
Oleomargarine	1	35,000	22	....	....	12,960	96,000	123,360
Paints (see also Varnish)	26	2,602,800	856	80	5	478,376	4,023,500	5,284,201
Paper	1	10,000	26	22	....	19,500	90,000	130,000
Paperhangings	3	285,000	230	50	92	175,733	783,753	1,382,862
Paper patterns	4	105,100	13	84	....	40,538	44,000	512,550
Patent medicines and compounds (see also Drugs and chemicals)	6	550,000	57	59	1	56,411	274,474	730,046
Pencils, lead	1	236,097	64	116	40	65,118	59,844	172,427
Pens, gold	2	78,000	39	9	3	24,628	20,590	75,979
Pickles, preserves, and sauces	1	34,400	17	1	....	5,908	38,830	69,500
Plated and britannia ware	1	150,000	85	30	....	37,000	60,000	200,000
Printing and publishing (see also Lithographing)	64	889,284	693	257	72	522,075	452,610	1,549,743
Pumps, not including steam pumps	6	10,150	17	....	....	9,708	8,156	24,190
Refrigerators	1	12,000	18	....	2	8,000	10,000	24,000
Roofing and roofing materials	29	82,975	196	....	3	98,443	160,974	447,259
Rubber and elastic goods	6	298,837	185	60	28	120,885	664,335	922,857
Saddlery and harness	90	107,577	131	42	15	74,137	153,648	304,625
Sand and emery paper and cloth	1	40,000	10	....	5	7,850	27,648	84,000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	25	368,550	394	....	40	190,659	399,679	740,222
Saws	2	115,000	114	5	6	56,861	69,616	150,784
Sewing machines and attachments	15	10,725	24	10	5	16,780	6,244	34,158
Shipbuilding	58	768,050	957	....	....	746,856	1,044,724	1,999,788
Shirts	25	97,300	57	240	7	105,723	260,511	439,060
Silk and silk goods (see also Mixed textiles)	15	559,325	147	453	107	231,135	443,135	853,480
Slaughtering and meat-packing, not including retail butchering establishments.	28	1,125,000	260	....	....	194,568	7,340,450	8,010,492
Soap and candles	8	338,000	101	4	13	55,642	587,036	799,053
Spectacles and eyeglasses	3	39,300	75	15	20	36,556	5,300	68,000
Sporting goods	11	65,750	77	24	24	45,112	32,487	103,826
Stamped ware (see also Tinware, copperware, and sheet-iron ware).	6	870,000	858	112	40	394,779	936,084	1,556,829
Starch	1	35,000	10	....	....	5,720	75,000	127,000
Stationery goods	7	325,800	63	91	28	65,390	226,237	386,097
Stone- and earthen-ware	4	198,600	175	113	10	102,053	56,960	194,284
Straw goods	3	182,000	49	270	23	70,234	138,358	253,192
Sugar and molasses, refined	11	10,946,000	2,054	....	13	954,929	56,423,868	59,711,168
Tinware, copperware, and sheet-iron ware (see also Coppersmithing; Stamped ware).	120	157,350	270	2	14	150,931	347,867	622,134
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	10	1,059,890	129	466	1	198,770	931,250	2,302,703
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	345	378,590	525	17	56	229,791	385,189	1,004,260
Toys and games	12	265,775	156	209	66	118,958	153,769	361,146
Trunks and valises	7	89,800	59	18	16	32,138	88,249	146,344
Umbrellas and canes	9	18,600	4	8	....	4,066	14,305	28,773
Upholstering (see also Furniture)	72	584,535	197	135	35	145,950	483,514	784,112
Varnish (see also Paints)	10	734,300	76	....	3	48,186	361,405	892,155
Vinegar	7	63,712	16	....	....	6,974	54,630	77,019
Watch cases	4	156,565	261	22	12	249,816	717,177	1,109,046
Whalebone and rattan	2	70,000	45	14	8	30,891	107,390	180,360
Wheelbarrows	1	12,000	14	....	....	10,640	8,700	27,118
Window blinds and shades	12	294,450	129	8	3	82,171	224,722	475,805
Wire	1	200,000	180	....	10	87,000	180,000	340,000
Wirework	10	240,778	128	23	21	83,690	97,641	228,204
Wood preserving	1	20,000	12	....	....	7,717	42,700	61,110
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	19	95,300	78	....	6	39,866	52,411	139,255
Wooden ware	3	9,250	20	....	1	9,477	21,150	36,264
Wool hats	1	300,000	249	117	74	131,819	226,632	448,060
Zinc	3	26,500	14	....	....	11,502	10,520	38,385
LEWIS:								
Carriages and wagons	3	15,700	20	....	....	9,100	8,000	21,100
Cheese and butter (factory)	90	133,550	111	39	....	22,501	331,871	458,968
Dyestuffs and extracts	1	60,000	10	....	....	3,375	20,000	40,000
Flouring- and grist-mill products	17	149,400	39	....	....	9,206	230,695	258,026
Furniture	8	20,000	22	....	....	8,445	6,100	22,922
Furniture, chairs	1	12,000	15	5	....	4,050	15,000	30,000
Iron and steel	3	195,000	164	....	1	6,204	10,015	25,500
Leather, tanned	13	629,900	364	3	8	123,909	1,140,503	1,550,160
Lumber, sawed	93	359,850	414	....	5	83,625	288,590	469,712
Paper	3	40,000	46	3	....	15,000	41,775	90,330
Saddlery and harness	11	19,350	18	....	1	5,135	15,030	33,650
LIVINGSTON:								
Agricultural implements	15	317,800	169	....	6	46,100	63,695	186,592
Brooms and brushes	13	16,750	44	....	....	8,615	29,775	46,700
Carriages and wagons	6	18,500	37	....	....	11,015	11,000	34,200
Cheese and butter (factory)	12	11,650	13	4	....	1,735	22,867	31,187
Flouring- and grist-mill products	32	301,580	59	2	1	20,538	561,310	628,810
Fruits and vegetables, canned and preserved	1	2,000	42	....	....	4,000	15,000	25,000
Lumber, planed	4	11,700	20	....	....	6,454	17,000	30,500
Lumber, sawed	42	120,200	161	....	....	18,884	84,200	135,768
Paper	4	49,000	56	3	....	15,212	44,304	84,326
Patent medicines and compounds	2	2,500	9	....	....	6,250	16,600	35,000
Saddlery and harness	17	12,800	26	....	....	8,224	12,200	28,600
Tinware, copperware, and sheet-iron ware	11	13,700	19	....	....	6,511	16,465	33,600

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
MADISON:								
Agricultural implements	3	$18, 200	33			$8, 750	$15, 125	$38, 775
Carriages and wagons	10	42, 700	70			19, 550	28, 180	56, 160
Cheese and butter (factory)	87	225, 460	146	32	6	33, 543	404, 137	691, 838
Coffins, burial cases, and undertakers' goods	1	75, 000	86	9		37, 000	100, 000	175, 000
Cotton goods	1	37, 500	16	20	11	10, 238	25, 991	42, 395
Cutlery and edge tools	2	145, 692	69	6		16, 800	4, 000	30, 280
Flouring- and grist-mill products	41	245, 300	65			15, 283	436, 592	490, 326
Foundery and machine-shop products	6	213, 100	120			51, 800	112, 100	216, 515
Fruits and vegetables, canned and preserved	1	57, 000	25	60	10	12, 475	68, 844	92, 175
Leather, curried	4	17, 500	4			1, 375	45, 892	48, 840
Leather, tanned	10	144, 600	66			19, 000	178, 030	219, 180
Lumber, sawed	55	129, 136	71			20, 619	112, 298	172, 900
Malt	1	25, 000	7			2, 500	20, 000	30, 000
Mattresses and spring beds	2	14, 000	32		2	6, 600	22, 780	52, 345
Paper	3	28, 000	24	1	1	7, 900	22, 344	45, 050
Saddlery and harness	17	19, 900	25			6, 008	13, 810	28, 650
Shipbuilding	3	28, 200	34			16, 806	25, 068	44, 987
Silk and silk goods	1	95, 000	9	54	3	15, 000	94, 300	130, 000
Tinware, copperware, and sheet-iron ware	14	45, 850	31			8, 695	29, 565	57, 780
Tobacco, cigars and cigarettes	4	24, 400	51		4	15, 832	24, 900	52, 500
Vinegar	3	47, 100	26		2	4, 575	30, 370	52, 100
Woolen goods	3	104, 290	76	43	19	37, 278	178, 710	247, 824
MONROE:								
Agricultural implements	13	862, 000	626		25	180, 423	314, 713	824, 800
Awnings and tents	2	48, 500	15	5	3	9, 700	17, 000	35, 000
Bags, paper	2	11, 000	6	7	3	4, 000	26, 000	42, 000
Baking and yeast powders (see also Drugs and chemicals)	4	31, 500	7		4	3, 084	129, 350	154, 040
Belting and hose, leather	1	20, 000	4			2, 000	10, 000	20, 000
Blacking	1	20, 000	15	15	5	5, 200	25, 000	50, 000
Bookbinding and blank-book making	2	10, 000	13	7	2	10, 580	12, 500	28, 000
Boot and shoe cut stock	1	6, 000	18	25	30	12, 000	50, 000	75, 000
Boots and shoes	24	1, 144, 900	1, 296	873	148	830, 487	2, 200, 674	3, 543, 170
Boxes, cigar	3	14, 600	21	3	3	7, 170	16, 800	28, 000
Boxes, fancy and paper	3	12, 000	15	34	24	13, 495	32, 700	53, 943
Boxes, wooden, packing	2	30, 000	24		7	11, 500	36, 400	65, 000
Bread and other bakery products	41	145, 900	98	9	4	40, 659	220, 091	349, 083
Brick and tile	7	415, 500	462		37	103, 958	58, 715	276, 650
Bridges	1	150, 000	80			34, 000	197, 000	241, 000
Brooms and brushes	4	3, 950	27		2	3, 400	18, 875	25, 900
Carriages and sleds, children's	1	30, 000	8	6	2	5, 000	50, 000	70, 000
Carriages and wagons	26	656, 000	534	13	26	211, 477	300, 070	620, 789
Clothing, men's	21	2, 019, 200	617	1, 932	255	807, 600	3, 081, 700	4, 412, 000
Clothing, women's	4	74, 000	7	218	2	66, 000	173, 000	298, 000
Coffee and spices, roasted and ground	3	19, 000	14	1	1	5, 072	87, 000	119, 000
Coffins, burial cases, and undertakers' goods	1	140, 000	95	4		45, 000	125, 000	230, 000
Confectionery	12	30, 550	26	8	3	11, 956	28, 450	62, 610
Cooperage	49	115, 840	251		1	66, 838	136, 810	248, 370
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	2	106, 000	37	95	29	34, 345	66, 340	111, 861
Cutlery and edge tools (see also Hardware; Tools)	9	208, 800	164		7	53, 105	110, 485	200, 700
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	1	70, 000	70	20	10	50, 000	275, 000	345, 000
Explosives and fireworks	1	10, 000	24	4	2	3, 264	2, 497	23, 525
Files (see also Saws)	3	45, 300	43		2	20, 300	20, 100	65, 250
Flouring- and grist-mill products	48	857, 300	178			92, 391	3, 051, 052	3, 344, 870
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	34	992, 500	765		73	379, 076	607, 935	1, 285, 629
Fruit and vegetables, canned and preserved	20	124, 383	104	230	119	49, 285	259, 995	427, 760
Furniture (see also Upholstering)	15	233, 000	500	7	84	230, 461	272, 150	655, 900
Furniture, chairs	3	200, 000	285	10	31	94, 375	110, 000	265, 000
Hardware (see also Cutlery and edge tools; Tools)	3	43, 500	36			12, 300	28, 700	52, 000
Hats and caps, not including wool hats	6							
Hosiery and knit goods (see also Cotton goods; Woolen goods)	1	14, 000	7	4	1	4, 400	11, 000	21, 300
Instruments, professional and scientific	2	11, 536	8	94		12, 945	30, 000	55, 536
Iron and steel	1	20, 100	13	5		7, 027	13, 663	34, 208
Iron work, architectural and ornamental (see also Foundery and	2	100, 000	50		2	17, 000	102, 560	165, 000
machine-shop products).		25, 000	12			5, 500	25, 000	40, 000
Jewelry	2	5, 800	5	1		4, 000	15, 800	22, 800
Lamps and reflectors	1	100, 000	95		15	57, 792	88, 646	181, 000
Lasts	3	12, 000	17			9, 700	6, 900	25, 000
Leather, tanned	5	131, 000	79		1	30, 464	210, 829	1 293, 802
Liquors, malt	15	1, 085, 271	350		1	156, 560	791, 758	, 413, 692
Lithographing (see also Printing and publishing)	2	15, 000	13		3	10, 000	14, 000	35, 300
Looking-glass and picture frames	7	78, 500	124	6	29	59, 704	94, 300	207, 000
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	4	35, 000	26			11, 090	5, 550	24, 622
Lumber, sawed	19	300, 000	144		10	39, 105	157, 820	253, 000
Malt	3	145, 000	46			16, 350	214, 500	262, 050
Marble and stone work	12	275, 100	245		1	93, 152	95, 508	257, 123
Millinery and lace goods	1	30, 000		8		1, 210	32, 000	40, 000
Mineral and soda waters	4	27, 000	20		1	6, 400	26, 700	48, 000
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	1	20, 000	16	25	10	10, 000	32, 300	60, 000
Musical instruments, pianos and materials	1	20, 000	22	1		11, 000	12, 000	30, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
MONROE—continued.								
Needles and pins	1	$60, 000	5	20	5	$12, 000	$20, 000	$40, 000
Oil, lubricating	2	32, 000	11	....	....	5, 544	15, 500	34, 000
Paper	2	258, 000	78	8	19	29, 900	214, 300	273, 245
Patent medicines and compounds (see also Drugs and chemicals)	5	353, 300	106	9	17	71, 500	410, 600	604, 800
Perfumery and cosmetics	3	79, 000	22	54	1	23, 747	80, 000	155, 000
Printing and publishing (see also Lithographing)	14	478, 338	348	41	93	236, 680	309, 425	664, 888
Saddlery and harness	35	102, 805	137	3	4	55, 264	107, 625	211, 195
Safes, doors, and vaults, fire-proof	3	202, 400	88	....	5	41, 300	110, 800	204, 000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved),	14	96, 400	108	....	5	37, 822	100, 050	191, 500
Saws	2	24, 000	54	4	20	21, 000	40, 500	80, 000
Scales and balances	2	10, 000	22	....	....	9, 100	14, 000	33, 000
Shipbuilding	30	108, 800	94	....	....	39, 118	92, 180	158, 610
Shirts	5	17, 500	4	30	1	9, 106	11, 350	28, 300
Silk and silk goods (see also Mixed textiles)	1	20, 000	16	25	10	10, 000	32, 300	60, 000
Soap and candles	6	55, 600	14	....	6	6, 560	82, 188	103, 527
Spectacles and eyeglasses	1	50, 000	98	9	28	52, 000	29, 476	110, 775
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	3	76, 500	37	....	....	17, 610	81, 700	136, 500
Tinware, copperware, and sheet-iron ware	41	233, 625	206	71	14	96, 909	183, 770	362, 335
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	4	541, 000	207	248	110	155, 600	963, 478	1, 200, 747
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking and snuff).	32	45, 275	73	2	11	32, 184	64, 163	145, 443
Tools (see also Cutlery and edge tools; Hardware)	1	20, 000	30	....	....	14, 560	15, 000	40, 000
Trunks and valises	2	25, 500	62	4	....	21, 000	51, 200	85, 000
Upholstering (see also Furniture)	11	22, 400	31	....	....	13, 531	44, 900	86, 270
Vinegar	12	79, 000	59	....	4	10, 081	117, 345	148, 100
Whips	3	110, 500	49	45	10	35, 103	72, 632	163, 983
Wirework	3	12, 000	11	....	2	6, 528	15, 300	28, 930
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	12	103, 400	131	20	22	70, 851	92, 839	247, 009
Woolen goods (see also Mixed textiles)	2	48, 000	25	8	....	6, 250	23, 845	37, 895
MONTGOMERY:								
Agricultural implements	3	34, 000	30	....	....	10, 040	9, 345	34, 120
Bags, other than paper	1	100, 000	12	48	....	21, 000	200, 000	300, 000
Boxes, fancy and paper	1	15, 000	31	19	....	15, 000	36, 000	60, 000
Brick and tile	4	20, 000	56	....	....	9, 634	5, 515	22, 436
Brooms and brushes	12	159, 200	223	....	27	66, 050	265, 500	494, 300
Carpets, other than rag	2	1, 344, 858	491	753	163	361, 805	730, 116	1, 539, 126
Carriages and wagons	12	68, 000	89	....	....	28, 750	49, 900	100, 258
Cheese and butter (factory)	53	141, 930	65	18	....	16, 799	271, 377	365, 996
Clocks	1	25, 000	[illegible]	4	2	3, 500	15, 000	20, 000
Coffins, burial cases, and undertakers' goods	2	200, 500	14	4	....	8, 000	20, 250	40, 600
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	1	40, 000	40	35	....	24, 000	24, 000	55, 000
Flouring- and grist-mill products	22	289, 100	56	....	....	15, 493	472, 589	529, 802
Food preparations (see page 39)	2	12, 000	27	....	....	6, 500	15, 500	26, 000
Foundery and machine-shop products	8	209, 500	106	....	....	35, 520	60, 839	130, 825
Furniture	4	25, 500	28	....	....	6, 298	10, 600	27, 904
Hosiery and knit goods (see also Cotton goods)	11	1, 423, 000	505	732	275	425, 154	1, 231, 555	2, 322, 475
Iron forgings	1	100, 000	120	....	20	50, 000	91, 000	180, 000
Leather, dressed skins	2	11, 700	5	....	....	1, 200	19, 750	26, 500
Leather, tanned	2	32, 000	7	....	....	2, 780	23, 200	37, 000
Liquors, malt	4	46, 000	10	....	....	4, 930	24, 995	44, 570
Lumber, sawed	23	93, 162	72	....	....	15, 428	92, 054	138, 655
Marble and stone work	2	5, 500	9	....	....	4, 500	12, 000	22, 500
Mixed textiles (see also Cotton goods)	11	1, 363, 000	372	705	241	410, 150	1, 194, 127	2, 107, 475
Oil, linseed	1	150, 000	65	....	....	22, 000	800, 000	872, 000
Paper	3	115, 000	50	11	2	14, 600	66, 816	113, 454
Saddlery and harness	10	15, 800	25	....	....	8, 210	17, 151	32, 943
Sash, doors, and blinds	3	68, 000	54	....	....	16, 000	44, 800	132, 000
Shoddy (see also Mixed textiles)	1	1, 700	6	....	....	2, 250	23, 220	28, 340
Springs, steel, car, and carriage	1	90, 000	89	....	4	20, 000	120, 000	180, 000
Tinware, copperware, and sheet-iron ware	7	12, 000	26	....	....	8, 846	15, 803	31, 874
Tobacco, cigars and cigarettes	5	16, 175	25	....	3	7, 675	20, 375	37, 601
Trunks and valises	1	34, 000	11	....	....	4, 680	17, 300	28, 000
NEW YORK (see Table VI).								
NIAGARA:								
Agricultural implements	8	72, 000	47	....	5	18, 698	38, 025	71, 842
Bread and other bakery products	5	41, 250	20	6	1	8, 925	40, 400	59, 265
Carriages and wagons	3	48, 600	40	....	1	10, 400	14, 100	37, 000
Clothing, men's	4	26, 500	30	15	....	12, 300	17, 000	40, 000
Cooperage	32	106, 800	264	....	25	61, 620	137, 600	236, 974
Cotton goods	1	10, 000	....	5	....	2, 000	26, 000	35, 000
Flouring- and grist-mill products	20	766, 500	129	....	....	58, 380	1, 998, 477	2, 508, 724
Foundery and machine-shop products	12	273, 000	464	....	3	144, 830	235, 900	509, 350
Fruits and vegetables, canned and preserved	8	105, 500	99	139	83	31, 105	87, 852	156, 365
Furniture	5	45, 500	43	....	5	18, 400	15, 900	46, 300
Furniture, chairs	1	10, 000	20	....	5	7, 000	3, 000	30, 000
Glass	1	45, 000	76	3	41	18, 000	23, 055	55, 000
Leather, tanned	1	25, 000	8	....	....	3, 000	18, 450	26, 200
Liquors, malt	3	88, 827	11	....	....	5, 335	27, 194	48, 382
Lumber, planed	2	64, 000	55	....	5	13, 200	30, 800	53, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
NIAGARA—continued.								
Lumber, sawed	19	$284,500	159		22	$76,933	$330,225	$517,626
Malt	2	67,472	10			2,540	28,472	55,939
Marble and stone work	3	31,000	19			10,000	10,500	30,000
Paper (see also Wood pulp)	2	130,000	58	20	2	30,000	139,500	185,500
Printing and publishing	3	87,000	61	30	7	29,990	49,700	100,019
Saddlery and harness	8	43,875	27			12,800	23,700	51,650
Shipbuilding	7	57,800	161			78,650	149,300	263,400
Shirts	2	17,000	2	56		9,650	35,243	65,000
Tinware, copperware, and sheet-iron ware	14	23,600	34			13,500	38,750	74,550
Tobacco, cigars and cigarettes	9	13,500	42	1		19,200	22,125	56,750
Wood pulp	2	140,000	50		2	14,700	20,500	120,000
ONEIDA:								
Agricultural implements	8	111,800	99			39,075	65,995	150,711
Boots and shoes	5	560,000	392	305	50	239,369	687,862	1,066,056
Boxes, wooden, packing	11	43,500	42	14	6	13,540	23,990	46,570
Brass ware	1	16,000	65			23,335	110,800	147,455
Bread and other bakery products	11	65,100	52	7	11	20,822	89,380	127,494
Brick and tile	10	73,175	121		3	25,594	20,775	62,085
Carriages and wagons	19	128,800	135			49,957	66,000	155,250
Cheese and butter (factory)	132	257,452	199	62	3	46,429	819,843	1,124,196
Clothing, men's	27	948,520	946	1,543		455,855	1,411,477	2,284,550
Clothing, women's	4	15,500	3	38		5,947	25,700	42,500
Coffee and spices, roasted and ground	2	12,500	6			3,100	21,000	29,000
Confectionery	4	14,000	12	4	3	6,200	25,400	44,400
Cotton goods (see also Hosiery and knit goods)	8	3,165,988	708	1,042	407	486,057	1,022,026	1,981,061
Dyeing and finishing textiles	1	50,000	28	3		9,828	33,158	55,880
Flavoring extracts	1	100,000	10			7,855	35,000	50,000
Flouring- and grist mill products	52	395,200	91			23,339	743,725	834,002
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	19	691,386	526	3	6	214,572	275,694	617,726
Fruits and vegetables, canned and preserved	9	54,475	389	193	56	24,250	41,800	82,300
Furniture (see also Mattresses and spring beds; Upholstering)	15	119,150	77	3	5	35,180	66,750	139,000
Furniture, chairs	3	60,000	55		8	21,600	22,500	58,300
Furs, dressed	2	30,000	8	10		5,000	25,000	40,000
Glass	2	160,000	83			63,179	68,518	140,000
Hardware, saddlery	3	107,000	152	21	21	82,770	87,500	195,000
Hosiery and knit goods (see also Cotton goods; Woolen goods)	5	185,000	89	210	47	75,612	167,053	408,234
Iron and steel	4	673,000	508		44	153,749	874,555	919,721
Leather, tanned	15	318,100	190			68,719	471,752	635,466
Lime	5	19,082	39			12,366	12,024	31,125
Liquors, malt	12	226,160	75			35,448	177,483	316,853
Looking-glass and picture frames	6	18,450	13	1		5,830	24,100	41,500
Lumber, sawed	104	298,457	176		5	50,586	247,975	381,422
Marble and stone work	16	59,975	75	1		27,202	52,042	106,853
Matches	1	75,000	10	20	30	10,800	100,000	121,000
Mattresses and spring beds (see also Furniture)	2	8,000	10		3	3,900	27,000	38,500
Oilcloth, floor	1	70,000	30			12,000	45,000	65,000
Paints	3	45,500	11			7,050	32,250	60,000
Perfumery and cosmetics	1	1,000	12			5,000	15,000	25,000
Printing and publishing	13	240,300	165	2	4	84,657	67,178	232,307
Saddlery and harness	35	49,885	57		1	19,782	51,174	101,946
Sash, doors, and blinds	10	294,000	250		4	90,561	307,956	525,378
Shipbuilding	13	47,100	70			29,828	41,454	84,376
Shirts	7	5,300	2	28		8,600	10,900	27,400
Silk and silk goods	1	35,000	22	37	38	25,000	236,415	296,500
Silverware	1	25,000	5			1,800	20,000	25,000
Slaughtering and meat-packing, not including retail butchering establishments.	4	78,125	40			13,100	165,365	209,787
Soap and candles	4	25,000	8			3,408	35,692	47,024
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	1	25,000	18			7,074	11,428	26,209
Surgical appliances	1	20,517	20		6	8,476	42,000	95,000
Telegraph and telephone apparatus	2	29,000	23			8,800	11,000	30,000
Tinware, copperware, and sheet-iron ware	48	124,672	114		3	45,215	116,383	220,085
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	3	315,000	46	7	33	23,600	140,900	196,315
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	21	96,500	102	6	14	44,081	81,923	162,035
Upholstering (see also Furniture)	5	9,600	10		1	3,733	11,300	22,050
Wooden ware	4	37,200	32	1		10,060	22,019	41,037
Woolen goods	8	1,272,000	503	287	105	290,302	1,159,011	1,624,006
ONONDAGA:								
Agricultural implements	8	380,500	300		4	120,878	197,948	447,088
Baking and yeast powders	4	14,000	11	4	2	4,550	31,000	43,000
Baskets, rattan and willow ware	6	19,560	305	100	52	18,206	9,722	35,339
Belting and hose, leather	1	10,000	5			3,380	20,364	40,000
Billiard tables and materials	2	9,500	15		1	6,192	22,000	33,300
Boots and shoes	4	84,000	188	131	31	81,000	307,000	440,100
Boxes, fancy and paper	1	12,000	9	32	2	7,000	15,000	30,000
Bread and other bakery products	27	68,494	77	10	9	25,117	198,819	274,507
Brick and tile (see also Drain and sewer pipe)	15	125,500	130	1	9	35,740	20,006	82,320
Carriages and wagons	21	165,600	258		18	106,591	183,705	393,574

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ONONDAGA—continued.								
Cement	3	$45, 000	61			$15, 800	$21, 500	$47, 000
Cheese and butter (factory)	26	70, 900	33	13		6, 870	94, 072	136, 732
Clothing, men's	28	924, 300	832	1, 858	86	488, 671	1, 586, 888	2, 552, 483
Clothing, women's	5	26, 200	5	101	3	17, 931	79, 930	106, 409
Coffee and spices, roasted and ground	2	102, 500	19	1		13, 830	163, 000	194, 950
Coffins, burial cases, and undertakers' goods	2	16, 700	5	5		5, 550	10, 900	20, 000
Confectionery	8	54, 500	36	6	2	15, 698	95, 632	126, 842
Cooperage	39	114, 700	332		22	89, 640	270, 329	426, 644
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	2	14, 000	13			6, 318	23, 600	37, 254
Cotton goods	1	150, 000	37	45		14, 000	63, 577	100, 000
Cutlery and edge tools (see also Hardware)	4	507, 300	243		1	77, 946	202, 250	299, 385
Drain and sewer pipe (see also Brick and tile)	4	11, 400	17		3	7, 902	25, 850	44, 200
Fertilizers	6	53, 000	24			3, 950	27, 570	36, 600
Fire-arms	2	75, 000	96			37, 000	22, 500	115, 000
Flouring- and grist-mill products	56	732, 150	174			62, 854	1, 855, 994	2, 105, 821
Food preparations (see page 39)	2	7, 600	3			550	18, 500	22, 500
Foundery and machine-shop products	21	671, 800	422		6	174, 165	420, 742	713, 871
Fruits and vegetables, canned and preserved	2	40, 000	45	70	30	6, 942	35, 000	60, 000
Furniture (see also Upholstering)	32	259, 925	250	1	18	98, 605	226, 010	414, 998
Furniture, chairs	6	40, 500	106	3	1	29, 200	45, 000	107, 800
Furs, dressed	2	25, 000	3	21		3, 800	24, 000	39, 000
Glass	1	130, 000	72		1	41, 388	40, 589	116, 940
Gunpowder	1	20, 000	7			4, 500	27, 000	39, 600
Hardware (see also Cutlery and edge tools)	2	30, 000	42		11	9, 392	12, 857	49, 000
Hardware, saddlery	2	118, 000	362	22	55	106, 685	196, 720	365, 478
Iron and steel	5	1, 306, 000	685		50	271, 487	629, 141	1, 268, 852
Iron bolts, nuts, washers, and rivets	1	35, 670	54	9		13, 214	45, 359	71, 292
Jewelry	2	1, 700	2			1, 690	26, 500	30, 600
Lead, bar, pipe, sheet, and shot	1	10, 000	3			1, 600	40, 000	50, 000
Leather, curried	5	30, 500	13			5, 191	79, 606	95, 398
Leather, tanned	5	74, 400	15			5, 292	104, 161	136, 846
Lime	6	44, 800	56			13, 200	8, 900	36, 500
Lime and cement	3	42, 500	32		1	7, 800	20, 748	37, 710
Liquors, distilled	1	25, 000	6			2, 500	19, 250	28, 875
Liquors, malt	9	552, 497	136	1	1	65, 444	333, 196	594, 945
Lithographing (see also Printing and publishing)	1	25, 000	15		15	11, 000	9, 650	22, 841
Looking-glass and picture frames	5	95, 731	128		26	41, 383	77, 000	161, 414
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	13	154, 300	114		4	29, 511	78, 550	128, 200
Lumber, sawed	47	161, 500	135		2	27, 699	102, 222	168, 932
Marble and stone work	16	94, 800	127			65, 096	56, 991	151, 590
Matches	2	39, 650	9	39	12	9, 360	50, 062	71, 000
Millinery and lace goods	6	21, 800	6	51		17, 456	65, 120	107, 960
Musical instruments, organs and materials	5	15, 900	58			11, 491	19, 383	36, 554
Paper	11	375, 000	165	66	12	79, 135	293, 410	447, 512
Patent medicines and compounds	7	42, 200	11	7	1	4, 682	28, 865	48, 534
Pens, gold	2	8, 500	9			5, 000	11, 400	20, 000
Printing and publishing (see also Lithographing)	14	289, 000	198	21	28	115, 638	84, 792	248, 152
Pumps, not including steam pumps	3	67, 000	20			7, 400	19, 600	49, 000
Roofing and roofing materials	12	17, 525	36		3	16, 950	34, 700	65, 000
Saddlery and harness	24	32, 731	53		3	18, 456	49, 257	92, 047
Salt	69	2, 286, 081	962	11	39	274, 087	507, 020	1, 107, 760
Salt, ground	4	229, 200	130	38		31, 807	218, 943	266, 906
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	4	97, 000	59		5	25, 600	67, 300	110, 400
Shipbuilding	5	30, 200	29			11, 638	16, 487	30, 700
Shirts	7	26, 950	24	153	11	43, 877	44, 366	150, 586
Silverware	2	70, 000	17		3	10, 200	43, 000	73, 000
Slaughtering and meat-packing, not including retail butchering establishments.	8	221, 000	64			22, 126	518, 590	620, 918
Soap and candles	4	94, 000	21		2	8, 700	70, 979	101, 540
Stone- and earthen-ware	5	61, 000	62	10	8	28, 600	26, 605	85, 223
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	36	88, 650	147	6	5	49, 451	110, 920	200, 419
Tobacco, cigars and cigarettes	69	303, 230	636	79	90	280, 443	462, 389	962, 923
Upholstering (see also Furniture)	6	21, 250	20	5	3	11, 376	33, 080	58, 100
Vinegar	6	33, 459	21			4, 230	13, 009	27, 596
Wheelbarrows	3	91, 000	62		10	14, 600	21, 978	47, 124
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	9	26, 650	45		2	12, 848	17, 798	39, 181
Woolen goods	5	187, 000	131	114	18	68, 477	384, 038	533, 771
ONTARIO:								
Agricultural implements	14	108, 584	79		2	30, 560	48, 127	134, 922
Bread and other bakery products	3	13, 000	20		1	7, 190	36, 766	50, 016
Brick and tile	10	28, 900	42		3	8, 294	7, 157	25, 318
Carriage and wagon materials	9	72, 800	73			27, 640	54, 855	108, 500
Carriages and wagons	8	63, 500	52			25, 750	25, 750	63, 300
Clothing, men's	10	35, 600	36	22		20, 692	43, 500	77, 356
Cooperage	29	35, 146	55		1	15, 514	31, 626	66, 621
Flouring- and grist-mill products	42	351, 800	98			25, 515	743, 648	844, 644
Foundery and machine-shop products	8	74, 000	55			18, 675	17, 300	53, 600
Furniture	3	23, 000	13	2		6, 164	25, 000	42, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products
			Males above 16 years.	Females above 15 years.	Children and youths.			
ONTARIO—continued.								
Gloves and mittens	2	$8,400	11	36		$13,500	$24,000	$48,000
Leather, curried	1	10,000	2			750	35,700	42,500
Leather, tanned	1	50,000	2			750	130,000	216,000
Liquors, malt	2	163,000	35			15,598	79,194	141,722
Lumber, planed	5	84,000	27			9,600	111,040	139,600
Lumber, sawed	40	108,250	139		2	23,575	123,952	191,803
Malt	5	438,000	64			19,885	585,630	667,600
Marble and stone work	3	13,100	18			9,200	15,403	30,000
Paper	3	101,000	59	7	2	22,600	43,750	91,667
Saddlery and harness	18	21,230	26			8,448	17,965	42,050
Spectacles and eyeglasses	1	25,000	13			4,900	37,000	49,000
Tinware, copperware, and sheet-iron ware	20	48,150	38			17,653	31,850	67,803
Tobacco, cigars and cigarettes	8	23,500	33		5	15,900	25,800	55,500
ORANGE:								
Agricultural implements	3	57,000	29		1	15,488	49,598	99,322
Boots and shoes	1	21,000	18		2	7,000	11,400	21,900
Bread and other bakery products	10	26,300	28			10,715	22,450	48,540
Brick and tile	13	271,200	329	17	19	73,400	47,695	196,125
Brooms and brushes	1	18,000	13	23	44	14,500	23,000	40,000
Carriages and wagons	9	129,000	69			30,600	34,365	89,250
Cheese and butter (factory)	34	185,550	70	6		16,415	229,707	363,781
Clothing, men's	17	58,800	73	112		43,800	107,900	182,700
Confectionery	3	2,600	13	10		6,470	7,000	21,500
Cordage and twine	1	32,000	20	10	5	8,000	28,000	40,000
Cotton goods (see also Mixed textiles)	1	300,000	55	212	33	52,424	105,690	166,761
Cutlery and edge tools	3	60,200	222	24	60	125,250	68,700	202,600
Dyeing and finishing textiles	2	390,000	130	10	45	63,590	136,582	331,286
Fertilizers	3	35,800	68			10,437	76,600	128,250
Files (see also Saws)	2	55,000	64	3	5	28,488	15,949	80,895
Flouring- and grist-mill products	53	427,800	91			26,448	639,680	723,792
Foundery and machine-shop products	15	341,000	648			255,909	304,472	692,142
Furniture	9	65,000	69		6	36,350	37,600	92,600
Glass	2	70,000	119		101	51,962	49,774	127,183
Gunpowder	1	16,000	16			10,000	33,233	114,368
Hats and caps, not including wool hats	1	(*a*)	92	95		59,000	80,000	180,000
Iron and steel	3	767,493	439		36	189,808	409,017	682,570
Leather, curried	7	87,000	56		4	25,023	332,634	387,670
Leather, tanned	7	79,500	31		1	12,839	224,980	301,140
Liquors, malt	3	256,000	38			17,628	87,931	156,988
Lumber, sawed	21	53,500	64		2	17,720	65,971	100,555
Marble and stone work	8	30,000	31			18,050	21,350	64,900
Mixed textiles (see also Cotton goods; Woolen goods)	3	190,000	159	41	44	76,000	132,456	255,000
Oilcloth, floor	1	60,000	48		2	18,000	40,000	60,000
Paints	1	50,000	43		7	20,000	36,000	85,000
Paper	6	460,000	130	119	9	78,500	366,020	572,860
Printing and publishing	2	33,000	26		6	14,950	19,000	41,000
Saddlery and harness	14	33,100	20			6,235	15,100	35,200
Saws	2	262,500	190	1		68,309	193,000	332,000
Shipbuilding	3	26,000	105			63,478	98,422	183,400
Shoddy (see also Mixed textiles)	4	14,000	23	13		22,060	105,500	143,000
Soap and candles	2	222,000	61	37	4	32,400	226,108	309,648
Tinware, copperware, and sheet-iron ware	22	51,700	54		1	21,887	58,600	119,150
Tobacco, cigars and cigarettes	11	10,700	15	1	1	6,600	7,530	23,485
Trunks and valises	1	20,000	13	12		9,600	38,000	75,000
Wool hats (see also Woolen goods)	3	335,000	259	152	68	145,400	328,343	645,400
Woolen goods (see also Mixed textiles; Wool hats; Worsted goods)	9	470,000	358	130	103	156,222	441,439	669,705
Worsted goods (see also Woolen goods)	1	45,000	10	10	25	5,280	19,524	26,154
ORLEANS:								
Agricultural implements	5	83,500	47			12,086	11,605	38,559
Carriages and wagons	5	41,000	36			15,683	27,000	52,988
Cooperage	23	23,295	57		4	14,680	32,620	64,430
Flouring- and grist-mill products	18	230,650	55			13,530	497,269	571,097
Foundery and machine-shop products	4	125,000	108		2	40,500	51,500	163,000
Furniture	2	16,500	23	2		10,700	9,400	31,000
Lumber, sawed	17	114,500	130		6	14,300	59,800	94,850
Paper	1	20,000	7	4		4,800	18,825	34,825
Vinegar	4	29,500	30			4,250	14,700	26,000
OSWEGO:								
Agricultural implements	3	157,000	30			12,120	11,445	56,722
Boxes, cigar	2	4,300	11	1	3	5,200	12,950	20,000
Boxes, wooden, packing	7	27,100	23	47	2	18,700	15,175	50,400
Bread and other bakery products	8	46,200	27	4		11,521	52,651	80,746
Carriages and wagons	8	62,100	52		2	23,950	23,000	63,934
Cement	1	15,000	12			3,050	18,000	23,500
Cheese and butter (factory)	58	100,435	82	21		19,447	289,806	391,565
Cooperage	19	39,900	62	1	6	15,597	53,295	82,580
Cutlery and edge tools	2	20,300	15			4,175	12,060	22,550
Flouring- and grist-mill products	40	1,059,700	167		1	77,086	2,462,016	2,697,873

a For capital, see Wool hats.

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
OSWEGO—continued.								
Foundery and machine-shop products	12	$476, 368	450	....	12	$200, 429	$312, 461	$703, 980
Furniture	14	41, 400	40	1	....	16, 552	41, 600	78, 000
Glass	3	160, 000	152	....	....	47, 394	63, 156	149, 734
Hosiery and knit goods	1	100, 000	51	70	17	28, 017	223, 463	331, 978
Instruments, professional and scientific	1	10, 000	25	1	....	7, 800	20, 000	40, 000
Leather, curried	10	104, 100	106	....	2	37, 950	609, 840	695, 100
Leather, tanned	21	627, 050	297	....	5	100, 433	919, 818	1, 218, 904
Lumber, planed (see also Sash, doors, and blinds)	7	184, 500	125	....	....	51, 000	174, 805	258, 432
Lumber, sawed	136	385, 740	470	....	20	100, 146	318, 593	551, 487
Liquors, malt	3	68, 000	12	....	1	6, 146	30, 970	55, 125
Malt	2	85, 000	14	....	....	4, 255	86, 000	114, 000
Marble and stone work	6	21, 500	26	....	....	7, 875	10, 585	35, 399
Mixed textiles	1	100, 000	38	70	17	28, 017	223, 463	331, 978
Paper	4	46, 400	30	2	....	9, 800	37, 700	60, 575
Printing and publishing	5	119, 000	75	1	15	30, 156	16, 901	76, 580
Saddlery and harness	21	21, 375	26	....	....	8, 275	21, 676	48, 181
Sash, doors, and blinds (see also Lumber, planed)	8	54, 500	92	....	20	43, 150	72, 700	145, 900
Shipbuilding	18	67, 900	133	....	....	53, 633	67, 719	145, 563
Starch	2	480, 000	365	98	5	177, 754	664, 384	996, 759
Tinware, copperware, and sheet-iron ware	22	29, 700	49	....	....	20, 369	52, 800	98, 175
Tobacco, cigars and cigarettes	5	17, 300	22	2	2	8, 346	13, 106	25, 508
Window blinds and shades	2	150, 000	94	6	....	29, 498	375, 000	445, 000
Worsted goods	1	938, 157	236	569	134	209, 291	746, 104	1, 356, 741
OTSEGO:								
Agricultural implements	7	28, 500	40	....	....	10, 147	16, 700	43, 688
Carriages and wagons	12	44, 050	55	....	....	14, 985	24, 750	56, 450
Cooperage	22	17, 575	17	....	....	5, 171	8, 400	24, 800
Cheese and butter (factory)	61	128, 225	80	17	1	16, 285	241, 234	330, 499
Clothing, men's	5	18, 900	13	13	....	5, 326	12, 761	23, 691
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	6	240, 000	115	122	42	56, 450	133, 702	219, 870
Flouring- and grist-mill products	49	198, 200	57	....	....	14, 696	373, 735	421, 719
Foundery and machine-shop products	6	33, 300	29	....	....	7, 600	9, 450	24, 925
Furniture	12	40, 510	31	1	1	8, 500	12, 115	32, 260
Hosiery and knit goods (see also Cotton goods)	2	55, 000	36	43	10	20, 500	65, 500	113, 750
Leather, tanned	8	89, 250	33	....	....	9, 555	88, 835	119, 900
Lumber, sawed	111	292, 250	237	....	2	33, 984	175, 740	280, 060
Mixed textiles (see also Cotton goods)	1	50, 000	32	38	10	19, 000	55, 000	95, 000
Paper	2	25, 000	15	1	....	2, 850	13, 954	21, 755
Saddlery and harness	16	17, 800	22	....	....	4, 474	15, 225	28, 100
Sash, doors, and blinds	6	38, 575	39	....	....	9, 800	22, 600	41, 850
Shirts	4	10, 000	19	152	....	24, 830	59, 380	103, 585
Tinware, copperware, and sheet-iron ware	16	39, 300	45	....	....	15, 200	36, 047	68, 240
Tobacco, cigars and cigarettes	4	6, 200	15	....	1	4, 320	11, 450	21, 250
PUTNAM:								
Cheese and butter (factory)	1	40, 000	60	44	....	49, 428	327, 881	463, 095
Drugs and chemicals	1	75, 000	20	....	....	9, 000	75, 000	125, 000
Flouring- and grist-mill products	11	29, 700	6	....	....	862	38, 896	42, 483
Lumber, sawed	5	23, 000	10	....	....	2, 865	12, 960	20, 776
Paper	2	26, 000	20	3	....	6, 500	40, 954	64, 800
Sash, doors, and blinds	1	4, 000	5	....	....	1, 600	40, 000	48, 000
QUEENS:								
Baking and yeast powders (see also Drugs and chemicals)	1	50, 000	30	20	....	25, 000	200, 000	245, 000
Bread and other bakery products	13	25, 700	16	3	1	10, 370	49, 250	75, 450
Brick and tile	4	63, 000	69	4	6	19, 175	8, 400	40, 222
Carriages and wagons	4	36, 400	34	....	....	21, 650	19, 650	51, 350
Clothing, men's	12	26, 800	23	11	....	12, 200	22, 350	47, 546
Coffins, burial cases, and undertakers' goods	1	140, 000	50	3	....	19, 671	50, 000	100, 000
Cordage and twine	5	15, 000	20	....	2	9, 000	22, 500	47, 000
Drugs and chemicals (see also Baking and yeast powders)	3	451, 300	73	2	....	35, 926	120, 500	203, 202
Explosives and fireworks	2	40, 000	23	7	....	9, 000	27, 000	48, 000
Flouring- and grist-mill products	20	173, 500	32	3	4	14, 225	163, 355	192, 754
Foundery and machine-shop products	2	40, 000	109	....	16	66, 000	71, 000	161, 000
Fruits and vegetables, canned and preserved	3	112, 000	30	35	15	29, 500	136, 000	193, 500
Furniture	5	156, 150	16	2	....	11, 100	32, 450	59, 400
Hats and caps, not including wool hats	1	7, 500	15	37	8	11, 000	40, 000	60, 000
Ink	1	100, 000	10	....	....	7, 000	65, 000	90, 000
Liquors, distilled	1	60, 000	45	....	....	25, 000	250, 000	375, 000
Liquors, malt	4	270, 000	95	....	....	47, 050	239, 499	427, 320
Lumber, planed (see also Wood, turned and carved)	4	17, 500	16	....	....	6, 315	31, 000	50, 000
Lumber, sawed	7	42, 500	16	....	1	6, 800	28, 300	46, 200
Marble and stone work	22	104, 300	128	....	1	65, 955	97, 550	218, 550
Musical instruments, pianos and materials	1	1, 500, 000	230	....	....	160, 000	250, 000	440, 000
Oil, lard	1	30, 000	15	....	2	10, 200	33, 600	48, 800
Oilcloth, enameled	1	25, 000	35	1	2	13, 000	96, 000	120, 000
Oilcloth, floor	1	50, 000	100	....	....	30, 000	150, 000	250, 000
Paints (see also Varnish)	1	75, 000	4	....	....	1, 500	40, 000	50, 000
Paving materials	1	15, 000	15	....	....	4, 500	10, 000	22, 000
Rubber and elastic goods	2	800, 000	440	160	14	312, 530	463, 000	856, 000
Saddlery and harness	11	8, 100	13	....	1	5, 930	8, 500	23, 650
Silk and silk goods	1	100, 000	75	82	42	51, 000	98, 024	190, 000
Starch	2	1, 155, 000	437	34	....	188, 532	693, 000	1, 225, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
QUEENS—continued.								
Stone- and earthen-ware	2	$32, 000	19	8	5	$9, 742	$11, 906	$25, 000
Tinware, copperware, and sheet-iron ware	14	846, 275	432	44	50	232, 960	884, 000	1, 556, 750
Tobacco, cigars and cigarettes	9	11, 050	17	2	3	9, 000	20, 200	44, 730
Varnish (see also Paints)	4	552, 000	34		3	25, 402	536, 000	806, 800
Wood, turned and carved (see also Lumber, planed)	2	58, 000	26			10, 000	24, 000	41, 000
Wooden ware	1	20, 000	43		3	17, 312	50, 000	80, 000
RENSSELAER:								
Agricultural implements	8	1, 609, 500	888		25	430, 645	1, 013, 919	2, 037, 590
Bells	2	40, 000	15			6, 479	53, 300	68, 800
Belting and hose, leather	2	15, 000	12	1		7, 644	38, 751	52, 108
Boots and shoes	3	82, 000	95	15		39, 000	77, 575	138, 600
Boxes, cigar	3	10, 300	22	8	2	9, 500	23, 000	42, 000
Boxes, fancy and paper	5	41, 100	37	151	2	57, 033	96, 742	176, 739
Brass castings	1	30, 000	7			6, 500	22, 000	31, 800
Bread and other bakery products	32	128, 500	154	5	4	77,372	311, 518	479, 743
Brick and tile (see also Drain and sewer pipe)	13	179, 500	279		15	78, 042	83, 098	220, 500
Brooms and brushes	27	307, 550	364	520	80	186, 639	247, 944	569, 272
Buttons	1	50, 000	25	10	6	15, 144	13, 973	34, 422
Carriages and wagons	6	38, 500	49			22, 262	28, 500	59, 850
Clothing, men's	33	217, 250	247	151		190, 285	364, 215	704, 836
Clothing, women's	5	26, 000	10	119		17, 740	66, 300	95, 596
Coffee and spices, roasted and ground	3	60, 000	26			14, 444	88, 820	130, 764
Coffins, burial cases, and undertakers' goods	8	25, 300	21			10, 814	28, 450	53, 150
Collars and cuffs, paper	1	20, 000	8	27		10, 000	55, 000	75, 000
Confectionery	9	29, 300	36	15		23, 143	86, 188	144, 266
Cooperage	4	16, 500	60		3	23, 100	77, 830	113, 080
Cordage and twine	5	105, 600	120	100	70	86, 988	258, 220	382, 398
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	4	325, 000	73	90	50	78, 467	290, 646	474, 115
Cutlery and edge tools (see also Hardware)	3	75, 000	101			40, 200	100, 600	163, 400
Drain and sewer pipe (see also Brick and tile)	1	1, 000	1			520	15, 000	20, 000
Drugs and chemicals	2	78, 000	10			5, 100	12, 900	29, 786
Electroplating	3	27, 000	76	1	4	22, 726	18, 500	56, 719
Flouring- and grist-mill products	32	337, 095	67		1	27, 792	633, 490	727, 657
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	36	2, 480, 400	2, 471		107	1, 316,055	1, 238, 925	3, 402, 434
Furnishing goods, men's	18	830, 000	384	4, 036	100	918, 932	1,123, 147	2, 636, 614
Furniture (see also Upholstering)	10	36, 700	60	3		27, 003	48, 640	101, 400
Grease and tallow	2	6, 800	5			3, 000	28, 000	35, 400
Gunpowder	1	140, 000	35			21, 000	87, 386	121, 500
Hardware (see also Cutlery and edge tools)	2	21, 300	17		4	7, 781	30, 500	49, 079
Hardware, saddlery	1	16, 000	15	1	22	14, 725	29, 015	52, 900
Hats and caps, not including wool hats	1	20, 000	4	[illegible]	1	6, 400	18, 000	35, 000
Hosiery and knit goods (see also Cotton goods; Woolen goods)	7	264, 000	185	271	56	123, 149	252, 727	535, 330
Instruments, professional and scientific	1	100, 000	70			38, 000	20, 000	89, 454
Iron and steel	4	4, 550, 000	3, 857		495	1, 657, 396	4, 618, 862	8, 702, 180
Iron forgings	1	39, 000	35			16, 925	26, 312	51, 994
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	2	21, 500	33			11, 800	38, 700	60, 100
Leather, curried	2	70, 667	39			21, 240	143, 500	185, 000
Leather, tanned	1	15, 333	6			3, 120	25, 000	34, 000
Liquors, malt	11	849, 750	232			111, 919	566, 349	1, 010, 883
Lumber, planed (see also Sash, doors, and blinds)	3	40, 500	30		2	14, 400	24, 000	44, 500
Lumber, sawed	31	130, 800	50			14, 154	86, 634	131, 530
Looking-glass and picture frames	4	18, 600	20		1	11, 062	34, 891	57, 310
Malt	5	422, 500	77			29, 030	477, 021	577, 617
Mantels, slate, marble, and marbleized	1	35, 000	20			11, 180	6, 864	27, 065
Marble and stone work	13	56, 400	69		1	33, 073	39, 253	99, 820
Mineral and soda waters	5	62, 500	41		3	20, 659	55, 314	84, 526
Mixed textiles (see also Cotton goods; Woolen goods)	3	125, 000	38	55	23	35, 079	71, 907	148, 800
Models and patterns	8	68, 971	90	1		42, 989	17, 114	99, 200
Oilcloth, floor	2	215, 000	73			26, 389	60, 153	126, 448
Paints (see also Varnish)	3	45, 000	14			7, 585	24, 800	49, 600
Paper (see also Collars and cuffs, paper)	11	1, 073, 465	277	91	11	131, 055	692, 811	976, 201
Printing and publishing	18	255, 338	228	4	11	126, 278	106, 897	322, 000
Regalia and society banners and emblems	1	15, 000	4	21		7, 800	40, 000	53, 900
Saddlery and harness	25	35, 700	47		3	19, 119	35, 446	88, 102
Sash, doors, and blinds (see also Lumber, planed)	3	34, 500	60		6	22, 914	61, 700	96, 700
Shirts	37	966, 000	318	7, 214	64	1, 089, 892	1, 580, 919	3, 275, 781
Slaughtering and meat-packing, not including retail butchering establishments.	6	98, 000	42		3	17, 580	192, 383	250, 161
Tinware, copperware, and sheet-iron ware	28	124, 200	117		5	45, 583	106, 910	199, 325
Tobacco, cigars and cigarettes	39	181, 125	277	3	63	149, 362	230, 392	464, 376
Upholstering (see also Furniture)	5	14, 000	20	2		11, 628	21, 000	43, 050
Varnish (see also Paints)	1	100, 000	20			15, 500	120, 000	150, 000
Vinegar	1	10, 000	5			2, 112	25, 000	34, 000
Wire	2	50, 000	53		1	24, 666	135, 038	195, 418
Woolen goods (see also Mixed textiles)	4	222, 000	97	51	38	61, 100	242, 143	528, 600
RICHMOND:								
Bread and other bakery products	4	19, 000	32	5		21, 100	58, 000	95, 000
Brick and tile	3	156, 000	150		11	53, 000	15, 800	142, 000
Carriages and wagons	6	54, 000	51			16, 500	19, 500	50, 000
Cleansing and polishing preparations	1	12, 000	10			3, 500	10, 500	22, 500
Dentists' materials	1	75, 000	92	4	4	50, 000	45, 000	180, 000

Table V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Richmond—continued.								
Liquors, malt	8	$989, 250	363			$156, 521	$792, 502	$1, 414, 732
Lumber, planed (see also Wood, turned and carved)	1	70, 000	14			7, 500	28, 000	53, 000
Oil, linseed	1	250, 000	70			50, 000	920, 000	1, 058, 500
Oilcloth, floor	1	450, 000	119		4	60, 000	150, 000	300, 000
Paints	1	250, 000	100			42, 256	258, 000	450, 000
Paperhangings	1	12, 000	15	2	9	4, 000	25, 000	31, 000
Shipbuilding	17	108, 600	119			74, 350	100, 900	188, 800
Stationery goods	1	100, 000	102	68		55, 000	245, 000	335, 000
Tinware, copperware, and sheet-iron ware	1	5, 000	10			3, 353	10, 000	28, 000
Wood, turned and carved (see also Lumber, planed)	3	9, 800	20			10, 500	32, 325	65, 875
Rockland:								
Boots and shoes	13	119, 100	404	232	20	257, 945	602, 263	953, 500
Brick and tile	28	371, 700	1, 036		125	264, 891	198, 854	637, 440
Carriages and wagons	3	16, 000	33			11, 000	12, 000	27, 000
Dyeing and finishing textiles	1	650, 000	238	80	64	150, 000	300, 000	900, 000
Flouring- and grist-mill products	18	60, 600	10			3, 231	69, 104	83, 680
Foundery and machine-shop products	3	72, 000	125			37, 900	34, 000	99, 000
Gold and silver leaf and foil	1	1, 000	1			470	21, 240	23, 320
Hats and caps, not including wool hats	1	1, 500	16	17		15, 000	10, 000	30, 000
Iron and steel	1	110, 000	20		10	4, 700	12, 315	23, 100
Lumber, sawed	10	20, 700	18		1	4, 590	32, 210	47, 048
Shipbuilding	3	16, 100	33			16, 580	11, 000	30, 000
Shoddy	1	7, 000	4	19	3	4, 800	35, 000	45, 000
Tobacco, cigars and cigarettes	4	6, 300	15	2	2	5, 225	11, 400	20, 140
Saint Lawrence:								
Agricultural implements	5	46, 200	41		1	14, 049	15, 450	42, 814
Boxes, wooden, packing	6	26, 700	41			6, 660	12, 300	22, 500
Bread and other bakery products	5	20, 100	23	4	4	9, 141	43, 500	59, 900
Carriages and wagons	7	33, 700	44			14, 900	17, 850	40, 500
Cheese and butter (factory)	140	271, 722	209	84	4	41, 621	726, 912	1, 004, 023
Clothing, men's	9	40, 250	18	39		12, 578	24, 068	44, 863
Flouring- and grist-mill products	51	762, 022	150		1	54, 913	1, 539, 158	1, 724, 512
Foundery and machine-shop products	11	80, 500	71			24, 255	31, 475	84, 950
Furniture	23	102, 140	95	1	9	27, 108	39, 270	100, 058
Kaolin and ground earths	3	73, 000	87			26, 410	12, 100	87, 000
Leather, curried	7	11, 500	1			182	19, 391	23, 325
Leather, tanned	23	299, 100	117	2		45, 184	465, 054	628, 427
Lumber, planed (see also Sash, doors, and blinds)	3	51, 000	55		8	29, 110	523, 487	564, 618
Lumber, sawed	120	1, 050, 160	845		67	182, 939	459, 025	831, 793
Marble and stone work	7	10, 880	28			10, 810	13, 650	35, 800
Paper	1	50, 000	23	15		13, 000	42, 000	62, 000
Patent medicines and compounds	2	88, 100	9	34		15, 500	88, 468	222, 000
Printing and publishing	4	32, 000	31	20	4	13, 917	17, 396	47, 978
Saddlery and harness	29	31, 850	39	1		10, 670	29, 598	61, 938
Sash, doors, and blinds (see also Lumber, planed)	10	65, 700	66			21, 544	33, 300	70, 200
Starch	10	55, 750	51			3, 496	47, 060	70, 160
Tinware, copperware, and sheet-iron ware	35	107, 900	75			26, 867	91, 276	149, 750
Tobacco, cigars and cigarettes	1	27, 350	13		2	7, 000	7, 000	22, 500
Woolen goods	10	58, 500	30	22		7, 600	39, 888	59, 302
Saratoga:								
Agricultural implements	7	251, 000	306		20	108, 370	192, 710	339, 985
Bags, paper	1	75, 000	11	24		8, 800	200, 000	240, 000
Boxes, fancy and paper	1	30, 000	3	40	17	14, 000	16, 000	32, 000
Bread and other bakery products	4	24, 500	16	14		15, 300	38, 000	64, 000
Brick and tile	5	14, 300	40	2		7, 490	4, 080	21, 700
Carriages and wagons	6	15, 400	32			14, 300	13, 700	39, 500
Collars and cuffs, paper	1	100, 000	40	50		13, 050	127, 458	208, 832
Confectionery	3	17, 000	10	6		4, 285	18, 000	42, 500
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	2	530, 000	183	320	81	128, 240	345, 343	659, 695
Emery wheels	1	10, 000	3		1	1, 920	15, 000	40, 000
Flouring- and grist-mill products	38	308, 900	77			22, 472	509, 708	565, 971
Foundery and machine-shop products	7	157, 000	119			62, 088	76, 450	173, 200
Hardware	2	165, 886	70		12	32, 326	33, 516	113, 600
Hosiery and knit goods (see also Cotton goods)	6	315, 000	178	428	89	163, 750	331, 463	708, 400
Iron bolts, nuts, washers, and rivets	2	17, 000	18			7, 624	22, 400	34, 724
Leather, dressed skins	1	100, 000	42			13, 000	114, 000	154, 000
Leather, tanned	7	228, 200	160			63, 650	437, 482	598, 050
Lime	1	30, 000	44			10, 000	19, 000	35, 000
Linen goods	1	70, 000	48	80	22	26, 442	10, 000	46, 000
Lumber, planed (see also Sash, doors, and blinds)	5	55, 250	29			12, 782	93, 711	120, 337
Lumber, sawed	49	1, 063, 076	518		24	113, 231	426, 290	676, 835
Marble and stone work	4	22, 000	16			6, 975	18, 000	37, 000
Mixed textiles (see also Cotton goods)	2	155, 000	60	272	18	89, 250	137, 375	310, 400
Paper (see also Collars and cuffs, paper; Wood pulp)	18	1, 058, 000	592	71	17	243, 080	1, 281, 602	1, 833, 949
Printing and publishing	4	37, 900	35	1	3	14, 336	10, 987	38, 100
Saddlery and harness	11	23, 750	23			9, 935	33, 200	56, 400
Sash, doors, and blinds (see also Lumber, planed)	4	55, 000	74			26, 100	61, 000	113, 000
Shipbuilding	3	8, 000	35			15, 400	25, 000	49, 000
Tinware, copperware, and sheet-iron ware	8	36, 300	52	6		19, 512	30, 500	77, 300
Wood pulp	1	40, 000	10			3, 450	7, 200	21, 600
Wooden ware	5	75, 750	166			53, 644	42, 400	152, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
SCHENECTADY:								
Agricultural implements	1	$150,000	115	....	....	$37,512	$63,500	$156,000
Boots and shoes	1	13,000	28	2	....	9,000	15,000	28,000
Bread and other bakery products	7	13,000	15	2	2	5,233	19,400	34,500
Brooms and brushes	20	94,115	177	....	21	52,022	147,462	229,393
Car, railroad, street, and repairs	1	100,000	200	....	....	70,000	100,000	250,000
Carriages and wagons	6	25,500	49	....	....	18,719	20,458	51,422
Clothing, men's	2	15,000	11	20	....	7,000	25,000	38,000
Clothing, women's	1	10,000	4	50	....	8,000	26,000	38,000
Flouring- and grist-mill products	4	49,000	6	....	....	2,275	81,200	89,620
Foundery and machine-shop products	5	528,000	895	....	9	371,575	678,105	1,111,200
Furniture	2	14,000	16	2	....	9,000	23,500	39,950
Hosiery and knit goods	1	100,000	62	124	22	44,500	129,886	197,500
Liquors, malt	3	30,500	7	....	....	3,138	15,743	28,024
Malt	1	45,000	5	....	....	800	16,600	20,000
Printing and publishing	4	34,500	29	9	6	14,000	11,700	43,000
Saddlery and harness	5	4,100	17	....	....	4,184	9,100	21,300
Sash, doors, and blinds	2	35,000	27	....	....	11,000	33,000	56,000
Tinware, copperware, and sheet-iron ware	8	35,600	40	....	2	14,552	18,852	46,930
Tobacco, cigars and cigarettes	11	19,950	61	....	7	13,792	20,335	52,552
SCHOHARIE:								
Agricultural implements	8	56,700	39	....	....	11,550	13,965	41,011
Clothing, men's	3	18,500	4	26	....	6,500	27,300	39,800
Flouring and grist-mill products	35	195,050	68	....	....	10,643	417,762	465,933
Lumber, sawed	54	115,350	114	....	....	9,599	67,499	99,723
Paper	2	14,000	21	2	....	7,000	21,640	35,240
Tinware, copperware, and sheet-iron ware	8	17,700	18	....	....	4,293	12,200	22,830
SCHUYLER:								
Clothing, men's	3	11,350	3	12	....	3,600	13,539	21,174
Flouring- and grist-mill products	14	120,500	42	....	....	13,455	295,563	330,648
Foundery and machine-shop products	4	46,000	36	....	1	9,450	9,700	25,000
Lumber, sawed	28	34,845	77	....	4	8,797	30,318	50,912
Malt	1	70,000	13	....	....	2,000	40,000	80,000
Sash, doors, and blinds	1	13,000	11	....	....	3,000	14,000	20,000
Shipbuilding	4	20,000	15	....	....	6,350	24,150	34,300
Tinware, copperware, and sheet-iron ware	6	10,800	9	....	....	4,400	11,600	21,800
SENECA:								
Baking and yeast powders	2	45,000	65	21	....	54,000	70,000	155,000
Carriage and wagon materials	1	47,000	39	....	....	16,000	96,000	149,000
Clothing, men's	4	10,100	11	9	....	6,925	11,100	22,600
Cooperage	8	22,275	27	....	3	7,675	23,040	37,300
Flouring- and grist-mill products	15	272,400	55	....	....	19,542	436,937	498,919
Foundery and machine-shop products	6	1,278,000	524	....	....	234,101	334,251	901,327
Lumber, sawed	9	53,400	24	....	....	4,055	31,900	45,162
Malt	3	86,000	12	....	....	3,750	48,700	65,000
Printing and publishing	4	21,300	24	1	....	8,980	8,600	29,300
Printing materials	1	15,000	15	....	....	4,680	18,000	28,000
Tinware, copperware, and sheet-iron ware	8	14,400	13	....	....	5,865	18,100	34,000
Wooden ware	2	70,000	66	5	4	12,188	29,500	46,200
Woolen goods	3	271,000	152	212	48	140,120	334,902	629,360
STEUBEN:								
Agricultural implements	4	179,000	48	....	....	18,250	29,460	68,450
Boots and shoes	4	260,000	241	30	4	101,717	424,626	586,421
Boxes, wooden, packing	12	37,910	28	25	....	9,755	21,422	45,500
Bread and other bakery products	3	39,500	18	....	....	5,000	29,165	52,000
Carriages and wagons	12	115,000	114	....	....	35,620	65,050	138,450
Cheese and butter (factory)	30	51,150	33	11	....	6,877	79,068	114,405
Clothing, men's	12	37,050	34	40	....	23,511	36,898	82,214
Cooperage	13	14,725	19	....	....	4,707	8,390	21,400
Dyestuffs and extracts	1	16,000	10	....	....	3,600	21,000	45,000
Flouring- and grist-mill products	43	451,550	114	....	....	36,303	855,831	965,924
Foundery and machine-shop products	6	182,000	137	....	....	66,346	103,330	214,367
Furniture	12	125,000	70	2	....	29,351	33,079	104,110
Furniture, chairs	3	60,950	42	1	....	17,600	18,300	42,300
Glass	1	75,000	107	1	....	51,000	48,000	120,000
Iron forgings	1	10,000	7	....	....	2,520	14,400	25,000
Leather, curried	4	39,000	13	....	....	5,650	91,722	105,600
Leather, tanned	10	488,000	149	....	....	53,888	753,155	965,885
Liquors, malt	4	41,000	6	1	....	2,961	14,843	26,470
Liquors, vinous	7	392,500	69	....	....	27,500	235,200	342,900
Lumber, planed (see also Sash, doors, and blinds)	5	72,300	85	....	5	27,605	91,665	135,275
Lumber, sawed	123	456,275	626	....	10	105,926	403,498	632,331
Marble and stone work	7	59,500	43	....	....	15,864	21,412	62,870
Paints	2	10,300	6	....	....	1,435	15,140	25,700
Saddlery and harness	18	22,450	28	....	1	6,494	17,095	38,295
Sash, doors, and blinds (see also Lumber, planed)	5	255,000	193	....	5	70,500	192,000	330,500
Springs, steel, car, and carriage	1	80,000	14	....	....	8,000	20,000	30,000
Tinware, copperware, and sheet-iron ware	25	33,275	45	....	....	17,711	27,000	63,425
Tobacco, cigars and cigarettes	15	28,200	65	2	3	17,880	34,019	78,295

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
SUFFOLK:								
Brick and tile	7	$587, 500	364	....	22	$66, 650	$51, 980	$164, 910
Carriages and wagons	4	15, 250	19	....	....	9, 043	10, 000	27, 100
Clothing, men's	15	25, 850	29	56	1	19, 800	71, 460	107, 400
Cordage and twine	1	15, 000	4	3	9	2, 000	18, 000	30, 000
Fertilizers	2	201, 000	72	....	....	9, 656	242, 375	290, 100
Flouring- and grist-mill products	32	255, 387	32	....	....	8, 136	334, 272	380, 292
Fruits and vegetables, canned and preserved	1	6, 000	10	10	5	3, 000	17, 000	20, 000
Leather, dressed skins	1	5, 000	3	....	....	1, 600	21, 428	30, 000
Lumber, planed	3	41, 000	16	....	4	7, 100	17, 900	31, 700
Paper	5	36, 000	34	....	4	7, 945	11, 850	29, 250
Rubber and elastic goods	1	25, 000	70	40	15	35, 000	40, 000	100, 000
Saddlery and harness	16	14, 700	20	....	....	6, 290	18, 200	37, 500
Shipbuilding	83	127, 100	223	....	....	114, 045	167, 999	309, 978
Tinware, copperware, and sheet-iron ware	13	49, 000	29	....	....	8, 550	28, 900	54, 600
Tobacco, cigars and cigarettes	19	45, 650	62	20	29	23, 030	63, 914	147, 880
SULLIVAN:								
Flouring- and grist-mill products	31	118, 950	35	....	....	8, 719	178, 724	199, 663
Furniture	12	21, 400	16	....	....	3, 825	9, 560	21, 600
Leather, dressed skins	2	14, 000	18	....	....	6, 100	80, 200	102, 000
Leather, tanned	13	342, 200	235	....	5	71, 626	575, 446	762, 941
Lumber, sawed	77	165, 225	291	....	10	32, 008	117, 832	194, 503
Shipbuilding	12	14, 800	32	....	....	11, 770	14, 850	29, 950
Wood, turned and carved	4	6, 350	38	....	....	9, 226	6, 485	21, 000
TIOGA:								
Agricultural implements	5	100, 000	72	....	1	23, 930	47, 830	112, 200
Boots and shoes	1	25, 000	15	1	....	7, 300	17, 700	30, 000
Carriages and wagons	3	14, 200	25	....	....	7, 900	13, 500	26, 500
Clothing, men's	7	27, 850	20	52	....	15, 300	35, 200	61, 900
Flouring- and grist-mill products	22	178, 600	42	....	....	10, 508	352, 202	380, 872
Leather, curried	2	24, 600	6	....	....	1, 825	67, 788	73, 900
Leather, tanned	10	735, 905	240	....	5	89, 754	1, 161, 962	1, 416, 017
Lumber, planed	4	35, 500	21	....	....	4, 530	21, 700	48, 800
Lumber, sawed	66	322, 500	442	....	....	81, 112	226, 120	392, 417
Marble and stone work	7	28, 350	30	....	....	10, 000	14, 700	34, 440
Mixed textiles (see also Woolen goods)	1	20, 000	20	4	1	2, 000	6, 100	20, 000
Saddlery and harness	10	12, 055	15	....	....	4, 320	7, 061	24, 815
Tinware, copperware, and sheet-iron ware	14	36, 350	36	....	....	13, 365	26, 104	51, 500
Woolen goods (see also Mixed textiles)	1	20, 000	20	4	1	2, 000	6, 100	20, 000
TOMPKINS:								
Agricultural implements	11	551, 000	228	....	2	88, 747	148, 242	397, 375
Bread and other bakery products	2	21, 000	8	....	....	3, 936	23, 350	35, 200
Bridges	1	8, 000	15	....	....	3, 500	12, 000	30, 000
Carriages and wagons	5	48, 500	41	....	....	15, 293	20, 338	41, 560
Cheese and butter (factory)	6	18, 525	13	1	....	2, 370	20, 516	30, 599
Clocks	1	75, 000	25	....	....	9, 900	25, 000	31, 600
Clothing, men's	6	22, 350	15	12	....	11, 050	27, 200	47, 500
Cooperage	10	59, 722	47	....	2	16, 268	38, 936	71, 500
Flouring- and grist-mill products	34	288, 300	61	....	....	16, 178	541, 095	611, 885
Furniture	7	26, 700	18	....	1	7, 542	7, 900	23, 290
Glass	1	40, 000	60	....	....	20, 000	23, 257	60, 000
Hardware	1	3, 000	50	....	....	5, 000	12, 500	25, 000
Leather, curried	2	30, 500	4	....	....	1, 560	61, 475	66, 900
Leather, tanned	5	163, 176	64	....	....	18, 636	209, 948	292, 012
Lumber, planed	7	53, 500	40	....	....	13, 751	16, 400	40, 530
Lumber, sawed	32	69, 900	72	....	3	10, 700	65, 240	100, 005
Musical instruments, organs and materials	1	50, 000	110	....	....	50, 000	50, 000	126, 000
Paper	2	31, 000	23	27	....	12, 904	46, 000	89, 520
Printing and publishing	7	51, 500	25	21	10	23, 279	20, 150	59, 841
Saddlery and harness	10	9, 720	20	....	....	5, 055	12, 348	25, 988
Shipbuilding	6	61, 600	49	....	....	19, 760	38, 120	86, 000
Tinware, copperware, and sheet-iron ware	12	19, 725	26	....	....	10, 609	25, 350	46, 100
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	30, 000	25	15	20	14, 000	33, 000	80, 000
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	7	17, 200	41	....	1	14, 187	40, 585	62, 060
Woolen goods	5	75, 500	48	7	5	13, 150	51, 065	90, 465
ULSTER:								
Bread and other bakery products	9	26, 350	22	....	....	8, 478	47, 031	67, 406
Brick and tile	13	186, 000	554	....	42	140, 200	120, 175	370, 500
Boxes, wooden and packing	4	32, 075	14	11	4	7, 450	27, 790	47, 645
Carpets, other than rag (see also Woolen goods)	1	300, 000	64	40	33	20, 005	130, 549	283, 712
Carriage and wagon materials	8	34, 100	26	....	1	6, 001	17, 850	32, 570
Carriages and sleds, children's	2	27, 000	12	....	5	5, 300	12, 000	24, 000
Carriages and wagons	5	32, 800	29	....	1	14, 799	22, 000	41, 900
Cement	3	118, 000	292	....	10	111, 831	116, 500	301, 958
Cooperage	10	25, 800	53	1	....	17, 064	25, 800	52, 592
Clothing, men's	8	19, 900	11	14	....	5, 960	18, 450	29, 900
Cutlery and edge tools	4	45, 500	48	8	12	36, 964	21, 000	69, 500
Dyestuffs and extracts	1	35, 000	6	....	....	4, 500	50, 000	80, 000
Flouring- and grist-mill products	46	219, 100	62	....	....	20, 626	446, 265	498, 148
Foundery and machine-shop products	8	209, 825	117	....	1	59, 963	64, 730	156, 364
Fuel, artificial	1	100, 000	70	....	....	10, 000	55, 000	102, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NEW YORK—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
ULSTER—continued.								
Furniture (see also Upholstering)	9	$44, 810	45	2	....	$15, 854	$23, 700	$53, 200
Furniture, chairs	3	181, 900	143	....	90	80, 875	150, 983	276, 925
Glass	1	25, 000	60	10	30	25, 000	41, 010	70, 000
Gunpowder	1	43, 660	45	....	....	24, 000	35, 000	84, 375
Iron and steel	3	325, 000	367	....	20	123, 418	151, 019	411, 255
Leather, tanned	5	117, 000	51	....	....	18, 825	178, 062	263, 965
Lime	4	51, 300	21	....	....	8, 100	8, 005	21, 600
Liquors, malt	7	92, 300	19	....	....	8, 435	42, 582	75, 860
Lumber, sawed	85	188, 100	240	....	....	29, 781	136, 755	221, 277
Malt	1	115, 000	15	....	....	6, 000	101, 000	112, 000
Marble and stone work	7	108, 000	201	....	....	89, 790	214, 552	510, 831
Mixed textiles (see also Woolen goods)	2	14, 000	22	10	2	8, 000	17, 464	30, 436
Paints	3	73, 000	32	....	2	10, 400	302, 100	365, 000
Paper (see also Wood pulp)	5	490, 000	123	70	8	72, 270	269, 390	438, 000
Patent medicines and compounds	1	10, 000	8	....	....	2, 000	20, 000	75, 000
Printing and publishing	4	73, 000	49	....	17	26, 000	14, 200	63, 000
Saddlery and harness	19	23, 525	19	....	1	7, 065	19, 390	39, 210
Sash, doors, and blinds	5	19, 500	21	....	....	9, 950	17, 100	31, 300
Slaughtering and meat-packing, not including retail butchering establishments.	1	50, 000	8	....	....	2, 500	64, 350	74, 000
Shipbuilding	19	159, 500	317	....	....	160, 102	155, 632	346, 547
Soap and candles	1	8, 000	5	....	....	3, 200	20, 000	27, 000
Tinware, copperware, and sheet-iron ware	13	25, 200	26	....	....	9, 498	23, 500	48, 280
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	4	10, 400	15	2	3	6, 130	31, 750	51, 000
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	19	22, 250	50	....	7	25, 912	35, 567	76, 670
Upholstering (see also Furniture)	2	17, 000	20	....	....	6, 200	9, 100	21, 500
Wood pulp	1	10, 000	12	....	....	3, 600	2, 000	20, 000
Woolen goods (see also Carpets, other than rag; Mixed textiles)	4	19, 000	28	12	2	8, 448	19, 173	33, 368
WARREN:								
Carriages and wagons	5	16, 000	56	....	....	16, 900	21, 200	47, 500
Flouring- and grist-mill products	10	43, 950	14	....	....	4, 170	88, 654	104, 372
Furnishing goods, men's	2	130, 000	44	1, 165	77	146, 800	188, 000	440, 000
Leather, curried	2	9, 500	8	....	....	3, 000	76, 448	106, 000
Leather, tanned	9	413, 500	179	....	....	62, 629	599, 266	788, 500
Lime	3	300, 000	190	....	50	36, 530	127, 400	193, 377
Liquors, malt	1	20, 000	5	....	....	2, 325	11, 550	20, 485
Lumber, sawed	28	853, 250	280	....	25	58, 746	327, 340	478, 532
Saddlery and harness	6	8, 500	10	....	....	3, 455	12, 100	21, 800
Sash, doors, and blinds	2	48, 000	40	....	10	11, 847	42, 190	124, 892
Shirts	3	58, 700	29	781	94	60, 775	172, 889	270, 000
WASHINGTON:								
Agricultural implements	7	50, 600	35	....	....	15, 343	8, 450	36, 000
Carriages and wagons	11	62, 500	68	....	....	21, 172	31, 480	67, 300
Cheese and butter (factory)	26	76, 700	33	20	1	8, 784	96, 465	140, 980
Fertilizers	3	10, 200	12	....	....	1, 350	16, 900	22, 750
Flax, dressed	5	49, 800	73	....	....	10, 518	42, 300	57, 300
Flouring- and grist-mill products	28	144, 300	47	....	....	9, 473	253, 104	289, 222
Foundery and machine-shop products	7	92, 000	75	....	....	25, 625	33, 500	76, 187
Hosiery and knit goods (see also Woolen goods)	1	30, 000	23	23	2	9, 600	30, 000	60, 060
Iron and steel	1	200, 000	46	....	....	18, 470	141, 564	200, 239
Leather, tanned	4	21, 900	10	....	....	2, 605	21, 880	29, 700
Lime	3	83, 500	99	....	10	21, 017	19, 638	51, 840
Linen goods	1	5, 000	2	8	....	3, 500	20, 000	27, 000
Liquors, malt	1	40, 000	14	....	....	6, 412	32, 223	57, 382
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	1	40, 000	21	....	3	4, 000	70, 000	80, 000
Lumber, sawed	31	523, 900	489	....	35	104, 440	404, 845	645, 805
Malt	1	25, 000	5	....	....	2, 000	20, 000	25, 000
Mantels, slate, marble, and marbleized	1	175, 000	60	....	....	25, 000	45, 000	80, 000
Marble and stone work	4	37, 700	32	....	....	8, 801	34, 190	48, 200
Mixed textiles (see also Woolen goods)	1	5, 000	25	2	1	6, 000	11, 800	30, 000
Paper	9	471, 600	224	75	....	82, 345	483, 248	753, 319
Saddlery and harness	19	17, 450	38	....	....	11, 201	19, 270	45, 700
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	5	25, 000	48	....	4	10. 000	17, 734	40, 064
Shipbuilding	6	14, 650	47	....	....	21, 800	41, 250	70, 600
Stone- and earthen-ware	5	83, 000	74	....	3	37, 587	37, 900	115, 000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	2	51, 000	20	....	....	7, 150	11, 550	40, 500
Woolen goods (see also Mixed textiles)	8	130, 013	94	40	6	29, 643	135, 830	224, 059
WAYNE:								
Agricultural implements	11	164, 500	76	....	....	26, 319	30, 245	71, 617
Bread and other bakery products	7	13, 550	10	1	....	2, 551	15, 670	25, 014
Carriages and wagons	9	56, 300	113	10	10	35, 773	90, 280	157, 815
Clothing, men's	8	40, 450	19	33	....	13, 760	44, 840	68, 750
Cooperage	37	71, 950	119	7	3	27, 492	57, 318	108, 317
Flouring- and grist-mill products	37	274, 025	66	....	....	21, 797	655, 274	752, 196
Foundery and machine-shop products	4	167, 200	77	....	....	36, 000	17, 930	118, 550
Fruits and vegetables, canned and preserved	15	115, 820	90	129	32	25, 971	110, 401	160, 601
Furniture	4	23, 100	16	....	....	5, 100	17, 100	30, 700
Glass	2	150, 000	113	....	19	58, 241	60, 633	180, 664

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NORTH CAROLINA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
FRANKLIN:								
Flouring- and grist-mill products	19	$57, 300	38	....	....	$4, 540	$49, 480	$59, 697
GASTON:								
Cotton goods	6	550, 000	93	146	113	57, 489	223, 167	393, 170
Flouring- and grist-mill products	19	35, 000	25	....	....	4, 369	298, 589	356, 121
Liquors, distilled	24	20, 615	15	....	....	3, 500	26, 875	42, 650
Lumber, sawed	17	24, 200	46	....	1	5, 392	23, 777	36, 718
GRANVILLE:								
Flouring- and grist-mill products	34	77, 300	46	....	....	5, 682	148, 957	160, 806
Lumber, sawed	24	27, 650	71	....	4	7, 147	23, 350	38, 220
Tobacco, chewing, smoking, and snuff	8	24, 000	63	21	27	9, 851	44, 200	85, 200
GUILFORD:								
Carriages and wagons	3	43, 600	91	....	....	27, 200	18, 900	56, 000
Cotton goods	2	88, 000	23	39	21	8, 265	40, 647	57, 834
Flouring- and grist-mill products	38	113, 300	40	....	....	6, 781	206, 847	233, 948
Foundery and machine-shop products	2	12, 000	28	....	....	8, 800	8, 300	20, 400
Leather, tanned	6	16, 000	17	....	....	2, 675	34, 855	48, 500
IREDELL:								
Cotton goods	2	35, 000	7	26	7	4, 405	13, 186	21, 337
Flouring- and grist-mill products	31	71, 700	24	....	....	4, 294	135, 981	153, 521
Liquors, distilled	13	20, 340	8	....	....	1, 625	13, 975	20, 500
Lumber, sawed	14	17, 400	35	....	1	3, 483	16, 685	27, 487
JOHNSTON:								
Flouring- and grist-mill products	22	39, 700	28	....	....	3, 053	53, 738	58, 627
Lumber, sawed	17	52, 300	86	....	2	13, 451	43, 548	78, 045
LENOIR:								
Flouring- and grist-mill products	5	22, 700	13	....	....	1, 510	53, 732	58, 170
Lumber, sawed	4	20, 000	26	....	1	5, 662	23, 025	38, 500
LINCOLN:								
Cotton goods	1	35, 000	10	28	8	6, 000	35, 465	59, 500
Flouring- and grist-mill products	17	38, 200	18	....	....	3, 664	109, 861	121, 706
Paper	2	99, 500	28	16	2	13, 360	59, 700	90, 000
MARTIN:								
Flouring- and grist-mill products	5	10, 000	11	....	....	995	82, 518	91, 937
Lumber, sawed	9	43, 100	50	....	6	7, 926	24, 869	45, 176
MECKLENBURG:								
Agricultural implements	1	15, 000	35	....	....	10, 000	12, 500	35, 000
Flouring- and grist-mill products	22	81, 550	26	....	....	3, 538	82, 114	90, 565
Leather, tanned	2	25, 500	20	....	....	4, 940	23, 800	38, 500
Lumber, sawed	18	33, 650	58	....	4	11, 222	29, 908	53, 450
Saddlery and harness	2	21, 500	21	....	5	6, 900	16, 500	30, 000
MONTGOMERY:								
Flouring- and grist-mill products	27	65, 250	56	....	....	3, 957	63, 891	77, 851
Lumber, sawed	12	22, 300	31	....	2	5, 478	22, 242	35, 720
MOORE:								
Carriages and wagons	3	17, 300	46	....	....	12, 300	13, 000	31, 500
Cooperage	26	6, 775	70	....	....	11, 651	9, 025	30, 075
Flouring- and grist-mill products	24	58, 200	27	....	....	2, 833	98, 575	109, 862
Lumber, sawed	26	63, 425	116	....	....	16, 200	51, 340	88, 965
Tar and turpentine, not including farm products	22	57, 200	379	3	....	66, 710	93, 885	233, 410
NASH:								
Cotton goods	2	180, 000	29	45	40	13, 233	46, 451	76, 472
Flouring- and grist-mill products	14	48, 600	39	....	....	3, 082	53, 647	60, 091
Lumber, sawed	11	24, 200	35	....	....	4, 498	13, 977	24, 000
NEW HANOVER:								
Cotton goods	1	60, 000	25	65	17	18, 900	34, 507	81, 388
Fertilizers	1	350, 000	100	....	25	40, 000	150, 000	300, 000
Flouring- and grist-mill products	4	125, 000	37	....	....	13, 229	219, 292	253, 652
Foundery and machine-shop products	1	65, 000	50	....	....	25, 000	40, 000	70, 000
Lumber, sawed	5	193, 000	175	....	6	64, 989	235, 980	385, 300
Printing and publishing	5	19, 000	26	2	3	13, 156	12, 828	35, 427
Tar and turpentine, not including farm products	8	99, 000	117	....	6	32, 279	265, 916	416, 641
Tobacco, chewing, smoking, and snuff	1	25, 000	50	20	8	15, 000	47, 000	72, 600
ORANGE:								
Cotton goods	1	20, 000	19	40	14	7, 267	10, 018	25, 649
Flouring- and grist-mill products	35	102, 200	36	....	....	6, 137	122, 189	132, 495
Lumber, sawed	21	28, 400	51	....	....	3, 801	15, 595	25, 830
Tobacco, chewing, smoking, and snuff	14	645, 000	454	173	243	101, 205	554, 000	996, 000
PASQUOTANK:								
Lumber, sawed	7	50, 400	53	....	1	14, 835	52, 170	87, 810
PERSON:								
Flouring- and grist-mill products	14	86, 500	20	....	....	3, 092	77, 705	88, 788
Tobacco, chewing, smoking, and snuff	3	24, 000	27	19	41	6, 300	12, 000	22, 800
RANDOLPH:								
Cotton goods	5	301, 000	140	372	149	82, 625	205, 527	372, 441
Flouring- and grist-mill products	44	114, 965	46	....	....	8, 129	326, 731	373, 327
Leather, tanned	7	24, 450	16	....	....	3, 630	23, 353	34, 859
Lumber, sawed	20	20, 600	57	....	....	8, 815	29, 691	52, 100
RICHMOND:								
Cotton goods	2	158, 800	53	60	31	23, 737	74, 604	135, 877
Flouring- and grist-mill products	14	22, 000	12	....	....	1, 707	44, 712	49, 157

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

NORTH CAROLINA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ROBESON:								
Flouring- and grist-mill products	33	$44, 645	43	....	....	$3, 192	$63, 571	$72, 900
Lumber, sawed	18	45, 000	76	....	10	13, 169	56, 379	91, 590
Tar and turpentine, not including farm products	36	65, 000	475	119	52	57, 692	131, 480	305, 397
ROCKINGHAM:								
Cotton goods	1	140, 000	27	70	23	21, 500	67, 168	98, 668
Flouring- and grist-mill products	23	50, 400	37	....	....	6, 413	120, 823	138, 875
Tobacco, chewing, smoking, and snuff	12	187, 400	237	117	155	41, 358	121, 930	224, 900
ROWAN:								
Flouring-and grist-mill products	36	88, 300	45	....	....	7, 967	157, 505	176, 273
Leather, tanned	4	8, 500	12	....	....	2, 210	11, 444	20, 516
Tobacco, chewing, smoking, and snuff	2	16, 000	38	42	30	8, 500	16, 000	33, 000
SAMPSON:								
Flouring- and grist-mill products	16	29, 800	25	....	....	1, 625	49, 772	57, 760
Tar and turpentine, not including farm products	17	31, 550	58	....	....	10, 853	112, 170	149, 245
STOKES:								
Flouring- and grist-mill products	25	43, 100	34	....	....	4, 371	114, 895	126, 191
Lumber, sawed	12	13, 772	35	....	....	3, 175	13, 012	21, 244
Tobacco, chewing, smoking, and snuff	12	27, 300	37	50	52	6, 055	24, 700	42, 347
SURRY:								
Cotton goods	3	65, 000	17	56	25	10, 000	36, 900	57, 200
Flouring- and grist-mill products	19	40, 450	28	....	....	3, 618	57, 443	65, 875
Tobacco, chewing, smoking, and snuff	11	47, 800	40	57	49	7, 575	24, 050	39, 000
Woolen goods	4	24, 000	19	5	2	3, 900	30, 750	41, 000
UNION:								
Flouring- and grist-mill products	13	27, 800	30	....	....	2, 652	63, 690	69, 573
Lumber, sawed	7	12, 700	27	....	3	3, 450	13, 310	22, 032
WAKE:								
Boots and shoes	1	15, 000	40	....	....	5, 400	14, 000	22, 600
Carriages and wagons	9	32, 200	51	....	....	14, 500	10, 700	39, 800
Confectionery	1	8, 000	23	7	....	1, 500	15, 000	20, 000
Flouring- and grist-mill products	31	100, 900	41	....	....	5, 057	96, 730	110, 755
Foundery and machine-shop products	3	20, 000	49	....	3	9, 000	8, 850	28, 500
Lumber, sawed	20	38, 150	65	....	....	5, 419	20, 785	35, 325
Paper	1	10, 000	10	10	....	4, 000	24, 500	40, 000
Printing and publishing	12	38, 600	78	8	26	34, 164	20, 384	85, 575
Sash, doors, and blinds	3	23, 000	110	....	....	34, 000	38, 600	96, 000
WARREN:								
Flouring- and grist-mill products	22	75, 200	43	....	....	4, 849	115, 524	128, 325
Lumber, sawed	14	19, 700	35	....	....	3, 527	19, 639	30, 741
WAYNE:								
Carriages and wagons	2	21, 000	18	....	....	6, 180	12, 000	22, 500
Flouring- and grist-mill products	14	30, 900	28	....	....	3, 822	77, 351	88, 111
Foundery and machine-shop products	1	20, 000	20	....	....	6, 500	7, 500	20, 000
Lumber, sawed	17	31, 200	100	....	....	13, 074	38, 227	68, 257
WILSON:								
Carriages and wagons	2	8, 800	25	....	....	6, 880	16, 000	26, 000
Flouring- and grist-mill products	11	28, 500	28	....	....	2, 144	20, 146	24, 325
Lumber, sawed	8	23, 400	39	....	2	6, 826	23, 088	40, 664

OHIO.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ADAMS:								
Flouring- and grist-mill products	21	$83, 300	48	....	....	$7, 168	$149, 365	$172, 357
Furniture	1	11, 000	23	....	....	9, 800	11, 845	25, 450
Lumber, sawed	21	42, 150	59	....	12	8, 675	39, 517	69, 165
ALLEN:								
Bagging, flax, hemp, and jute	1	30, 000	16	11	11	10, 000	5, 600	24, 600
Bread and other bakery products	5	9, 350	15	1	....	3, 950	15, 080	25, 000
Brick and tile	11	17, 300	79	....	1	10, 120	8, 200	29, 512
Carriages and wagons	4	84, 000	91	....	5	32, 400	31, 735	103, 596
Clothing, men's	8	47, 000	66	22	....	26, 200	49, 600	93, 300
Cooperage	3	12, 300	28	....	....	5, 750	13, 800	21, 300
Flouring- and grist-mill products	10	100, 000	34	....	....	10, 485	211, 530	231, 033
Foundery and machine-shop products	2	65, 000	59	....	....	34, 000	46, 300	101, 500
Furniture	6	37, 900	37	....	2	12, 050	13, 150	40, 900
Liquors, malt	2	27, 000	9	....	....	3, 212	13, 880	24, 775
Lumber, planed	3	27, 700	22	....	....	5, 850	8, 950	30, 700
Lumber, sawed	36	119, 200	166	....	2	37, 065	135, 344	234, 254
Marble and stone work	3	15, 500	29	....	....	10, 800	10, 988	32, 000
Paper	1	75, 000	100	....	....	30, 000	40, 000	140, 000
Printing and publishing	5	31, 500	23	4	....	8, 100	7, 150	26, 500
Saddlery and harness	13	28, 900	54	....	11	15, 348	20, 675	49, 333
Slaughtering and meat-packing, not including retail butchering establishments.	1	75, 000	40	....	....	3, 500	53, 825	64, 550
Tinware, copperware, and sheet-iron ware	6	29, 700	18	....	1	7, 100	11, 700	29, 100

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OHIO—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
CLERMONT—continued.								
Liquors, distilled	2	$45, 000	10			$4, 125	$41, 000	$61, 000
Lumber, sawed	18	57, 600	57		1	10, 310	44, 830	81, 335
Woolen goods	1	60, 000	10	6	13	9, 000	59, 070	100, 000
CLINTON:								
Brick and tile	14	25, 200	44		11	4, 975	9, 157	21, 020
Flouring- and grist-mill products	17	73, 925	39			7, 840	192, 014	223, 694
Foundery and machine-shop products	1	12, 000	15			6, 000	20, 000	40, 000
Lumber, sawed	32	57, 056	89			16, 607	91, 287	147, 615
Saddlery and harness	11	19, 000	14		1	4, 229	11, 264	22, 260
COLUMBIANA:								
Agricultural implements	4	25, 100	18		1	8, 050	15, 440	35, 396
Brick and tile (see also Terra-cotta ware)	12	39, 300	93		13	23, 423	16, 777	62, 730
Carriages and wagons	10	50, 450	79			26, 620	30, 100	75, 700
Cheese and butter (factory)	21	7, 582	28	1		3, 830	35, 991	50, 081
Clothing, men's	11	16, 800	18	19		7, 970	26, 900	44, 100
Coke	2	57, 500	27			11, 965	103, 057	125, 652
Fertilizers	1	12, 000	12			4, 000	16, 000	35, 000
Flouring- and grist-mill products	41	286, 350	90			26, 859	781, 685	862, 607
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	16	631, 350	449		3	191, 659	298, 373	641, 562
Furniture	7	14, 975	19			6, 280	14, 036	29, 000
Hardware	3	27, 500	55	3	4	25, 300	13, 565	58, 000
Iron and steel	4	460, 000	703		55	247, 271	837, 538	1, 251, 084
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	1	50, 000	44		1	19, 000	20, 000	50, 000
Kaolin and ground earths	2	30, 000	18			6, 000	14, 000	22, 000
Labels and tags	3	28, 000	19	10		8, 400	12, 170	27, 750
Leather, curried	9	9, 525	6			1, 922	17, 300	22, 701
Lumber, planed	4	35, 300	46		1	13, 200	34, 600	61, 500
Lumber, sawed	40	102, 050	99			20, 244	86, 100	154, 293
Saddlery and harness	14	16, 125	20			6, 745	16, 160	31, 650
Stone- and earthen-ware	25	1, 037, 000	1, 120	179	214	559, 500	393, 275	1, 278, 900
Terra-cotta ware (see also Brick and tile)	1	50, 000	70		30	30, 000	16, 000	80, 000
Tinware, copperware, and sheet-iron ware	15	81, 300	28			10, 025	27, 750	51, 050
Woolen goods	4	47, 000	21	12	14	10, 639	44, 997	60, 430
COSHOCTON:								
Carriages and wagons	3	21, 500	29			11, 500	13, 800	32, 000
Clothing, men's	5	6, 950	8	9		5, 000	18, 600	29, 650
Flouring- and grist-mill products	16	164, 900	47			16, 415	392, 080	455, 650
Lumber, sawed	21	38, 150	60			9, 415	39, 735	67, 282
Saddlery and harness	13	10, 675	13			3, 263	12, 075	21, 900
Springs, steel, car, and carriage	1	60, 000	70			27, 200	54, 690	90, 000
CRAWFORD:								
Brick and tile	8	19, 300	42			6, 925	6, 785	20, 750
Clothing, men's	5	10, 200	27	20		14, 520	25, 400	51, 700
Flouring- and grist-mill products	9	85, 700	34			12, 765	278, 107	347, 555
Foundery and machine-shop products	5	149, 000	68			30, 190	62, 300	129, 800
Hosiery and knit goods	1	50, 000	4	44		5, 298	17, 618	30, 000
Leather, tanned	2	13, 000	4			1, 300	13, 000	20, 100
Liquors, malt	3	6, 400	10			4, 107	17, 926	32, 075
Lumber, sawed	25	49, 150	43		3	5, 639	41, 291	69, 525
Sash, doors, and blinds	3	140, 000	83			35, 000	207, 800	307, 000
Tinware, copperware, and sheet-iron ware	7	20, 300	21			9, 320	16, 100	29, 800
Tobacco, cigars and cigarettes	14	17, 550	46		2	15, 770	18, 500	51, 200
CUYAHOGA:								
Agricultural implements	4	105, 200	41		10	16, 406	54, 330	86, 920
Bags, other than paper	1	7, 000	4	3	4	4, 000	20, 000	30, 000
Bags, paper	2	27, 000	10	36		7, 468	96, 500	110, 000
Baking and yeast powders (see also Drugs and chemicals)	1	20, 000	15			6, 200	45, 000	68, 000
Baskets, rattan and willow ware	4	26, 600	38		20	23, 400	27, 375	62, 300
Belting and hose, leather	1	2, 500	3			1, 500	19, 000	24, 500
Belting and hose, rubber	1	65, 000	102		18	21, 721	200, 000	235, 000
Bookbinding and blank-book making	12	116, 000	115	71	10	66, 705	114, 112	210, 200
Boot and shoe uppers	3	19, 000	16	15	1	8, 488	27, 450	42, 920
Boots and shoes	7	175, 800	170	41		66, 711	164, 524	270, 573
Boxes, cigar	3	6, 900	11	12	8	8, 500	24, 000	44, 000
Brass castings	6	37, 500	81		2	35, 200	60, 000	118, 140
Bread and other bakery products	45	110, 303	131	16	7	63, 163	290, 515	452, 823
Brick and tile	27	101, 600	285		28	80, 064	46, 069	184, 750
Bridges	4	347, 000	573		4	180, 122	504, 348	925, 063
Brooms and brushes	9	29, 400	222	64	101	56, 375	60, 225	149, 331
Carriages and wagons	25	165, 400	283		2	126, 388	122, 480	335, 084
Cars, railroad, street, and repairs	4	144, 500	216			103, 925	461, 000	661, 000
Cheese and butter (factory)	19	25, 400	24	1	2	6, 581	81, 214	111, 702
Clothing, men's	73	1, 086, 600	824	1, 172	61	634, 319	1, 488, 780	2, 687, 409
Coffee and spices, roasted and ground	4	138, 000	62	1	6	43, 440	199, 000	300, 000
Coffins, burial cases, and undertakers' goods	3	198, 000	144	39	10	70, 012	103, 780	265, 150
Confectionery	5	61, 500	47	25	9	23, 300	111, 500	161, 550
Cooperage	13	42, 875	198		2	89, 318	335, 115	475, 800
Cutlery and edge tools (see also Hardware)	3	97, 000	116			47, 531	54, 326	123, 000
Drugs and chemicals (see also Baking and yeast powders)	7	613, 000	237	4	1	81, 400	335, 875	657, 500
Electric lights	1	200, 000	150			80, 000	100, 000	300, 000
Explosives and fireworks	2	150, 000	55	13	10	34, 000	432, 341	550, 868
Fertilizers	4	192, 000	70			25, 450	118, 945	212, 200
Files (see also Saws)	2	15, 000	32		10	13, 200	7, 000	26, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OHIO—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
CUYAHOGA—continued.								
Flouring- and grist-mill products	26	$264,500	108			$40,890	$1,209,805	$1,363,315
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	57	1,992,338	2,464	3	108	960,152	1,804,670	3,867,585
Foundery supplies	1	3,000	7		1	4,500	9,000	20,000
Fruits and vegetables, canned and preserved	2	14,000	14			3,500	28,000	39,250
Furniture (see also Mattresses and spring beds; Upholstering)	29	327,800	392	12	23	167,251	183,399	477,435
Furniture, chairs	2	37,000	83		6	30,600	15,150	49,200
Grindstones	5	37,000	45			9,050	7,380	31,900
Gunpowder	1	200,000	40			30,000	99,000	165,000
Hairwork	10	14,740	5	19		4,335	10,230	21,140
Hardware (see also Cutlery and edge tools)	8	49,000	69		11	28,550	59,875	142,500
Hosiery and knit goods (see also Woolen goods)	5	27,000	4	192	2	21,960	42,100	97,550
Ink	1	5,000	2	7	6	4,200	20,000	28,000
Iron and steel	10	2,839,042	2,788		211	1,960,237	6,491,506	9,435,432
Iron bolts, nuts, washers, and rivets	5	307,500	364			153,923	48[illegible],926	860,711
Iron forgings	3	305,000	206			86,500	323,000	523,000
Iron nails and spikes, cut and wrought	1	75,000	30	8	2	16,970	30,000	49,000
Iron pipe, wrought	1	10,000	30		5	18,000	114,550	150,000
Iron railings, wrought	4	28,200	25		8	8,885	23,800	45,500
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	3	11,500	37			18,844	47,274	84,354
Jewelry	4	5,900	26			10,500	11,600	30,000
Lamps and reflectors	2	225,000	130	3	20	55,000	22,000	92,000
Lead, bar, pipe, sheet, and shot	1	16,000	6			3,500	44,000	48,000
Leather, curried	7	56,500	26			10,540	185,766	212,600
Leather, dressed skins	2	12,000	18			7,250	62,000	76,000
Leather, tanned	7	77,500	40			17,490	159,800	207,060
Lime	4	44,600	45		4	19,100	35,750	63,500
Liquors, malt	24	1,306,200	330	1	1	163,677	705,406	1,259,750
Lithographing (see also Printing and publishing)	4	100,700	136	16	5	70,600	124,100	223,000
Looking-glass and picture frames	8	41,650	24	1	3	11,200	40,050	61,850
Lumber, sawed	34	317,500	167		2	33,665	147,826	242,488
Malt	4	260,000	40		2	20,603	259,673	333,452
Marble and stone work	16	196,900	190		37	108,188	229,664	458,650
Mattresses and spring beds (see also Furniture)	2	55,500	20	4		8,600	40,800	64,760
Millstones	1	10,000	16		3	6,000	10,808	20,000
Mineral and soda waters	4	21,500	25		4	9,230	12,950	43,000
Mixed textiles (see also Woolen goods)	2	13,000	4	25	2	9,050	6,180	31,970
Musical instruments, organs and materials	2	33,000	34		1	15,400	10,200	31,000
Oil, lard	2	200,000	113			19,000	545,000	596,000
Oil, linseed	2	255,000	48			30,450	415,400	467,600
Oil, lubricating	5	655,850	122		3	56,123	850,102	1,163,714
Paints (see also Varnish)	10	423,500	207	12	15	113,214	801,334	1,202,480
Paper	3	415,000	156	64	8	77,010	341,000	439,000
Printing and publishing (see also Lithographing)	12	717,300	407	18	16	264,590	248,947	690,509
Roofing and roofing materials	4	61,000	41			19,292	113,000	169,000
Saddlery and harness	39	37,931	83		2	30,676	65,550	126,675
Sash, doors, and blinds (see also Wood, turned and carved)	15	406,314	489		11	202,703	533,035	857,687
Saws	1	50,000	34		2	14,000	25,000	40,000
Screws	1	500,000	95			54,000	184,000	260,000
Sewing-machine cases	5	36,000	275		22	108,600	126,000	255,600
Sewing machines and attachments	1	112,500	350	4	100	265,000	521,457	947,325
Shipbuilding	15	170,100	291			148,100	303,550	518,250
Shirts	7	20,300	7	48		14,589	51,812	87,295
Shoddy (see also Mixed textiles)	1	250,000	30	216		40,000	575,000	700,000
Show-cases	1	10,000	23		18	17,000	28,000	50,000
Slaughtering and meat-packing, not including retail butchering establishments.	13	467,000	393		28	194,692	4,917,446	5,466,438
Soap and candles	6	57,000	23		2	9,320	49,315	72,700
Springs, steel, car, and carriage	2	143,000	128			63,029	142,735	241,405
Tinware, copperware, and sheet-iron ware	64	146,750	220	1	25	101,530	231,219	455,586
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	2	105,000	23	62		28,000	354,500	433,000
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	68	106,950	299	36	11	119,315	166,320	366,412
Trunks and valises	6	28,700	35	3	5	12,200	29,100	49,600
Upholstering (see also Furniture)	8	4,300	16	6	2	5,820	21,500	33,350
Varnish (see also Paints)	4	432,500	53			32,695	562,939	691,245
Wire	1	452,471	1,250		250	46,400	1,000,000	1,500,000
Wirework	4	118,500	78	2	25	31,750	200,500	287,000
Wood, turned and carved (see also Sash, doors, and blinds)	5	27,450	40		9	19,400	24,195	64,489
Wooden ware	5	121,500	151	10	58	56,150	158,800	243,500
Woolen goods (see also Mixed textiles)	1	25,000	18	5		7,500	45,000	75,000
DARKE:								
Brick and tile	35	63,035	153		16	24,524	28,304	81,887
Carriage and wagon materials	3	18,500	51			15,300	40,000	91,000
Carriages and wagons	2	3,500	19			9,000	19,000	30,000
Cooperage	3	9,300	44		12	11,450	15,500	38,100
Flouring- and grist-mill products	18	103,700	44			13,340	353,729	406,044
Furniture	7	26,450	49		2	21,150	42,850	91,200
Lumber, sawed	39	80,100	117		1	24,625	113,355	193,960

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OHIO—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
DEFIANCE:								
Carriage and wagon materials	3	$278,000	365		6	$126,839	$129,066	$332,000
Cooperage	7	25,900	63		10	17,075	34,425	67,555
Flouring- and grist-mill products	8	136,000	27			8,850	197,023	218,428
Foundery and machine-shop products	1	56,000	68		8	32,875	27,260	89,940
Leather, curried	3	18,300	7			2,695	19,736	27,045
Leather, tanned	3	12,700	5			1,860	15,159	20,806
Liquors, malt	1	30,000	7			3,100	13,389	23,925
Lumber, planed	2	16,000	10			8,000	20,500	36,200
Lumber, sawed	30	197,050	152		32	42,135	157,493	267,290
Saddlery and harness	5	3,350	11			3,800	19,000	29,500
Woolen goods	1	30,000	3	15	2	10,000	28,870	40,000
DELAWARE:								
Agricultural implements	2	24,000	24			6,000	15,000	29,500
Brick and tile	16	15,350	59		4	9,390	6,786	26,525
Carriages and wagons	3	17,500	29			11,250	10,600	26,600
Clothing, men's	8	34,000	22	21		16,700	31,700	61,200
Flouring- and grist-mill products	17	109,400	26			8,477	270,958	301,962
Furniture, chairs	1	40,000	22	7	16	20,000	40,000	80,000
Liquors, malt	2	44,000	8			3,490	15,058	26,925
Lumber, sawed	43	66,100	122		1	18,587	90,502	159,207
Oil, linseed	1	50,000	10			4,000	30,000	40,000
Paper	1	30,000	15	8	4	7,262	17,339	27,918
Tobacco, cigars and cigarettes	1	21,000	40	12	3	17,000	61,500	80,000
ERIE:								
Carriage and wagon materials	2	301,000	292		24	98,786	146,270	321,948
Cooperage	4	62,900	91		7	31,175	32,700	83,000
Flouring- and grist-mill products	7	151,500	41			14,628	247,510	302,722
Food preparations (see page 39)	2	25,300	31		2	8,750	17,500	31,178
Foundery and machine-shop products	4	126,000	145		3	57,760	86,000	192,700
Handles, wooden	2	257,500	214		3	79,525	139,500	267,340
Hardware	2	160,000	131			49,099	61,600	157,000
Iron and steel	1	275,000	220		5	7,232	75,000	105,000
Lime	3	98,000	50		5	23,900	48,778	88,756
Liquors, malt	3	150,000	71			29,424	126,830	226,474
Liquors, vinous	15	214,000	41	10	2	23,390	165,100	244,110
Lumber, sawed	8	32,400	26		4	4,000	25,715	38,970
Printing and publishing	4	52,300	18		4	12,905	35,200	75,000
Saddlery and harness	7	10,550	17			8,110	10,750	23,400
Sash, doors, and blinds	3	79,200	58		20	21,375	75,000	105,800
Shipbuilding	6	24,600	55			33,355	88,800	129,300
Tobacco, cigars and cigarettes	13	18,150	34		1	15,380	20,891	49,460
FAIRFIELD:								
Agricultural implements	3	165,000	153		10	61,600	78,900	201,020
Brick and tile	12	28,000	79		1	10,440	7,710	25,970
Carriages and wagons	6	53,000	101			24,250	30,800	79,000
Clothing, men's	4	76,300	31	96		35,100	91,500	146,000
Flouring- and grist-mill products	22	113,300	32			10,452	364,840	403,344
Leather, tanned	5	28,300	16			5,282	30,180	42,400
Liquors, malt	1	50,000	10			5,019	21,975	39,165
Lumber, planed	2	29,000	20			9,200	6,000	26,500
Lumber, sawed	16	27,150	47			8,600	46,509	81,156
Saddlery and harness	9	7,550	16			4,980	12,285	26,250
FAYETTE:								
Brick and tile	18	20,550	90		11	10,504	11,060	28,816
Clothing, men's	2	9,000	18	5		7,600	17,000	28,600
Flouring- and grist-mill products	7	43,350	14			6,760	111,467	135,269
Lumber, sawed	11	22,300	29		1	4,769	23,620	46,667
FRANKLIN:								
Agricultural implements	5	284,350	258			70,140	152,660	313,400
Baskets, rattan and willow ware	1	30,000	45		5	11,000	22,000	38,000
Bookbinding and blank-book making	3	41,200	26	20	8	27,800	66,200	153,600
Boots and shoes	3	42,200	72	17		38,500	62,265	120,200
Brass castings	3	13,200	31			13,420	54,250	115,000
Bread and other bakery products	10	49,653	51	5		25,241	142,193	198,395
Brick and tile	38	249,112	429	2	26	98,445	126,673	338,503
Brooms and brushes	9	35,300	50	4	6	21,914	63,344	104,647
Carriage and wagon materials	5	221,000	158			49,481	81,625	222,999
Carriages and sleds, children's	1	15,000	37			10,000	31,217	45,942
Carriages and wagons	11	396,500	556	2	40	249,022	600,376	1,010,879
Cars, railroad, street, and repairs	1	250,000	224			111,320	691,528	963,496
Clothing, men's	3	23,000	80	20		11,560	56,053	86,458
Coffee and spices, roasted and ground	2	81,000	26	20	2	29,000	305,000	360,000
Confectionery	4	6,400	4	3	3	4,430	20,447	33,800
Cooperage	3	28,650	52		3	20,224	15,500	64,800
Cutlery and edge tools	2	201,000	99		1	33,499	37,765	95,000
Enameled goods	1	70,000	165			21,822	99,876	131,328
Files (see also Saws)	2	3,000	17		4	7,500	10,700	22,400
Flouring- and grist-mill products	21	161,963	40			11,934	384,201	439,400
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	16	376,500	376		6	142,965	233,231	446,350
Furniture	3	197,000	187	8	12	79,883	62,000	208,500
Furniture, chairs	2	187,676	165	25	33	62,780	71,000	175,000
Glass	1	50,000	50			16,000	13,200	45,000
Hardware, saddlery	1	130,000	268	12	16	55,120	150,000	240,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OHIO—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
FRANKLIN—continued.								
Iron and steel	3	$800,000	504	....	26	$177,008	$734,794	$1,149,525
Iron bolts, nuts, washers, and rivets	1	40,000	75	....	5	24,500	40,000	110,000
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	2	5,600	21	....	....	5,418	16,317	29,266
Leather, curried	3	41,300	22	....	....	10,000	110,790	128,960
Leather, tanned	3	42,000	14	....	....	6,200	85,785	107,140
Liquors, malt	4	510,000	149	....	....	67,459	290,895	519,529
Lumber, planed (see also Sash, doors, and blinds)	10	223,100	125	....	15	58,395	324,470	455,505
Lumber, sawed	26	45,390	77	....	1	13,091	50,424	91,845
Marble and stone work	11	34,750	59	....	....	19,954	28,500	70,925
Paper	1	60,000	20	10	....	10,940	41,000	65,475
Printing and publishing	10	167,100	199	8	11	129,271	110,900	272,358
Regalia and society banners and emblems	1	72,000	20	60	20	52,000	104,231	208,914
Saddlery and harness	12	27,050	25	....	....	10,883	19,750	59,648
Sash, doors, and blinds (see also Lumber, planed)	2	50,500	20	....	5	9,600	60,300	90,600
Saws	1	75,000	28	....	2	10,000	20,000	50,000
Shirts	3	7,400	....	18	....	4,400	13,900	25,500
Starch	1	100,000	95	10	....	30,000	75,000	134,000
Tinware, copperware, and sheet-iron ware	23	89,800	103	....	....	40,012	76,175	162,675
Tobacco, cigars and cigarettes	19	46,645	131	6	18	43,831	79,766	188,039
Wire	1	35,000	23	....	....	4,230	56,000	75,000
FULTON:								
Brick and tile	12	18,455	70	....	1	8,071	8,234	25,175
Cheese and butter (factory)	9	12,700	15	3	2	3,575	47,683	59,611
Flouring and grist-mill products	9	85,400	27	....	....	10,955	255,036	290,395
Lumber, sawed	37	109,975	133	....	3	24,645	98,550	176,275
Saddlery and harness	6	16,150	13	....	....	4,500	11,100	25,300
GALLIA:								
Flouring- and grist-mill products	20	114,304	69	....	....	18,315	515,606	595,974
Foundery and machine-shop products	2	56,000	35	....	....	14,380	8,000	50,000
Furniture	2	91,000	84	....	24	23,500	35,500	77,000
Leather, curried	3	10,600	8	....	....	2,400	47,155	56,640
Leather, tanned	3	10,500	7	....	....	2,250	36,700	44,540
Lumber, sawed	16	34,400	55	....	1	8,460	34,179	66,034
Tinware, copperware, and sheet-iron ware	6	5,150	9	....	....	2,225	12,200	20,500
GEAUGA:								
Cheese and butter (factory)	42	92,300	68	22	2	18,767	236,853	318,102
Flouring- and grist-mill products	11	42,900	15	....	....	3,805	91,738	106,966
Leather, tanned	2	25,250	10	....	....	3,000	25,730	38,000
Lumber, sawed	32	67,100	72	....	....	11,160	52,180	93,241
GREENE:								
Agricultural implements	1	25,000	20	....	....	5,000	7,800	28,000
Bread and other bakery products	5	11,000	9	....	1	3,828	13,756	23,533
Brick and tile	11	13,870	47	....	5	7,918	6,068	21,050
Carriages and wagons	2	17,500	22	....	....	11,580	9,325	24,000
Clothing, men's	6	14,750	13	25	....	13,654	26,027	47,635
Flouring- and grist-mill products	19	193,570	60	....	....	20,675	767,120	870,782
Furniture	2	12,500	15	....	....	6,000	11,000	26,800
Gunpowder	1	250,000	35	....	....	15,000	121,000	136,073
Liquors, distilled	1	80,000	23	....	....	7,250	60,500	91,000
Lumber, sawed	27	77,700	95	....	....	22,348	103,019	176,535
Oil, linseed	1	55,000	8	....	....	3,528	62,302	72,929
Paper	1	12,000	12	2	2	4,500	10,700	20,000
Slaughtering and meat-packing, not including retail butchering establishments.	1	50,000	18	....	....	5,800	312,900	348,475
Tinware, cooperware, and sheet-iron ware	8	8,000	13	....	....	5,566	9,950	22,034
GUERNSEY:								
Flouring- and grist-mill products	16	80,000	32	....	....	7,325	270,937	311,015
Lumber, sawed	19	66,150	63	....	....	12,634	46,552	79,650
HAMILTON:								
Agricultural implements	3	30,000	13	....	....	6,970	12,350	34,650
Awnings and tents	9	7,450	19	30	....	11,492	34,095	64,750
Axle-grease	2	102,400	8	....	....	3,204	36,600	54,000
Bags, other than paper	1	18,000	9	6	2	5,000	45,000	69,000
Bags, paper	3	85,000	42	41	2	26,377	376,072	472,808
Baking and yeast powders (see also Drugs and chemicals)	6	28,000	19	....	4	8,560	54,347	119,700
Baskets, rattan and willow ware	11	9,525	15	....	2	4,825	11,245	26,360
Belting and hose, leather	3	57,000	26	....	....	15,429	73,107	104,554
Billiard tables and materials	2	80,200	41	....	....	28,000	133,080	240,580
Bookbinding and blank-book making	18	157,910	122	148	22	116,534	116,377	387,640
Boot and shoe findings	5	28,000	9	2	....	4,366	63,200	91,000
Boot and shoe uppers	3	5,400	13	9	3	9,000	14,900	29,900
Boots and shoes	32	860,700	1,836	545	266	887,855	2,044,639	3,401,759
Boxes, cigar	8	23,750	47	44	23	32,090	60,185	118,740
Boxes, fancy and paper	7	38,550	27	35	7	26,726	32,012	72,809
Boxes, wooden, packing	5	43,100	75	8	11	30,469	71,900	125,612
Brass castings	14	220,777	226	....	33	109,240	306,962	551,696
Bread and other bakery products	233	392,810	553	66	82	246,944	1,160,917	1,830,716
Brick and tile	41	99,860	288	....	44	87,745	64,360	233,745
Brooms and brushes	18	101,237	108	13	13	41,438	64,835	148,050
Carpets, rag	21	4,775	32	3	6	11,425	15,899	41,822
Carriage and wagon materials	5	368,440	178	2	20	92,318	160,089	450,636
Carriages and sleds, children's	2	15,000	41	4	32	17,000	20,000	75,000
Carriages and wagons	50	1,252,131	2,694	81	522	1,207,319	3,061,264	5,287,113
Cars, railroad, street, and repairs	2	41,500	24	....	....	15,000	18,500	38,500

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OHIO—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
HAMILTON—continued.								
Cigar molds	1	$64, 000	55			$25, 000	$36, 000	$78, 000
Clothing, men's	248	6, 308, 333	3, 758	4, 928	654	2, 696, 630	8, 746, 613	14, 042, 013
Clothing, women's	19	194, 802	31	898	8	222, 380	608, 002	1, 036, 454
Coffee and spices, roasted and ground	10	86, 400	65	4	3	32, 542	258, 170	410, 100
Coffins, burial cases, and undertakers' goods	8	636, 500	464	98	96	258, 446	462, 675	1, 002, 866
Coke	3	14, 000	13			4, 012	17, 206	42, 887
Confectionery	20	177, 075	148	60	23	83, 595	467, 820	660, 260
Cooperage	61	535, 650	836		161	336, 539	559, 278	1, 053, 583
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	5	34, 000	50		2	25, 054	57, 740	102, 536
Cordage and twine	2	22, 500	26		18	14, 000	28, 300	47, 860
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	3	715, 000	97	275	26	99, 147	298, 465	684, 158
Cutlery and edge tools (see also Hardware; Tools)	12	40, 100	31		4	16, 452	13, 500	48, 900
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	9	103, 200	49			16, 844	159, 725	227, 525
Dyeing and finishing textiles	7	58, 300	27	13	3	20, 401	78, 400	144, 295
Electrical apparatus and supplies	5	83, 500	31	8	6	15, 260	80, 700	173, 580
Electroplating	7	33, 160	88	2	5	30, 637	23, 065	83, 440
Enameled goods	1	10, 000	9			2, 818	15, 359	23, 295
Engraving and die-sinking	12	11, 050	26	8	10	16, 838	6, 894	38, 021
Envelopes	1	35, 000	9	8	1	8, 000	37, 000	65, 000
Explosives and fireworks	1	10, 000	12	15	13	7, 500	30, 000	42, 000
Fertilizers	3	367, 000	111			33, 900	175, 000	256, 000
Files (see also Saws)	1	5, 000	20			11, 000	2, 000	20, 000
Flouring- and grist-mill products	24	365, 300	127			44, 863	732, 196	887, 227
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	91	4, 090, 475	3, 521	6	127	1, 754, 584	2, 595, 176	5, 733, 508
Foundery supplies	2	32, 500	19			5, 460	69, 300	95, 650
Fruits and vegetables, canned and preserved	4	221, 380	179	577	150	79, 173	565, 234	743, 928
Furniture (see also Mattresses and spring beds; Upholstering)	120	2, 649, 711	2, 861	138	470	1, 338, 413	1, 649, 141	4, 384, 339
Furniture, chairs	16	71, 850	167	17	14	73, 775	50, 222	208, 635
Furs, dressed	1	40, 000	10	25		18, 000	75, 000	105, 000
Gas machines and meters	6	121, 000	76		1	41, 998	77, 100	139, 670
Glass, cut, stained, and ornamented	3	5, 650	14			8, 700	3, 525	23, 600
Glue	3	189, 000	46		26	21, 180	34, 700	143, 000
Gold and silver leaf and foil	2	3, 800	9	7		4, 700	12, 000	21, 100
Grease and tallow	7	44, 550	34		1	18, 486	187, 200	229, 600
Hairwork	14	32, 050	11	31		9, 988	16, 090	42, 680
Hardware (see also Cutlery and edge tools; Tools)	19	960, 109	673	3	48	251, 233	508, 052	1, 053, 193
Hats and caps, not including wool hats	9	9, 350	25	19	3	14, 205	37, 870	66, 770
Hosiery and knit goods (see also Cotton goods; Woolen goods)	9	76, 400	32	213	76	55, 425	147, 300	235, 825
Ink	3	41, 200	13		2	7, 360	45, 200	78, 800
Instruments, professional and scientific	8	33, 200	37	1	2	17, 557	11, 998	47, 549
Iron and steel	4	610, 689	305		8	163, 590	338, 479	596, 160
Iron railing, wrought	5	18, 150	58		4	22, 183	32, 969	69, 386
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	8	50, 250	84			39, 025	152, 124	255, 847
Jewelry	9	152, 600	179	25	49	131, 886	142, 385	418, 900
Lead, bar, pipe, sheet, and shot	2	45, 000	15			6, 200	75, 000	160, 000
Leather, curried	21	379, 000	184			86, 175	1, 425, 505	1, 700, 426
Leather, tanned	29	918, 600	341		5	168, 393	1, 594, 137	2, 090, 672
Lightning rods	3	40, 000	13			6, 950	96, 000	144, 500
Liquors, distilled	11	3, 343, 500	805	5	7	337, 500	3, 832, 000	5, 635, 250
Liquors, malt	21	4, 157, 968	1, 381		8	598, 568	2, 579, 498	4, 605, 231
Lithographing (see also Printing and publishing)	9	322, 400	286	20	39	185, 063	283, 517	633, 744
Looking-glass and picture frames	9	404, 350	462		44	187, 120	249, 500	524, 000
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	12	250, 276	350	1	1	169, 800	404, 959	666, 824
Lumber, sawed	24	577, 700	345		21	119, 394	1, 039, 822	1, 345, 241
Malt	14	839, 000	107			57, 316	736, 613	884, 310
Mantles, slate, marble, and marbleized	5	235, 000	199		17	93, 362	136, 540	304, 330
Marble and stone work	47	473, 150	636	5	33	265, 047	289, 562	845, 063
Mattresses and spring beds (see also Furniture)	13	37, 940	48	14	15	22, 239	74, 150	135, 350
Millinery and lace goods	22	81, 450	25	259	11	77, 486	162, 852	320, 091
Mineral and soda waters	11	34, 600	50		5	18, 192	29, 991	82, 742
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	2	5, 700	6	12	8	3, 100	17, 140	34, 000
Models and patterns	13	8, 350	26	8	4	10, 243	6, 140	29, 346
Oil, cottonseed and cake	1	150, 000	45		10	7, 450	400, 000	435, 000
Oil, illuminating	1	5, 000	2			900	50, 000	55, 000
Oil, lard	5	220, 000	35			14, 272	357, 916	395, 145
Oil, linseed	1	110, 000	16			9, 600	120, 000	140, 000
Oil, lubricating	4	104, 775	29		1	18, 404	169, 100	238, 000
Oleomargarine	1	300, 000	20			8, 000	108, 000	250, 000
Paints (see also Varnish)	1	5, 000	4			1, 750	12, 000	20, 000
Paper (see also Envelopes)	5	260, 000	99	36		56, 460	244, 240	373, 500
Patent medicines and compounds (see also Drugs and chemicals)	41	505, 750	102	11	11	56, 360	361, 163	540, 120
Pens, gold	1	55, 000	55	5		25, 000	15, 000	65, 000
Pickles, preserves, and sauces	3	35, 000	56	12		16, 800	95, 000	130, 000
Printing and publishing (see also Lithographing)	89	2, 527, 791	1, 910	349	830	1, 168, 592	1, 397, 880	4, 006, 450
Refrigerators	4	44, 100	41		2	11, 303	13, 425	42, 040
Regalia and society banners and emblems	5	46, 200	17	76	7	18, 550	45, 800	80, 500
Roofing and roofing materials	25	230, 520	234	1	3	91, 764	409, 244	612, 401
Saddlery and harness	64	446, 605	592	14	37	249, 236	534, 796	1, 205, 224
Safes, doors, and vaults, fire-proof	4	784, 000	865		10	502, 428	425, 000	1, 335, 000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	9	410, 600	391		12	187, 949	355, 400	735, 200

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OHIO—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed: Males above 16 years.	Average number of hands employed: Females above 15 years.	Average number of hands employed: Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
HAMILTON—continued.								
Saws	5	$112, 750	96		10	$37, 518	$66, 410	$145, 550
Scales and balances	2	20, 500	19		2	8, 300	4, 690	26, 200
Sewing machines and attachments	6	14, 700	13	1	2	8, 035	152, 104	168, 800
Shipbuilding	8	131, 000	231			134, 995	395, 100	566, 700
Shirts	21	188, 400	69	418	2	107, 271	253, 325	416, 627
Show-cases	4	26, 200	92		3	41, 616	53, 019	116, 637
Silk and silk goods (see also Mixed textiles)	5	21, 700	19	68	39	10, 700	18, 355	46, 140
Slaughtering and meat-packing, not including retail butchering establishments.	49	4, 074, 682	1, 107		36	338, 302	10, 454, 991	11, 614, 810
Smelting and refining (base scrap metal, not from the ore)	1	10, 000	5			1, 500	26, 000	30, 000
Soap and candles	3	202, 950	106	18	5	24, 150	306, 517	350, 699
Starch	4	1, 300, 000	410	50	40	149, 030	1, 024, 292	1, 620, 710
Stencils and brands	4	9, 450	19		7	12, 924	3, 450	22, 620
Stereotyping and electrotyping (see also Type founding)	3	10, 600	20		2	13, 495	7, 600	28, 348
Stone- and earthen-ware	12	287, 100	275	41	75	139, 508	93, 730	356, 900
Surgical appliances	4	16, 300	8	2		6, 452	8, 060	26, 000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	114	348, 308	409	3	19	171, 033	412, 078	803, 283
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	13	490, 615	431	85	60	101, 986	1, 138, 489	1, 508, 486
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	258	751, 435	2, 029	372	386	907, 673	1, 053, 406	2, 789, 637
Tools (see also Cutlery and edge tools; Hardware)	3	17, 800	28		1	19, 100	14, 700	45, 800
Trunks and valises	11	93, 700	199	20	14	61, 200	100, 935	226, 706
Type founding (see also Stereotyping and electrotyping)	2	329, 990	189	57	21	125, 360	63, 700	226, 889
Umbrellas and canes	7	20, 250	12	11	3	9, 800	31, 525	55, 600
Upholstering (see also Furniture)	11	152, 850	113	16	45	48, 883	168, 495	265, 825
Varnish (see also Paints)	4	94, 500	23			14, 355	131, 958	186, 090
Veneering	1	211, 000	50		16	23, 900	125, 332	229, 205
Vinegar	8	92, 750	49			16, 848	79, 600	167, 728
Window blinds and shades	6	17, 100	17	4	1	9, 484	61, 000	100, 424
Wirework	6	82, 600	170		36	36, 157	97, 200	198, 600
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	17	27, 070	60	4	2	26, 979	23, 965	104, 160
Wooden ware	3	83, 064	70		42	50, 850	77, 291	173, 684
Woolen goods (see also Mixed textiles)	2	190, 000	54	72	34	44, 400	165, 000	295, 000
HANCOCK:								
Brick and tile	18	32, 225	81		4	11, 375	18, 754	46, 860
Carriages and wagons	4	25, 800	49			19, 300	17, 000	45, 000
Cooperage	5	41, 800	19		29	15, 700	17, 050	48, 500
Flouring- and grist-mill products	12	84, 500	29			10, 761	246, 880	317, 501
Foundery and machine-shop products	3	33, 700	22			9, 900	10, 200	29, 400
Lumber, planed	2	41, 000	17			5, 600	20, 500	40, 800
Lumber, sawed	45	118, 500	130		4	23, 755	122, 001	204, 580
Oil, linseed	1	30, 000	10			4, 000	3, 821	86, 000
Saddlery and harness	7	30, 700	24	5		11, 300	44, 900	68, 600
Tinware, copperware, and sheet-iron ware	6	19, 800	18			5, 600	25, 150	34, 350
HARDIN:								
Brick and tile	20	26, 660	90		5	13, 516	11, 985	35, 805
Clothing, men's	5	5, 000	22	12		10, 650	12, 700	35, 000
Flouring- and grist-mill products	7	86, 000	28			8, 309	166, 458	188, 252
Furniture	7	11, 650	13	1		5, 918	9, 700	20, 000
Iron railing, wrought	1	100, 000	18		7	9, 672	53, 000	63, 000
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	1	39, 000	14			6, 000	50, 000	60, 000
Lumber, sawed	37	247, 750	151		15	35, 852	181, 110	310, 570
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	1	20, 000	12			3, 775	25, 000	35, 500
Tinware, copperware, and sheet-iron ware	8	25, 500	29			8, 005	11, 350	23, 650
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	2	14, 000	20		7	13, 200	20, 500	41, 679
HARRISON:								
Clothing, men's	5	12, 250	9	13		6, 485	18, 500	33, 000
Flouring- and grist-mill products	18	92, 000	44		1	10, 507	385, 243	445, 263
Lumber, sawed	14	19, 250	50		1	11, 174	46, 790	79, 215
HENRY:								
Brick and tile	5	20, 800	57		9	13, 000	8, 060	29, 550
Cooperage	2	9, 500	30		15	11, 727	11, 707	29, 500
Flouring- and grist-mill products	7	86, 000	17			3, 140	148, 927	165, 256
Liquors, distilled	1	60, 000	11			4, 800	73, 000	105, 000
Lumber, sawed	41	156, 300	199		41	41, 758	187, 007	326, 686
Woolen goods	1	25, 000	11	12	1	3, 500	14, 000	25, 000
HIGHLAND:								
Carriages and wagons	4	17, 200	37			10, 060	15, 350	32. 500
Flouring- and grist-mill products	21	94, 800	50			10, 680	384, 824	433, 787
Leather, curried	3	7, 300	5			1, 875	20, 350	25, 025
Leather, tanned	4	16, 600	13			4, 225	20, 120	29, 575
Liquors, distilled	1	100, 000	25			10, 800	84, 000	130, 000
Lumber, planed	4	31, 500	35			11, 400	21, 000	40, 000
Lumber, sawed	19	26, 390	48			7, 955	53, 576	83, 076
Woolen goods	4	30, 125	28	7	10	6, 930	25, 411	39, 650
HOCKING:								
Flouring- and grist-mill products	9	37, 050	16			5, 390	98, 804	111, 588
Furniture	3	35, 055	29			15, 775	12, 300	32, 700
Iron and steel	6	1, 890, 000	923		4	135, 107	322, 447	491, 965
Lumber, sawed	13	16, 800	38			7, 074	32, 350	57, 460

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OHIO—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
MAHONING:								
Bread and other bakery products	8	$17, 000	7	2	....	$3, 988	$20, 921	$34, 835
Brick and tile	5	12, 150	35	....	14	8, 700	12, 785	31, 445
Carriages and wagons	4	41, 000	34	....	....	13, 334	12, 100	38, 800
Flouring- and grist-mill products	17	136, 500	49	....	....	15, 629	343, 461	404, 825
Foundery and machine-shop products	8	216, 086	146	....	7	66, 565	98, 861	192, 723
Iron and steel	13	3, 781, 715	2, 774	....	115	1, 326, 366	6, 066, 349	7, 850, 278
Iron bolts, nuts, washers, and rivets	1	150, 000	100	25	....	65, 000	150, 000	240, 000
Leather, curried	10	32, 725	15	....	....	7, 876	99, 465	120, 735
Leather, tanned	11	52, 625	25	....	....	12, 578	75, 390	103, 610
Liquors, malt	4	66, 500	31	....	....	13, 023	56, 041	100, 250
Lumber, planed (see also Sash, doors, and blinds)	3	18, 100	28	....	....	8, 244	27, 500	43, 244
Lumber, sawed	40	92, 000	94	....	2	16, 745	94, 262	153, 704
Printing and publishing	6	49, 000	53	2	....	24, 625	17, 480	58, 880
Saddlery and harness	14	7, 750	21	....	1	7, 434	12, 398	28, 800
Sash, doors, and blinds (see also Lumber, planed)	2	10, 800	19	....	....	11, 500	41, 500	53, 000
Tinware, copperware, and sheet-iron ware	14	13, 800	31	....	....	9, 765	14, 100	30, 970
MARION:								
Agricultural implements	1	72, 000	74	....	6	33, 000	39, 470	100, 000
Brick and tile	15	32, 400	57	....	3	8, 850	12, 610	34, 380
Confectionery	1	4, 000	2	....	1	1, 023	19, 000	25, 000
Flouring- and grist-mill products	8	77, 700	22	....	....	5, 760	245, 717	276, 761
Lumber, sawed	24	53, 400	71	....	1	12, 635	81, 430	127, 854
MEDINA:								
Agricultural implements	7	29, 000	24	....	....	5, 800	7, 055	22, 463
Cheese and butter (factory)	20	55, 800	43	1	1	9, 492	118, 975	166, 531
Clothing, men's	7	9, 800	16	5	....	7, 380	9, 688	21, 493
Flouring- and grist-mill products	14	96, 000	31	....	....	7, 293	209, 829	236, 250
Foundery and machine-shop products	4	26, 700	43	....	....	21, 200	29, 280	44, 488
Lumber, sawed	33	66, 160	84	....	1	12, 169	70, 355	118, 095
Saddlery and harness	7	13, 100	15	....	....	4, 585	10, 020	20, 610
Sash, doors, and blinds	1	15, 000	11	....	....	4, 356	16, 340	22, 856
MEIGS:								
Cooperage	12	19, 455	72	....	....	15, 656	29, 240	48, 044
Flouring- and grist-mill products	17	114, 705	35	....	....	11, 338	235, 441	273, 622
Foundery and machine-shop products	5	82, 600	55	....	....	17, 718	22, 322	56, 320
Furniture	2	23, 650	51	....	3	16, 290	9, 400	44, 500
Iron and steel	1	100, 000	225	....	25	37, 500	137, 950	245, 000
Leather, curried	4	6, 700	3	....	1	925	18, 340	21, 420
Leather, tanned	4	8, 900	3	....	1	1, 125	15, 530	20, 250
Liquors, malt	1	23, 000	7	....	....	3, 469	15, 060	26, 892
Lumber, sawed	24	50, 300	78	....	1	8, 806	41, 938	70, 812
Saddlery and harness	8	13, 000	9	....	1	2, 375	14, 650	23, 915
Salt	9	593, 000	316	....	....	68, 845	132, 819	235, 837
MERCER:								
Flouring- and grist-mill products	6	30, 200	19	....	....	4, 250	135, 964	151, 394
Lumber, sawed	34	89, 037	144	....	10	19, 748	103, 825	178, 725
MIAMI:								
Agricultural implements	1	89, 436	50	....	....	20, 000	34, 000	85, 000
Brick and tile	10	35, 965	53	1	7	8, 262	10, 996	28, 960
Carriage and wagon materials	2	62, 000	82	....	5	29, 000	58, 000	113, 000
Carriages and wagons	5	88, 400	102	....	....	41, 500	46, 500	104, 000
Cooperage	8	10, 025	29	....	....	8, 320	12, 235	25, 194
Flouring- and grist-mill products	23	[illegible]3, 200	68	....	....	17, 290	662, 879	765, 107
Foundery and machine-shop products	2	116, 000	86	....	3	48, 000	93, 000	188, 500
Furniture	3	37, 600	89	....	....	26, 300	41, 800	105, 000
Liquors, distilled	2	70, 000	13	....	2	6, 900	60, 000	93, 500
Liquors, malt	4	60, 000	12	....	1	5, 279	22, 820	40, 748
Lumber, sawed	25	46, 400	72	....	2	10, 025	49, 613	84, 460
Oil, linseed	4	206, 000	110	....	....	48, 000	511, 000	665, 300
Paper	1	14, 000	18	....	2	6, 864	12, 691	37, 560
Patent medicines and compounds	4	26, 000	25	4	....	12, 000	21, 000	55, 000
Slaughtering and meat-packing, not including retail butchering establishments.	1	5, 000	2	....	....	700	57, 500	60, 810
Tobacco, cigars and cigarettes	5	5, 480	22	....	2	6, 600	20, 100	33, 800
Woolen goods	5	81, 500	35	46	4	18, 242	76, 587	106, 309
MONROE:								
Cheese and butter	53	102, 900	30	3	....	3, 742	44, 550	64, 209
Flouring- and grist-mill products	24	86, 000	37	....	....	5, 826	186, 229	215, 293
Leather, curried	6	13, 250	8	....	1	3, 150	31, 365	40, 227
Leather, tanned	6	9, 900	8	....	1	2, 260	25, 370	31, 620
Lumber, sawed	18	31, 425	59	....	1	6, 829	32, 621	58, 174
MONTGOMERY:								
Agricultural implements	15	997, 000	670	....	30	243, 813	505, 536	1, 283, 239
Bagging, flax, hemp, and jute	1	2, 500	10	50	15	10, 000	17, 000	35, 000
Bags, paper	1	20, 000	6	10	....	6, 000	31, 300	50, 000
Bookbinding and blank-book making	3	22, 000	11	11	3	10, 700	21, 500	54, 000
Bread and other bakery products	21	104, 025	65	2	6	27, 075	163, 949	230, 010
Brick and tile	20	35, 250	77	....	13	21, 310	21, 674	64, 670
Bridges	1	30, 000	35	....	10	20, 000	40, 000	70, 000
Carriage and wagon materials	3	300, 000	219	....	11	82, 695	100, 000	244, 000
Carriages and wagons	21	114, 600	249	....	12	83, 310	110, 150	289, 175
Cars, railroad, street, and repairs	1	750, 000	875	....	25	373, 861	850, 000	1, 509, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OHIO—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
MONTGOMERY—continued.								
Clothing, men's	21	$120, 700	227	121	2	$123, 455	$207, 900	$436, 900
Coffee and spices, roasted and ground	4	18, 700	18	4	....	10, 495	86, 300	112, 675
Confectionery	11	18, 600	32	22	....	11, 258	88, 335	125, 800
Cooperage	10	27, 250	53	....	1	18, 336	48, 319	84, 061
Cotton goods	2	92, 000	23	15	45	13, 750	64, 127	116, 500
Cutlery and edge tools	1	20, 000	19	....	....	8, 000	14, 160	34, 000
Fancy articles	2	21, 000	30	35	100	33, 408	54, 700	119, 005
Flax, dressed	2	19, 000	7	....	5	5, 000	12, 000	20, 500
Flouring- and grist-mill products	29	471, 400	97	....	....	38, 787	1, 462, 484	1, 718, 309
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	17	788, 000	698	....	36	299, 769	484, 952	1, 063, 687
Furniture (see also Upholstering)	16	153, 250	138	3	12	55, 640	89, 702	218, 752
Iron railing, wrought	3	23, 400	13	....	1	5, 060	14, 400	30, 000
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	3	33, 000	61	....	....	11, 800	57, 200	104, 600
Lasts	1	40, 000	37	8	....	13, 500	10, 500	31, 700
Leather, curried	4	31, 000	13	....	....	6, 340	75, 030	96, 275
Leather, tanned	5	21, 300	10	....	....	4, 340	51, 934	67, 625
Liquors, distilled	2	152, 000	10	....	....	4, 200	40, 250	60, 000
Liquors, malt	9	158, 428	52	1	....	26, 339	113, 690	203, 021
Looking-glass and picture frames	4	34, 200	5	1	....	2, 676	13, 800	26, 000
Lumber, sawed	34	115, 750	81	....	3	15, 794	123, 240	201, 095
Malt	2	44, 931	10	....	....	3, 618	40, 934	53, 944
Marble and stone work	7	22, 400	37	....	....	14, 480	18, 100	48, 100
Oil, lard	1	50, 000	10	....	2	4, 500	130, 320	140, 190
Oil, linseed	4	112, 500	32	....	....	12, 124	270, 700	332, 055
Paper	6	786, 000	255	55	29	122, 564	240, 769	634, 604
Patent medicines and compounds	4	3, 700	3	1	2	1, 145	7, 700	23, 750
Printing and publishing	10	244, 600	133	55	22	97, 885	126, 018	332, 624
Saddlery and harness	12	45, 350	73	....	5	32, 000	63, 150	135, 060
Sash, doors, and blinds	1	40, 000	26	....	4	12, 000	40, 000	60, 000
Slaughtering and meat-packing, not including retail butchering establishments.	6	70, 500	33	....	2	24, 100	244, 296	310, 978
Tinware, copperware, and sheet-iron ware	19	27, 900	71	....	2	31, 625	37, 850	94, 625
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	100, 000	10	30	25	15, 000	125, 000	175, 000
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking and snuff).	37	82, 400	176	57	27	83, 107	98, 342	328, 975
Trunks and valises	2	9, 000	18	....	3	6, 500	7, 600	25, 775
Upholstering (see also Furniture)	4	17, 300	8	....	2	4, 460	15, 700	29, 300
Varnish	2	99, 000	7	....	....	5, 020	65, 000	135, 000
Woolen goods	3	12, 500	6	2	2	2, 900	14, 136	20, 761
MORGAN:								
Agricultural implements	1	75, 000	60	....	3	20, 000	70, 000	115, 000
Clothing, men's	4	11, 050	9	33	9	13, 084	38, 435	64, 320
Flouring- and grist-mill products	8	66, 950	15	....	....	6, 650	197, 1 3	226, 003
Leather, curried	4	4, 700	5	....	....	1, 204	17, 647	21, 050
Leather, tanned	4	12, 300	10	....	....	3, 756	17, 500	24, 550
Lumber, sawed	11	30, 500	48	....	1	10, 701	64, 075	93, 632
Salt	5	23, 200	30	....	....	4, 340	12, 670	20, 020
Slaughtering and meat-packing, not including retail butchering establishments.	1	22, 000	10	....	....	750	19, 000	22, 476
Tobacco, chewing, smoking, and snuff	2	35, 000	40	7	19	15, 062	74, 050	100, 750
MORROW:								
Carriages and wagons	3	19, 000	28	....	....	8, 000	7, 800	20, 500
Clothing, men's	5	7, 875	9	13	....	5, 200	18, 000	30, 600
Flouring- and grist-mill products	11	53, 800	26	....	....	6, 100	175, 130	198, 026
Lumber, planed	3	6, 700	8	....	....	1, 100	15, 900	22, 500
Lumber, sawed	22	40, 700	73	....	1	9, 538	49, 782	87, 492
Saddlery and harness	8	7, 150	14	....	1	4, 500	11, 150	20, 800
MUSKINGUM:								
Agricultural implements	1	100, 000	100	....	20	48, 000	110, 000	182, 280
Bread and other bakery products	9	15, 540	24	3	1	5, 346	21, 617	31, 432
Brick and tile	5	96, 200	69	12	14	28, 091	11, 615	54, 200
Carriages and wagons	8	52, 700	59	....	....	18, 868	19, 600	56, 400
Clothing, men's	10	67, 500	38	108	1	27, 030	95, 800	156, 150
Coffins, burial cases, and undertakers' goods	1	30, 000	36	2	....	11, 000	15, 000	40, 000
Confectionery	2	69, 000	41	3	2	11, 421	105, 100	123, 000
Cotton goods	1	50, 000	45	30	....	18, 000	70, 000	120, 000
Flouring- and grist-mill products	34	279, 070	90	....	....	29, 120	1, 034, 807	1, 122, 222
Foundery and machine-shop products	8	675, 000	655	....	3	264, 313	447, 021	919, 350
Furniture	11	29, 400	55	1	....	13, 517	24, 261	50, 600
Glass	3	272, 000	180	....	70	90, 000	72, 318	232, 000
Iron and steel	2	400, 000	256	....	11	174, 394	529, 944	848, 018
Leather, curried	4	21, 700	7	....	....	3, 540	33, 719	47, 350
Leather, tanned	5	33, 900	13	....	....	4, 650	29, 375	40, 300
Liquors, malt	5	72, 000	20	....	....	9, 090	39, 200	70, 012
Lumber, planed (see also Sash, doors, and blinds)	2	14, 000	14	....	....	4, 400	25, 000	34, 500
Lumber, sawed	17	27, 300	43	....	....	6, 395	41, 553	67, 610
Marble and stone work	4	24, 500	34	....	....	11, 400	23, 500	48, 000
Paper	2	80, 000	35	30	....	20, 875	96, 527	132, 632

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OHIO—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
MUSKINGUM—continued.								
Printing and publishing	4	$18,300	25	16	18	$14,690	$10,480	$38,000
Saddlery and harness	14	18,375	28	2	1	7,496	11,504	29,250
Sash, doors, and blinds (see also Lumber, planed)	2	65,000	51	....	3	17,000	72,000	110,000
Slaughtering and meat-packing, not including retail butchering establishments.	2	34,000	6	....	....	1,150	27,550	37,720
Soap and candles	3	58,000	37	20	....	16,875	305,000	329,000
Stone- and earthen-ware	43	31,100	120	....	13	25,254	19,988	66,248
Tinware, copperware, and sheet-iron ware	14	21,450	33	....	....	10,950	27,350	56,450
Tobacco, cigars and cigarettes	14	33,586	58	3	5	14,670	47,558	76,569
Woolen goods	2	86,000	71	1	12	15,500	62,750	87,250
NOBLE:								
Flouring- and grist-mill products	17	79,800	33	....	....	5,398	200,839	223,883
Lumber, sawed	22	33,500	70	....	11	7,935	45,352	73,617
OTTAWA:								
Carriages and wagons	3	18,000	27	....	....	10,350	10,500	25,300
Cooperage	7	15,200	33	2	8	9,950	15,300	40,750
Flouring- and grist-mill products	4	39,000	9	....	....	3,535	103,246	119,564
Lime	6	48,500	60	....	4	15,250	17,700	72,050
Liquors, vinous	4	373,500	42	8	7	20,600	265,600	339,000
Lumber, sawed	28	240,340	234	....	53	55,556	280,535	438,928
PAULDING:								
Flouring- and grist-mill products	5	31,000	19	....	....	4,085	78,625	89,190
Iron and steel	3	200,000	180	....	....	37,000	88,100	122,000
Lumber, sawed	21	69,700	98	....	25	17,950	55,270	99,806
PERRY:								
Flouring- and grist-mill products	10	80,885	29	....	....	7,006	174,288	203,498
Iron and steel	6	913,500	603	....	2	211,427	438,908	644,275
Lumber, sawed	13	23,100	65	....	1	8,735	47,872	73,685
Sash, doors, and blinds	1	5,000	10	....	....	5,000	12,000	20,000
Stone- and earthen-ware	37	19,450	82	....	22	10,275	11,854	44,453
PICKAWAY:								
Carriages and wagons	3	18,000	25	....	....	8,200	11,000	31,000
Flouring- and grist-mill products	14	106,175	28	....	....	6,925	220,284	246,216
Foundery and machine-shop products	1	30,000	55	....	....	21,475	20,000	54,000
Fruits and vegetables, canned and preserved	1	20,000	....	24	20	8,000	25,000	35,000
Leather, curried	3	10,250	7	....	....	2,525	21,880	26,900
Leather, tanned	3	10,250	8	....	....	2,525	17,000	22,070
Lumber, planed	2	5,000	28	....	....	8,800	12,000	27,000
Lumber, sawed	18	30,600	57	....	....	8,100	51,205	79,068
Marble and stone work	2	4,500	12	....	....	5,400	9,168	21,500
Slaughtering and meat-packing, not including retail butchering establishments.	2	265,000	130	....	....	11,600	203,000	232,000
Tinware, copperware, and sheet-iron ware	5	5,750	9	....	....	4,050	9,150	24,700
PIKE:								
Flouring- and grist-mill products	6	55,800	32	....	....	3,060	38,125	45,990
Liquors, distilled	1	500,000	10	....	2	5,500	67,137	105,250
Lumber, sawed	13	31,600	46	....	2	7,800	43,853	73,485
PORTAGE:								
Carriages and wagons	3	91,500	62	....	....	35,130	32,300	89,627
Cheese and butter (factory)	33	85,850	58	12	....	15,825	201,237	296,517
Flouring- and grist-mill products	13	87,500	45	....	....	18,304	288,661	334,353
Food preparations (see page 39)	1	25,000	19	2	....	12,042	88,406	104,372
Glass	3	155,500	159	....	14	80,513	57,100	168,298
Lumber, sawed	46	119,650	142	....	5	19,369	113,720	182,073
Stone- and earthen-ware	5	11,300	40	....	8	7,800	11,000	25,375
Worsted goods	1	67,000	51	32	25	23,400	69,606	101,250
PREBLE:								
Brick and tile	18	29,100	74	1	5	8,113	11,999	28,478
Carriages and wagons	3	12,000	16	....	....	6,400	11,500	21,000
Clothing, men's	9	14,400	12	16	....	4,897	14,400	26,500
Flouring- and grist-mill products	17	103,900	36	....	....	9,472	265,472	306,776
Leather, curried	3	8,000	4	....	....	1,725	18,587	23,225
Lumber, sawed	35	75,850	117	....	1	19,795	111,748	177,303
Saddlery and harness	7	6,700	12	....	....	3,381	13,500	26,100
Sash, doors, and blinds	3	11,300	19	....	....	7,450	33,500	48,500
Tobacco, cigars and cigarettes	4	8,600	21	11	14	10,700	28,900	54,400
PUTNAM:								
Brick and tile	14	28,500	65	....	3	6,936	7,545	23,230
Carriage and wagon materials	2	55,000	34	....	....	12,203	17,500	35,600
Flouring- and grist-mill products	8	56,000	24	....	....	5,400	141,125	171,529
Handles, wooden	2	16,250	19	....	....	6,800	8,200	22,000
Lumber, sawed	34	105,550	129	....	30	20,158	106,673	173,062
Sash, doors, and blinds	2	15,500	34	....	....	8,400	65,000	80,000
RICHLAND:								
Agricultural implements	3	1,602,140	296	5	....	116,900	301,140	952,342
Bread and other bakery products	7	33,400	35	12	2	12,238	91,288	125,324
Brick and tile	15	23,300	73	....	14	12,825	13,715	43,800
Carriages and wagons	5	57,400	106	2	2	28,700	91,320	135,792
Cooperage	8	35,500	52	....	....	25,143	58,990	133,063

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OHIO—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Average number of hands employed. Females above 15 years.	Average number of hands employed. Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
RICHLAND—continued.								
Flouring- and grist-mill products	25	$236,900	81			$34,885	$863,945	$937,962
Foundery and machine-shop products	8	326,000	201		4	99,738	256,015	449,490
Furnishing goods, men's	2	19,000	10	16	3	5,600	60,000	75,000
Furniture	13	25,925	20			7,600	9,893	32,030
Leather, curried	6	12,150	6			2,581	23,710	30,650
Leather, tanned	6	13,350	7			2,781	18,500	25,800
Liquors, malt	2	51,000	13			4,095	17,710	31,627
Lumber, sawed	33	53,236	72		1	7,323	48,524	80,605
Marble and stone work	4	3,250	26			12,130	7,570	26,300
Printing and publishing	5	23,600	22	1	2	9,800	14,712	37,200
Saddlery and harness	12	5,750	20			8,273	18,880	36,950
Sash, doors, and blinds	4	106,500	101			40,675	142,500	209,550
Tinware, copperware, and sheet-iron ware	9	14,050	15			7,250	27,500	45,350
Tobacco, cigars and cigarettes	9	20,520	61	3	24	21,727	54,184	98,591
ROSS:								
Bread and other bakery products	6	9,750	9			3,295	16,900	28,800
Brick and tile	5	13,650	62		1	12,119	6,320	30,480
Carriages and wagons	3	21,200	20			10,600	11,300	28,000
Clothing, men's	8	19,800	44	9	4	20,261	33,600	68,150
Flouring- and grist-mill products	16	162,000	48			12,144	240,170	283,555
Furniture	2	10,000	20			8,000	8,500	22,000
Leather, curried	7	56,800	26			12,358	117,655	151,250
Leather, tanned	8	44,200	21		1	8,192	87,231	112,572
Liquors, malt	2	35,000	13			5,538	24,050	42,950
Lumber, planed	2	60,000	26			13,700	32,000	68,000
Lumber, sawed	16	30,250	44			5,730	31,190	51,113
Paper	1	65,000	48	5		20,472	79,380	112,000
Printing and publishing	5	29,094	22		1	10,001	7,685	34,469
Slaughtering and meat-packing, not including retail butchering establishments.	2	100,000	24			6,500	94,700	156,000
Tinware, copperware, and sheet-iron ware	5	14,175	13			4,200	12,200	22,750
Tobacco, cigars and cigarettes	5	11,300	18		3	9,582	10,190	28,550
SANDUSKY:								
Agricultural implements	3	147,000	143			69,100	247,750	389,284
Brick and tile	7	23,500	44		31	10,178	7,475	31,000
Carriages and wagons	5	46,000	60	1		24,750	22,500	70,000
Clothing, men's	9	8,700	38	17		13,300	22,750	46,700
Cooperage	6	9,850	55		6	16,040	26,400	48,300
Flouring- and grist-mill products	10	162,000	47			19,012	590,371	697,595
Foundery and machine-shop products	1	75,000	65			36,500	37,000	90,000
Furniture	4	43,000	55		1	14,480	14,000	40,500
Lime	5	21,500	73		4	22,100	14,200	54,000
Liquors, malt	2	26,000	11			4,345	18,745	33,490
Lumber, sawed	35	239,700	176		15	39,050	296,238	382,595
Malt	2	64,000	40	7		24,600	76,707	142,600
Printing and publishing	4	28,000	18	4	1	6,660	6,400	25,500
Saddlery and harness	5	6,300	13			5,112	11,000	20,620
Slaughtering and meat-packing, not including retail butchering establishments.	2	18,500	21			5,650	80,050	98,300
Tinware, copperware, and sheet-iron ware	6	16,000	23			9,000	18,100	45,500
Wood, turned and carved	4	8,800	26	11		8,772	18,135	33,219
SCIOTO:								
Boots and shoes	2	21,000	70	42	12	37,000	98,275	153,200
Bread and other bakery products	6	20,800	10	2	1	2,694	23,610	33,447
Brick and tile	9	138,950	181		9	43,792	56,573	140,125
Carriage and wagon materials	1	75,000	60			25,000	30,255	75,985
Clothing, men's	7	106,500	81	377		52,655	174,500	265,585
Cooperage	12	15,180	53			9,464	14,296	28,627
Flouring- and grist-mill products	8	72,500	15			6,220	170,586	195,706
Foundery and machine-shop products	6	217,500	157			59,110	103,030	193,070
Furniture	3	22,500	82			20,566	33,300	71,250
Iron and steel	10	1,130,000	1,091		115	430,577	618,650	859,000
Liquors, distilled	1	250,000	35			15,500	172,000	255,175
Liquors, malt	1	15,000	8			3,850	16,775	30,000
Lumber, planed	2	11,500	9			2,471	12,043	20,696
Lumber, sawed	39	139,185	120			18,810	149,711	202,875
Marble and stone work	5	33,900	38			9,097	17,756	40,753
Printing and publishing	4	16,600	17		3	7,325	6,600	25,591
Tinware, copperware, and sheet-iron ware	6	6,350	15			3,970	12,150	22,055
Tobacco, cigars and cigarettes	7	7,400	39		8	14,500	37,071	59,752
Woolen goods	2	18,000	20	33		8,700	36,260	49,640
SENECA:								
Agricultural implements	1	90,000	82		5	30,227	23,500	67,000
Bread and other bakery products	2	16,000	10	1		3,900	10,000	23,000
Carriage and wagon materials	4	26,500	42			11,300	21,625	49,000
Carriages and wagons	12	78,800	98	1		35,016	43,200	95,765
Clothing, men's	6	55,015	33	47		24,500	39,175	81,625
Flouring- and grist-mill products	17	185,200	49			8,892	482,196	551,009
Foundery and machine-shop products	6	138,000	100		1	42,124	38,529	119,875
Liquors, malt	2	90,000	33			10,504	45,395	81,075
Lumber, planed (see also Sash, doors, and blinds)	2	45,000	27			10,420	15,000	40,000
Lumber, sawed	46	76,800	125			16,879	91,302	139,653

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OHIO—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
SENECA—continued.								
Saddlery and harness	10	$9, 900	21		1	$5, 235	$10, 650	$20, 850
Sash, doors, and blinds (see also Lumber, planed)	4	55, 600	46	1		13, 665	32, 900	62, 000
Slaughtering and meat-packing, not including retail butchering establishments.	1	10, 000	10			900	24, 800	28, 000
Tinware, copperware, and sheet-iron ware	14	40, 875	61			18, 595	37, 438	96, 475
Wooden ware	2	19, 400	33			14, 000	19, 000	36, 800
SHELBY:								
Agricultural implements	3	58, 000	58			18, 400	25, 500	70, 500
Brick and tile	13	22, 154	66		14	7, 463	9, 783	27, 326
Carriage and wagon materials	2	9, 000	16		4	3, 200	20, 800	31, 800
Carriages and wagons	2	15, 000	19			5, 600	8, 000	23, 000
Flouring- and grist-mill products	8	128, 100	19			4, 650	193, 148	217, 937
Foundery and machine-shop products	2	25, 000	79		3	23, 000	57, 000	105, 000
Furniture	3	27, 600	54		10	16, 000	85, 150	116, 500
Liquors, malt	1	20, 000	15			6, 550	28, 227	50, 486
Lumber, planed	1	10, 000	30			7, 000	50, 000	75, 000
Lumber, sawed	22	59, 150	87			13, 618	60, 755	91, 628
Saddlery and harness	4	7, 600	21		1	4, 950	13, 300	25, 700
Slaughtering and meat-packing, not including retail butchering establishments.	1	50, 000	15			2, 000	72, 000	80, 000
Tinware, copperware, and sheet-iron ware	3	8, 500	31			4, 500	12, 000	22, 000
STARK:								
Agricultural implements	18	3, 097, 900	1, 198		12	482, 689	1, 286, 238	3, 068, 521
Bagging, flax, hemp, and jute	1	35, 000	22	15	2	9, 000	50, 000	68, 000
Bread and other bakery products	11	8, 350	19	3		5, 724	33, 100	50, 150
Brick and tile	9	10, 800	63		8	11, 738	8, 500	29, 350
Bridges	2	181, 000	170			80, 961	110, 000	348, 000
Carriages and wagons	6	39, 300	59			17, 120	31, 940	58, 540
Cars, railroad, street, and repairs	1	5, 000	13			3, 700	12, 260	40, 000
Cheese and butter (factory)	12	13, 400	9	1		1, 410	14, 179	20, 983
Clothing, men's	7	33, 600	24	21		13, 690	20, 100	53, 150
Coffee and spices, roasted and ground	1	20, 000	2	3		1, 800	60, 000	84, 000
Cooperage	6	9, 100	34			10, 656	16, 100	29, 600
Cutlery and edge tools	1	12, 000	49	6	5	20, 000	20, 000	50, 000
Flouring- and grist-mill products	40	468, 200	161			55, 718	1, 297, 257	1, 490, 679
Foundery and machine-shop products	11	157, 300	274			97, 050	149, 350	292, 900
Furniture	6	11, 100	32	1		10, 150	13, 900	38, 100
Iron and steel	4	450, 000	136		3	61, 106	111, 137	282, 889
Liquors, malt	8	79, 500	29			11, 179	48, 223	86, 129
Lumber, planed (see also Sash, doors, and blinds)	5	40, 075	47		1	14, 706	36, 300	75, 000
Lumber, sawed	36	63, 525	101			14, 050	70, 923	107, 765
Malt	2	45, 000	8			2, 100	11, 500	28, 000
Marble and stone work	9	25, 700	29			9, 349	13, 600	32, 040
Paper	2	110, 000	60		10	22, 900	79, 000	168, 000
Printing and publishing	5	47, 000	57		1	22, 848	14, 505	52, 100
Roofing and roofing materials	2	5, 750	6			1, 504	15, 000	22, 550
Saddlery and harness	20	18, 825	37			13, 332	27, 155	59, 267
Safes, doors, and vaults, fire-proof	1	180, 000	260		2	85, 000	155, 000	300, 000
Sash, doors, and blinds (see also Lumber, planed)	4	39, 800	23			6, 500	60, 000	76, 400
Soap and candles	1	40, 000	17		4	12, 000	90, 000	125, 000
Springs, steel, car, and carriage	1	35, 000	85			37, 880	66, 500	140, 000
Tinware, copperware, and sheet-iron ware	14	30, 200	45			14, 905	35, 810	66, 425
Tobacco, cigars and cigarettes	14	17, 375	55	1	1	21, 235	24, 125	61, 320
Woolen goods	3	42, 000	15	18	2	6, 200	23, 505	32, 200
SUMMIT:								
Agricultural implements	4	2, 089, 000	723		30	331, 455	696, 260	1, 453, 000
Bread and other bakery products	10	7, 100	12	3		4, 971	24, 694	43, 850
Brick and tile (see also Drain and sewer pipe)	12	439, 600	229		17	85, 715	256, 640	556, 893
Carriages and wagons	3	43, 000	54			22, 500	31, 500	75, 500
Cheese and butter (factory)	18	43, 800	38	9		10, 095	123, 476	172, 294
Clothing, men's	1	5, 000	4	7		5, 200	15, 000	25, 000
Confectionery	3	4, 200	15	2	1	5, 700	24, 500	39, 500
Cooperage	8	12, 750	54			22, 500	45, 465	82, 220
Cutlery and edge tools	1	500, 000	125			85, 000	140, 000	350, 000
Drain and sewer pipe (see also Brick and tile)	2	85, 000	49			19, 000	11, 500	85, 000
Flouring- and grist-mill products	25	797, 800	181			82, 758	1, 999, 274	2, 256, 662
Foundery and machine-shop products	12	247, 900	217		23	110, 200	297, 420	510, 518
Hardware, saddlery	2	48, 000	70		14	38, 000	125, 000	200, 000
Iron and steel	2	207, 000	178		19	133, 475	362, 954	603, 427
Iron bolts, nuts, washers, and rivets	1	25, 000	32			17, 000	55, 000	100, 000
Iron forgings	1	5, 000	57			20, 000	40, 000	67, 000
Leather, curried	6	44, 775	25			10, 200	113, 068	143, 158
Leather, tanned	6	39, 700	24			9, 230	82, 069	108, 874
Liquors, malt	2	29, 000	16			7, 146	30, 826	55, 110
Lumber, planed (see also Wood, turned and carved)	4	206, 000	90			47, 500	128, 000	218, 000
Lumber, sawed	31	100, 475	138			27, 078	197, 371	251, 112
Matches	1	300, 000	102	46	80	68, 686	600, 000	935, 529
Paper	5	264, 600	156	38	2	75, 526	217, 996	392, 500
Pipes, tobacco	1	25, 000	40			12, 000	18, 000	50, 000
Printing and publishing	4	55, 500	50	16	1	32, 500	32, 900	92, 500

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OHIO—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
SUMMIT—continued.								
Rubber and elastic goods	1	$100,000	53	....	2	$26,667	$210,832	$273,694
Saddlery and harness	16	29,305	14	....	....	5,750	17,530	40,205
Shipbuilding	5	6,600	31	....	....	13,110	5,660	23,460
Stone- and earthen-ware	22	237,800	296	5	54	125,390	80,251	261,600
Tinware, copperware, and sheet-iron ware	17	41,200	41	....	1	18,241	43,775	94,620
Tobacco, cigars and cigarettes	9	3,950	21	....	....	7,600	14,160	32,850
Upholstering	3	8,500	9	....	....	3,840	13,558	23,500
Varnish	1	7,000	5	....	....	1,600	16,500	25,000
Wire	1	40,000	25	....	7	9,600	195,000	320,000
Wood, turned and carved (see also Lumber, planed)	2	28,000	22	....	....	10,456	27,000	40,800
TRUMBULL:								
Bagging, flax, hemp, and jute	1	100,000	80	20	20	20,000	80,000	110,000
Carriages and wagons	3	26,500	31	....	....	17,300	16,000	39,000
Cheese and butter (factory)	44	56,370	67	15	....	15,834	224,546	301,938
Flouring- and grist-mill products	23	192,300	50	....	....	21,539	458,661	526,395
Foundery and machine-shop products	7	106,800	75	....	2	35,010	55,720	153,750
Furniture	3	13,000	20	1	....	8,038	9,875	25,200
Iron and steel	10	1,330,000	1,516	....	116	604,228	1,888,167	2,866,927
Leather, tanned	4	52,100	27	....	....	11,710	62,871	93,090
Lumber, sawed	54	195,400	212	....	4	40,845	187,252	269,600
Oil, linseed	1	50,000	14	....	....	6,552	119,000	136,000
Sash, doors, and blinds	1	15,000	15	....	....	5,439	25,000	40,000
Tinware, copperware, and sheet-iron ware	11	14,900	11	....	....	5,089	15,600	30,300
TUSCARAWAS:								
Agricultural implements	1	50,000	44	1	....	10,000	24,500	45,000
Brick and tile	7	46,700	87	....	17	18,639	8,031	35,375
Carriages and wagons	5	35,800	34	....	....	9,269	17,278	38,629
Cheese and butter (factory)	35	34,600	37	4	2	5,313	55,784	74,125
Clothing, men's	6	3,840	16	11	....	7,355	12,975	26,300
Cooperage	6	6,325	39	....	....	10,400	15,671	33,292
Flouring- and grist-mill products	25	327,000	91	....	....	26,363	1,047,746	1,183,972
Iron and steel	3	627,909	100	....	....	42,500	288,951	390,000
Leather, curried	5	13,300	12	....	....	3,500	28,363	37,192
Leather, tanned	7	20,200	14	....	....	4,130	23,183	33,540
Liquors, malt	5	22,500	11	....	....	3,930	16,925	30,263
Lumber, planed	4	44,500	41	....	....	12,125	48,350	78,480
Lumber, sawed	11	48,800	31	....	....	5,665	32,290	46,156
Paper	1	20,000	14	....	....	5,500	5,000	20,000
Saddlery and harness	20	19,480	33	....	....	5,665	18,995	34,725
Salt	3	47,000	32	....	....	14,049	30,940	51,570
Tinware, copperware, and sheet-iron ware	13	14,400	24	....	....	3,618	25,650	35,910
Woolen goods	4	33,500	25	12	6	5,000	23,752	29,690
UNION:								
Brick and tile	21	33,850	68	....	3	9,000	14,805	40,655
Flouring- and grist-mill products	5	38,500	12	....	....	3,044	72,022	81,412
Lumber, planed	1	10,000	4	....	....	1,000	15,000	20,000
Lumber, sawed	26	54,510	127	....	....	17,225	101,525	141,930
Woolen goods	2	28,000	17	7	4	6,300	21,350	32,770
VAN WERT:								
Brick and tile	10	17,500	42	....	2	4,230	7,245	20,460
Carriage and wagon materials	1	112,000	69	....	....	29,036	31,152	120,000
Flouring- and grist-mill products	8	74,000	27	....	....	11,684	292,746	334,527
Handles, wooden	2	22,000	19	3	....	5,500	6,500	20,000
Liquors, malt	2	26,200	7	....	....	3,120	13,457	24,063
Lumber, sawed	41	262,688	431	....	42	99,458	251,822	441,055
Saddlery and harness	7	18,300	24	....	....	7,475	10,100	28,000
VINTON:								
Flouring- and grist-mill products	13	61,800	23	....	....	5,580	138,985	159,055
Lumber, sawed	16	24,860	44	....	....	7,550	33,280	49,135
WARREN:								
Brick and tile	11	20,300	53	....	3	6,250	6,424	20,350
Carriages and wagons	6	23,000	56	....	....	13,675	14,354	35,800
Flouring- and grist-mill products	17	99,800	21	....	....	7,044	220,729	243,560
Food preparations (see page 39)	7	11,250	62	29	53	3,247	11,400	20,448
Gunpowder	1	100,000	38	....	....	10,000	60,000	100,000
Lumber, sawed	20	44,550	53	....	....	7,054	37,077	54,680
Paper	3	273,000	65	50	....	37,375	175,000	300,000
Saddlery and harness	8	5,625	18	....	....	4,693	8,385	23,650
WASHINGTON:								
Carriage and wagon materials	1	16,000	45	....	....	8,700	6,000	23,400
Carriages and wagons	2	11,000	26	....	....	10,000	9,000	23,500
Cooperage	15	66,540	108	....	5	16,801	23,102	47,116
Flouring- and grist-mill products	27	159,500	63	....	....	14,879	545,167	615,521
Foundery and machine-shop products	6	114,000	105	....	....	32,621	35,763	106,042
Furniture, chairs	1	80,000	180	90	60	80,000	50,000	170,000
Leather, curried	9	37,875	16	5	1	7,950	97,145	123,657
Leather, dressed skins	1	9,000	8	....	....	2,000	15,000	22,000
Leather, tanned	10	57,500	28	....	2	9,980	96,315	126,270
Lumber, sawed	22	53,150	80	....	1	14,755	67,555	103,238
Shipbuilding	1	10,000	9	....	....	4,900	52,000	58,500
Tobacco, cigars and cigarettes	4	2,500	18	....	1	6,475	21,430	57,300
Woolen goods	3	15,000	25	2	1	1,550	14,535	20,200

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OHIO—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
WAYNE:								
Agricultural implements	4	$155, 800	132	2	....	$36, 919	$72, 300	$189, 810
Brick and tile	9	11, 600	39	....	4	8, 629	7, 425	26, 852
Brooms and brushes	2	5, 700	[illegible]	9	2	5, 127	11, 426	20, 000
Carriages and wagons	5	29, 000	40	....	....	13, 000	29, 000	57, 500
Coffins, burial cases, and undertakers' goods	2	45, 000	27	2	....	14, 000	17, 000	45, 000
Flouring- and grist-mill products	28	290, 900	93	....	....	30, 801	943, 957	1, 119, 588
Foundery and machine-shop products	3	21, 900	22	....	....	8, 260	8, 800	20, 970
Furniture	6	25, 300	32	....	....	10, 250	9, 950	26, 050
Leather, curried	6	14, 425	8	....	....	3, 759	44, 035	58, 440
Leather, tanned	7	17, 725	11	....	....	4, 815	31, 260	45, 950
Liquors, malt	1	12, 000	6	....	....	2, 900	12, 560	22, 500
Lumber, sawed	28	58, 650	76	....	....	11, 135	74, 485	101, 700
Marble and stone work	3	7, 755	12	....	....	5, 300	16, 400	26, 000
Paper	1	50, 000	50	....	6	15, 000	24, 900	50, 000
Printing and publishing	3	22, 000	20	....	2	7, 500	5, 300	21, 760
Saddlery and harness	13	16, 690	21	2	....	6, 298	11, 530	26, 344
Sash, doors, and blinds	5	54, 275	58	....	4	25, 800	55, 000	105, 000
Tinware, copperware, and sheet-iron ware	8	6, 450	15	....	....	4, 560	13, 300	24, 750
Whips	1	10, 000	6	....	2	7, 000	20, 000	30, 000
WILLIAMS:								
Agricultural implements	5	119, 500	67	1	....	25, 995	37, 075	85, 550
Carriages and wagons	2	23, 000	14	....	....	4, 002	14, 000	20, 000
Cheese and butter (factory)	4	6, 100	10	....	....	2, 282	26, 412	34, 839
Cooperage	8	3, 425	25	....	....	8, 722	6, 525	22, 230
Flouring- and grist-mill products	12	100, 800	41	....	....	10, 333	305, 749	353, 879
Lumber, sawed	40	131, 400	146	....	1	26, 761	125, 078	181, 735
Saddlery and harness	11	15, 050	25	....	1	5, 687	12, 850	31, 595
WOOD:								
Brick and tile	16	21, 200	74	....	5	12, 924	20, 778	49, 110
Carriages and wagons	4	11, 700	20	....	....	9, 100	12, 150	25, 800
Flouring- and grist-mill products	13	104, 100	37	....	....	12, 764	304, 570	351, 830
Lumber, sawed	95	398, 535	423	....	120	87, 854	396, 099	591, 648
Saddlery and harness	16	9, 200	13	....	....	2, 820	13, 210	24, 490
Sash, doors, and blinds	2	22, 000	17	....	....	5, 500	11, 000	28, 000
WYANDOT:								
Brick and tile	14	35, 025	109	....	5	11, 170	12, 341	40, 220
Carriages and wagons	6	46, 000	58	....	....	23, 800	71, 800	116, 500
Clothing, men's	5	15, 900	15	9	....	7, 000	16, 000	27, 300
Flouring- and grist-mill products	10	85, 000	23	....	....	8, 350	204, 770	224, 526
Furniture	3	6, 600	8	....	....	3, 100	13, 100	20, 600
Lumber, planed	2	50, 000	31	....	....	15, 000	30, 000	51, 200
Lumber, sawed	42	80, 275	118	....	1	17, 531	76, 000	120, 320
Saddlery and harness	7	13, 900	21	....	....	6, 550	15, 000	27, 250

OREGON.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
BAKER:								
Lumber, sawed	8	$34, 800	11	....	....	$4, 295	$30, 925	$47, 750
BENTON:								
Flouring- and grist-mill products	4	57, 000	12	....	....	7, 057	56, 478	68, 268
Lumber, sawed	11	68, 100	18	....	....	5, 725	37, 197	62, 845
CLACKAMAS:								
Flouring- and grist-mill products	13	161, 400	29	....	....	14, 640	517, 595	574, 755
Iron and steel	1	100, 000	247	....	3	46, 822	33, 073	78, 393
Lumber, sawed	19	41, 300	20	....	1	4, 925	28, 140	45, 400
Paper	1	12, 000	18	....	....	8, 888	20, 360	43, 100
Slaughtering and meat-packing, not including retail butchering establishments.	2	20, 000	7	....	....	2, 500	37, 400	43, 200
Woolen goods	2	402, 500	117	15	7	62, 692	147, 236	405, 185
CLATSOP:								
Boots and shoes	1	10, 000	15	....	....	10, 000	27, 500	45, 000
Leather, curried	1	6, 667	3	....	....	2, 250	22, 900	33, 000
Leather, tanned	1	13, 333	5	....	....	3, 750	14, 500	22, 500
Lumber, sawed	1	40, 000	12	....	....	4, 850	33, 200	50, 000
Slaughtering and meat-packing, not including retail butchering establishments.	1	10, 000	4	....	....	1, 620	36, 640	39, 840
COLUMBIA:								
Lumber, sawed	6	70, 000	26	....	....	10, 715	88, 180	132, 055
COOS:								
Lumber, sawed	7	171, 000	56	....	1	24, 060	146, 705	212, 850
DOUGLAS:								
Flouring- and grist-mill products	12	74, 500	23	....	....	6, 650	98, 200	125, 560
Lumber, sawed	21	135, 900	45	....	....	15, 595	98, 767	150, 305
Tinware, copperware, and sheet-iron ware	3	19, 500	6	....	....	2, 470	3, 800	20, 600
JACKSON:								
Flouring- and grist-mill products	4	76, 000	12	....	....	7, 588	94, 597	116, 561
Lumber, planed	2	18, 000	24	....	....	15, 500	12, 000	36, 000
Lumber, sawed	9	27, 300	11	....	....	4, 190	26, 475	42, 800
Woolen goods	1	50, 000	13	8	1	9, 000	31, 600	50, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

OREGON—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
LANE:								
Flouring- and grist-mill products	6	$79, 200	19	....	....	$9, 084	$116, 079	$137, 716
Lumber, sawed	14	91, 400	23	....	1	8, 652	78, 825	109, 405
LINN:								
Flouring- and grist-mill products	10	137, 300	42	....	....	21, 771	434, 610	551, 120
Furniture	4	17, 000	7	....	....	3, 675	6, 100	23, 500
Lumber, sawed	15	87, 200	31	....	1	14, 140	69, 950	113, 000
Saddlery and harness	7	15, 000	10	....	1	5, 900	7, 800	22, 800
Woolen goods	2	102, 000	29	8	5	11, 796	36, 500	75, 195
MARION:								
Bread and other bakery products	2	8, 000	6	....	....	3, 750	20, 000	29, 500
Flouring- and grist-mill products	13	296, 400	71	....	....	44, 075	839, 683	932, 384
Foundery and machine-shop products	2	15, 000	17	....	2	13, 138	14, 500	43, 000
Lumber, sawed	18	84, 500	43	....	....	14, 760	68, 920	110, 884
Oil, linseed	1	35, 000	8	....	....	3, 550	29, 317	35, 967
Saddlery and harness	4	12, 100	11	....	....	7, 000	17, 800	30, 500
Slaughtering and meat-packing, not including retail butchering establishments.	1	4, 000	3	....	....	1, 200	19, 275	30, 000
Tinware, copperware, and sheet-iron ware	3	1, 950	8	....	....	5, 400	15, 000	27, 850
MULTNOMAH:								
Awnings and tents	1	10, 000	7	....	....	5, 000	30, 000	38, 000
Boot and shoe uppers	2	10, 500	17	....	2	10, 250	6, 500	20, 000
Boxes, wooden, packing	1	10, 000	12	....	....	7, 000	12, 000	22, 000
Bread and other bakery products	7	42, 000	38	3	7	25, 200	71, 500	119, 500
Brick and tile	7	23, 200	82	1	....	23, 400	9, 690	51, 800
Brooms and brushes	1	5, 000	9	....	....	5, 200	10, 000	20, 000
Carriages and wagons	5	23, 000	29	....	....	20, 500	32, 750	77, 000
Cheese and butter	13	147, 150	15	2	....	3, 240	10, 233	25, 608
Clothing, men's	6	34, 500	35	8	....	23, 736	45, 000	80, 000
Coffee and spices, roasted and ground	2	17, 000	1	3	....	1, 000	24, 000	31 000
Confectionery	2	25, 200	10	1	1	9, 200	32, 000	46, 000
Cooperage	4	38, 000	56	....	1	15, 700	29, 800	85, 200
Flouring- and grist-mill products	1	25, 000	4	....	....	1, 000	33, 850	42, 000
Foundery and machine-shop products	11	231, 500	150	....	6	120, 884	105, 647	294, 000
Furniture (see also Upholstering)	4	143, 400	64	3	10	46, 880	62, 200	139, 166
Gloves and mittens	1	10, 000	4	10	....	7, 200	12, 000	25, 000
Liquors, malt	4	160, 000	31	....	....	15, 669	57, 545	104, 640
Lithographing (see also Printing and publishing)	1	17, 500	10	1	2	7, 500	25, 000	55, 000
Lumber, planed (see also Sash, doors, and blinds)	1	10, 000	12	....	....	7, 800	15, 000	30, 000
Lumber, sawed	7	343, 000	81	....	1	48, 756	339, 238	450, 400
Marble and stone work	3	7, 500	12	....	....	5, 900	12, 900	26, 500
Printing and publishing (see also Lithographing)	11	59, 500	67	8	7	62, 760	35, 800	126, 300
Saddlery and harness	7	111, 500	51	....	....	36, 232	142, 000	226, 500
Sash, doors, and blinds (see also Lumber, planed)	6	163, 000	69	....	....	57, 852	120, 400	203, 150
Shipbuilding	7		32	....	....	28, 950	39, 500	71, 200
Slaughtering and meat-packing, not including retail butchering establishments.	1	12, 000	5	....	....	3, 000	22, 600	30, 000
Tinware, copperware, and sheet-iron ware	8	118, 600	39	....	....	30, 340	70, 800	132, 050
Upholstering (see also Furniture)	1	10, 000	12	....	2	10, 000	15, 000	35, 000
POLK:								
Flouring- and grist-mill products	6	46, 000	17	....	....	4, 567	130, 675	150, 585
Lumber, sawed	10	48, 500	32	....	2	10, 556	36, 380	64, 600
UMATILLA:								
Flouring- and grist-mill products	5	107, 500	8	....	....	5, 600	210, 150	238, 770
Lumber, sawed	10	59, 000	25	....	....	17, 900	58, 885	99, 145
UNION:								
Flouring- and grist-mill products	7	84, 500	16	....	....	5, 069	87, 176	104, 239
Lumber, sawed	13	55, 375	22	....	....	12, 400	31, 505	63, 699
WASCO:								
Flouring- and grist-mill products	2	18, 000	5	....	....	3, 000	17, 200	24, 750
Lumber, planed	3	17, 000	14	....	....	9, 300	7, 700	30, 500
Shipbuilding	2	23, 000	40	....	....	37, 200	72, 800	111, 500
Slaughtering and meat-packing, not including retail butchering establishments.	3	5, 800	14	....	....	8, 200	81, 952	111, 712
Tinware, copperware, and sheet-iron ware	3	5, 800	11	....	....	7, 200	10, 500	26, 500
WASHINGTON:								
Flouring- and grist-mill products	5	25, 700	13	....	....	1, 328	109, 620	120, 495
Lumber, sawed	16	57, 200	43	....	3	16, 245	43, 740	82, 100
YAM HILL:								
Flouring- and grist-mill products	10	45, 200	14	....	....	3, 025	166, 815	203, 022
Lumber, sawed	16	66, 500	26	....	1	9, 840	36, 365	63, 650

PENNSYLVANIA.

ADAMS:								
Flouring- and grist-mill products	52	$231, 266	77	....	....	$6, 921	$399, 189	$448, 509
Leather, curried	10	26, 350	6	....	....	1, 620	25, 551	32, 261
Leather, tanned	10	41, 850	12	....	1	2, 655	32, 560	43, 065
Lumber, sawed	36	30, 295	51	....	....	5, 713	47, 690	75, 791
Tobacco, cigars and cigarettes	11	29, 055	34	12	9	9, 042	14, 002	58, 428

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

PENNSYLVANIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
ALLEGHENY:								
Agricultural implements	5	$675,000	402	....	7	$167,769	$393,210	$755,150
Bags, paper	1	50,000	24	15	....	12,000	100,000	130,000
Baking and yeast powders (see also Drugs and chemicals)	3	18,000	8	7	1	7,776	27,747	57,100
Bellows	2	8,500	13	....	....	6,200	13,000	25,400
Bells	1	40,000	13	....	....	10,000	15,000	30,000
Bookbinding and blank-book making	4	9,300	18	14	1	10,405	5,600	20,345
Boot and shoe uppers	4	18,000	17	8	....	16,160	31,600	56,500
Boots and shoes	5	477,000	462	17	....	111,370	367,480	564,700
Boxes, fancy and paper	5	13,300	11	32	....	13,145	13,740	34,365
Boxes, wooden, packing	2	3,500	14	6	6	6,420	16,000	38,000
Brass and copper, rolled	2	600,000	94	....	5	80,000	432,000	640,000
Brass castings (see also Bronze castings)	13	177,700	86	....	....	38,329	96,240	181,825
Bread and other bakery products	85	492,620	248	90	25	150,481	570,837	944,806
Brick and tile (see also Drain and sewer pipe)	41	420,150	492	....	81	193,538	163,274	546,920
Bridges	3	590,000	692	....	3	339,164	648,836	1,214,932
Bronze castings (see also Brass castings)	1	16,100	9	....	....	5,489	28,581	44,464
Brooms and brushes	11	84,200	109	20	14	44,528	116,709	216,150
Carriages and wagons	21	264,800	242	....	1	132,073	175,740	421,338
Cars, railroad, street, and repairs	6	132,856	110	....	....	56,671	97,518	184,196
Clothing, men's	105	833,200	829	521	....	347,198	1,183,750	1,844,226
Clothing, women's	17	64,000	26	181	....	29,500	115,000	194,000
Coffins, burial cases, and undertakers' goods	21	599,000	283	80	1	140,232	1,255,469	1,610,141
Coke	18	325,150	169	....	2	59,485	126,994	235,915
Confectionery	12	120,700	78	54	20	66,875	190,265	327,325
Cooperage	27	668,435	632	....	102	228,374	1,112,855	1,495,770
Cordage and twine	4	25,500	22	....	7	8,700	24,141	49,500
Cork cutting	2	364,500	79	103	25	59,500	276,450	453,500
Cotton goods	3	596,935	148	461	164	138,513	435,235	734,250
Crucibles	2	270,000	42	....	....	31,500	290,000	365,000
Cutlery and edge tools (see also Hardware)	3	355,000	326	....	....	175,184	259,793	499,000
Drain and sewer pipe (see also Brick and tile)	1	20,000	16	....	....	10,000	12,000	30,000
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	11	1,298,948	462	3	32	214,942	695,410	1,114,746
Files	4	30,550	22	....	....	10,623	3,700	23,380
Fire-arms	2	35,000	32	1	....	14,000	18,500	51,400
Flouring- and grist-mill products	32	425,066	103	....	....	43,245	1,015,028	1,192,032
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	79	5,081,708	3,484	....	53	1,801,225	3,303,464	6,703,446
Fruits and vegetables, canned and preserved	2	9,000	5	4	3	4,780	7,500	35,900
Furniture (see also Upholstering)	23	506,750	390	12	12	196,607	314,251	641,338
Galvanizing	2	40,000	31	....	....	8,500	41,975	64,000
Glass	52	5,491,000	4,442	141	1,470	2,686,425	2,139,658	5,668,212
Glass, cut, stained, and ornamented	3	10,500	13	1	....	9,300	4,950	26,000
Glue	2	53,000	24	....	....	12,625	93,000	116,000
Grease and tallow	6	40,500	24	....	....	11,250	351,201	393,091
Hardware (see also Cutlery and edge tools)	11	713,566	706	11	100	294,877	616,201	1,189,857
Hardware, saddlery	1	30,000	26	20	....	27,000	50,000	110,000
Iron and steel	56	32,596,364	18,345	11	1,442	9,966,803	26,827,087	46,078,375
Iron bolts, nuts, washers, and rivets	5	455,000	458	....	52	198,709	646,943	1,027,760
Iron forgings	5	130,500	84	....	13	52,410	86,419	194,387
Iron nails and spikes, cut and wrought	2	40,100	23	....	....	9,700	100,600	142,600
Iron pipe, wrought	4	1,869,150	1,608	....	60	553,123	3,111,974	4,073,850
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	2	8,450	12	....	....	7,040	15,500	30,325
Jewelry	2	58,000	14	....	5	10,000	27,000	55,000
Lead, bar, pipe, sheet, and shot	1	300,000	60	....	....	26,000	200,000	250,000
Leather, curried	10	597,500	128	....	....	65,241	1,714,580	1,899,406
Leather, tanned	18	647,000	257	....	....	124,714	1,256,845	1,751,145
Liquors, distilled	2	323,000	31	....	....	14,500	161,000	241,213
Liquors, malt	39	1,919,608	458	....	4	225,138	1,031,880	1,876,146
Lithographing (see also Printing and publishing)	1	12,000	11	1	....	9,033	3,935	21,672
Looking-glass and picture frames	5	81,000	16	1	6	12,400	35,500	65,336
Lumber, planed (see also Wood, turned and carved)	28	704,147	389	....	9	196,839	704,292	1,207,041
Lumber, sawed	31	671,700	332	....	16	73,883	653,481	968,778
Malt	4	114,000	23	1	....	8,661	83,900	116,300
Mantels, slate, marble, and marbleized	3	50,500	29	....	....	13,180	23,592	47,470
Marble and stone work	19	140,500	157	....	....	76,707	61,758	171.017
Mineral and soda waters	3	38,000	10	....	12	8,250	13,900	33,500
Oil, lard	5	66,000	13	....	1	7,075	119,464	144,831
Oil, linseed	2	99,000	19	5	....	9,550	189,700	231,000
Oil, lubricating	6	42,500	42	2	....	25,113	241,100	311,500
Paints (see also Varnish)	10	1,162,000	309	....	4	128,523	976,616	1,366,178
Patent medicines and compounds (see also Drugs and chemicals)	5	346,000	76	59	3	47,283	322,508	740,164
Pickles, preserves, and sauces	1	62,348	32	12	....	17,861	111,434	182,532
Plated and britannia ware	2	110,300	43	29	2	30,000	42,800	88,500
Printing and publishing (see also Lithographing)	45	1,635,100	682	53	34	481,321	480,752	1,458,004
Roofing and roofing materials	8	52,000	62	....	....	29,660	54,000	113,912
Saddlery and harness	31	229,990	228	46	13	128,305	227,113	444,977
Safes, doors, and vaults, fire-proof	3	59,000	49	....	1	26,350	25,000	63,575
Salt	7	189,500	77	....	4	34,472	61,409	142,700
Shipbuilding	30	233,800	348	....	....	217,000	540,733	849,840
Show-cases	3	35,000	20	....	4	20,200	72,000	115,500
Slaughtering and meat-packing, not including retail butchering establishments.	12	753,000	113	....	19	49,799	1,423,047	1,594,816

Table V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

PENNSYLVANIA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Allegheny—continued.								
Soap and candles	17	$278, 506	74	1	1	$39, 527	$216, 168	$418, 363
Springs, steel, car, and carriage	4	296, 600	200	....	24	101, 951	329, 489	523, 995
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	2	36, 300	20	....	....	8, 074	35, 491	55, 582
Stone- and earthen-ware	4	85, 500	69	20	3	49, 450	67, 744	137, 181
Tinware, copperware, and sheet-iron ware	84	402, 550	245	64	53	153, 258	369, 506	683, 556
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	4	67, 000	48	42	1	22, 676	204, 966	301, 962
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	101	147, 620	346	24	25	144, 420	179, 499	470, 850
Trunks and valises	3	1, 800	8	....	....	4, 350	15, 150	26, 000
Upholstering (see also Furniture)	12	48, 450	39	38	2	33, 850	70, 058	155, 508
Upholstering materials	2	28, 000	16	7	....	9, 500	32, 500	54, 000
Varnish (see also Paints)	4	10, 800	12	....	....	5, 325	40, 000	61, 000
Wirework	5	9, 100	13	....	4	7, 499	14, 600	33, 400
Wood, turned and carved (see also Lumber, planed)	6	21, 800	26	....	1	16, 143	20, 279	50, 048
Woolen goods	2	95, 000	21	32	....	16, 000	70, 970	108, 000
Armstrong:								
Brick and tile	4	38, 300	36	....	8	16, 675	11, 085	36, 827
Clothing, men's	2	13, 000	6	27	....	8, 320	7, 700	29, 750
Flouring- and grist-mill products	32	237, 000	68	....	....	14, 851	413, 301	463, 239
Foundery and machine-shop products	10	33, 650	29	....	....	12, 050	13, 630	38, 340
Iron and steel	6	690, 000	395	....	50	235, 000	236, 265	668, 513
Leather, curried	10	18, 400	8	....	1	3, 291	46, 645	55, 615
Leather, tanned	12	31, 400	15	....	....	5, 230	46, 450	69, 785
Liquors, distilled	1	350, 000	85	....	....	36, 800	192, 000	325, 000
Lumber, planed	3	63, 500	45	....	....	16, 190	101, 329	146, 229
Lumber, sawed	21	131, 880	85	....	12	14, 771	107, 420	157, 770
Tools	2	18, 000	12	....	....	17, 000	18, 000	50, 000
Woolen goods	5	142, 000	35	33	4	10, 700	87, 762	121, 200
Beaver:								
Agricultural implements	2	92, 000	54	....	....	23, 017	34, 864	101, 595
Brick and tile	11	98, 900	137	....	22	41, 580	18, 706	85, 435
Bridges	1	15, 000	30	....	....	9, 000	35, 000	50, 000
Carriages and wagons	3	20, 000	22	....	....	8, 094	12, 650	25, 900
Cars, railroad, street, and repairs	1	50, 000	106	....	....	33, 600	50, 000	90, 000
Cooperage	3	88, 150	76	....	39	37, 000	48, 150	100, 500
Cordage and twine	1	175, 000	39	48	13	26, 000	150, 000	200, 000
Cutlery and edge tools (see also Hardware)	3	551, 768	360	40	33	136, 100	193, 923	444, 900
Files (see also Saws)	1	216, 000	189	15	10	86, 424	61, 867	216, 000
Flouring- and grist-mill products	22	138, 570	44	....	....	13, 885	291, 694	326, 896
Foundery and machine-shop products	4	106, 200	91	....	....	45, 100	58, 350	118, 850
Glass	4	256, 487	375	11	158	193, 000	211, 000	503, 587
Hardware (see also Cutlery and edge tools)	2	65, 000	218	2	85	83, 942	354, 200	549, 600
Iron and steel	2	290, 000	76	....	3	34, 942	107, 868	149, 101
Liquors, malt	4	22, 500	7	....	....	2, 589	11, 857	21, 576
Lumber, planed	5	78, 500	76	....	5	27, 250	157, 008	210, 429
Lumber, sawed	16	125, 000	52	....	2	7, 693	59, 584	96, 368
Saddlery and harness	9	8, 150	11	....	....	3, 626	12, 350	22, 450
Saws	1	75, 000	50	....	....	23, 490	52, 817	106, 000
Shipbuilding	1	20, 000	55	....	....	29, 100	199, 200	234, 400
Stone- and earthen-ware	7	87, 800	75	26	25	36, 900	27, 025	77, 800
Wire	1	200, 000	49	1	....	25, 000	90, 000	150, 000
Bedford:								
Brick and tile	5	32, 175	49	....	14	16, 994	8, 774	36, 850
Flouring and grist-mill products	57	280, 300	77	....	....	15, 563	453, 317	512, 092
Iron and steel	3	678, 334	116	....	4	46, 861	117, 691	216, 667
Leather, tanned	15	180, 750	98	....	....	33, 184	481, 399	690, 129
Lumber, sawed	23	49, 200	66	....	....	8, 946	49, 483	82, 190
Woolen goods	6	32, 964	26	2	1	4, 690	24, 085	33, 281
Berks:								
Agricultural implements	9	99, 812	84	....	....	24, 668	17, 880	71, 993
Boots and shoes	4	74, 600	56	12	2	17, 730	54, 280	78, 017
Boxes, cigar	4	10, 950	8	8	1	5, 180	25, 750	45, 450
Bread and other bakery products	30	41, 800	75	1	13	26, 137	78, 023	147, 280
Brick and tile	25	216, 570	219	....	97	51, 978	87, 297	197, 269
Brooms and brushes	9	8, 128	23	1	5	7, 375	16, 600	38, 900
Carpets, rag	8	6, 300	34	4	3	10, 476	12, 650	32, 243
Carriages and wagons	12	51, 800	85	....	3	26, 096	39, 000	87, 200
Clothing, men's	33	162, 091	105	111	1	45, 334	134, 777	209, 512
Confectionery	8	20, 100	16	8	3	7, 600	28, 400	49, 600
Cordage and twine	1	50, 000	11	7	10	7, 200	50, 000	75, 000
Cotton goods (see also Mixed textiles)	1	150, 000	39	124	63	38, 445	83, 334	155, 175
Flouring- and grist-mill products	155	789, 300	174	....	....	34, 229	1, 320, 305	1, 522, 821
Foundery and machine-shop products	21	762, 265	838	1	28	304, 749	546, 044	1, 019, 648
Furniture	28	125, 625	116	....	....	36, 769	69, 441	178, 382
Hardware	4	422, 363	529	12	78	182, 562	188, 241	579, 789
Iron and steel	33	5, 365, 118	2, 949	....	99	1, 123, 946	5, 409, 091	7, 730, 512
Iron forgings	1	40, 000	43	....	....	16, 816	58, 813	76, 792
Iron pipe, wrought	1	1, 000, 000	600	....	100	240, 000	2, 000, 000	3, 000, 000
Leather, curried	23	69, 747	39	1	....	12, 988	155, 381	192, 840

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

PENNSYLVANIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
CLARION:								
Flouring- and grist-mill products	33	$151, 700	30	....	....	$11, 682	$296, 397	$340, 818
Foundery and machine-shop products	8	43, 300	25	....	....	7, 650	7, 075	24, 900
Lumber, sawed	57	626, 150	393	....	9	67, 194	227, 709	390, 378
Shipbuilding	7	3, 600	17	....	....	7, 550	12, 200	28, 580
CLEARFIELD:								
Brick and tile	4	164, 900	240	....	22	93, 367	48, 150	166, 722
Cars, railroad, street, and repairs	1	15, 000	10	....	....	3, 450	20, 000	23, 450
Flouring- and grist-mill products	29	174, 587	39	....	....	11, 606	323, 503	360, 427
Foundery and machine-shop products	5	45, 200	59	....	....	22, 481	19, 266	50, 178
Leather, curried	3	51, 500	25	....	....	10, 000	251, 845	302, 100
Leather, tanned	4	69, 000	35	....	....	14, 100	225, 994	285, 250
Lumber, sawed	77	2, 086, 080	629	....	14	161, 176	683, 073	1, 168, 437
CLINTON:								
Agricultural implements	4	29, 000	29	....	....	6, 060	48, 560	85, 975
Brick and tile	3	43, 500	65	....	3	15, 150	10, 400	33, 000
Cutlery and edge tools	2	107, 000	108	....	....	37, 300	52, 000	111, 000
Flouring- and grist-mill products	17	185, 700	41	....	....	8, 520	234, 613	273, 648
Foundery and machine-shop products	6	84, 100	50	....	2	17, 550	63, 250	179, 000
Furniture	7	29, 700	18	....	....	5, 970	8, 900	26, 000
Leather, curried	4	25, 000	9	....	....	3, 000	30, 894	35, 625
Leather, tanned	4	13, 000	7	....	....	1, 725	12, 652	20, 050
Lumber, planed	3	125, 000	55	....	....	16, 375	98, 000	125, 000
Lumber, sawed	35	440, 650	292	....	25	68, 472	503, 593	712, 543
Tobacco, cigars and cigarettes	7	20, 000	28	1	2	9, 250	8, 600	28, 425
COLUMBIA:								
Cars, railroad, street, and repairs	1	25, 000	50	....	....	12, 000	80, 000	98, 000
Clothing, men's	5	14, 550	11	18	....	6, 700	11, 300	21, 500
Flouring- and grist-mill products	33	217, 700	37	....	....	8, 485	334, 131	394, 473
Iron and steel	4	575, 000	415	....	9	153, 528	419, 165	695, 644
Leather, curried	7	20, 500	8	....	....	3, 100	56, 923	65, 592
Leather, tanned	10	34, 500	15	....	....	5, 120	55, 965	79, 160
Lumber, sawed	32	49, 850	61	....	....	8, 307	33, 596	78, 879
Paper	2	70, 000	34	11	....	13, 500	37, 000	67, 000
Shipbuilding	1	5, 000	8	....	....	3, 500	18, 000	24, 000
CRAWFORD:								
Brick and tile	7	11, 900	50	....	6	10, 075	5, 350	23, 100
Carriages and wagons	3	15, 000	25	....	....	8, 195	13, 500	30, 000
Cheese and butter (factory)	45	81, 300	76	13	2	16, 100	190, 758	268, 194
Cooperage	9	22, 600	75	....	3	25, 006	100, 156	139, 537
Drugs and chemicals	1	75, 000	9	....	....	10, 000	4, 000	70, 000
Flouring- and grist-mill products	33	323, 300	78	....	....	29, 518	784, 580	882, 323
Foundery and machine-shop products	15	1, 115, 814	770	....	37	353, 375	763, 550	1, 263, 330
Furniture	7	23, 550	21	1	1	7, 400	10, 475	22, 732
Handles, wooden	5	34, 000	42	....	....	13, 040	15, 950	41, 916
High explosives	1	50, 000	40	....	....	20, 000	50, 000	100, 000
Iron and steel	1	50, 000	21	....	....	10, 941	9, 917	22, 827
Leather, curried	10	27, 986	7	....	1	2, 800	81, 228	91, 791
Leather, tanned	12	98, 186	36	....	....	12, 375	156, 470	206, 106
Liquors, malt	2	50, 000	18	....	....	4, 158	20, 790	37, 800
Lumber, planed (see also Sash, doors, and blinds)	6	65, 000	24	....	2	5, 560	35, 300	46, 300
Lumber, sawed	131	440, 400	563	1	9	88, 050	341, 318	652, 612
Marble and stone work	4	5, 300	8	....	....	3, 250	13, 100	23, 000
Printing and publishing	3	53, 000	36	....	4	18, 218	8, 454	32, 614
Saddlery and harness	22	21, 400	26	....	....	10, 466	17, 865	39, 721
Sash, doors, and blinds (see also Lumber, planed)	4	62, 500	48	....	....	17, 109	24, 370	51, 412
Tinware, copperware, and sheet-iron ware	11	22, 325	23	....	....	8, 675	11, 625	26, 850
CUMBERLAND:								
Agricultural implements	5	48, 500	43	....	6	18, 980	23, 860	53, 339
Boots and shoes	1	70, 000	28	15	....	15, 000	30, 000	48, 000
Carriage and wagon materials	3	45, 500	74	....	....	16, 500	39, 000	69, 000
Carriages and wagons	3	27, 400	39	....	....	14, 550	27, 450	55, 000
Clothing, men's	6	13, 800	16	39	....	10, 100	31, 600	48, 100
Flouring- and grist-mill products	55	532, 750	93	....	....	20, 066	567, 702	654, 627
Foundery and machine-shop products	6	61, 350	51	....	....	18, 050	22, 300	56, 000
Furniture	14	27, 025	26	....	....	4, 775	11, 525	26, 950
Iron and steel	6	760, 000	665	....	22	239, 624	414, 034	860, 400
Leather, tanned	12	70, 517	28	....	3	7, 535	69, 730	98, 844
Lumber, sawed	17	83, 700	71	2	7	14, 441	51, 825	82, 965
Paper	4	370, 000	90	119	2	61, 100	172, 925	321, 707
Saddlery and harness	12	10, 175	18	....	....	3, 190	10, 911	20, 915
Sash, doors, and blinds	4	75, 000	114	....	....	32, 260	112, 729	161, 600
Tinware, copperware, and sheet-iron ware	16	28, 385	25	....	....	6, 293	21, 550	39, 150
DAUPHIN:								
Agricultural implements	9	70, 740	38	....	1	8, 028	12, 318	34, 063
Boots and shoes	1	45, 000	31	20	....	19, 000	41, 000	75, 000
Bread and othery bakery products	36	41, 575	51	2	2	14, 108	86, 555	133, 982
Brick and tile	16	170, 263	195	....	68	53, 010	55, 322	144, 826
Brooms and brushes	3	4, 000	9	....	3	4, 422	15, 700	30, 000
Cars, railroad, street, and repairs	2	375, 000	1, 053	....	7	264, 000	1, 428, 000	1, 903, 561
Carriages and wagons	7	44, 150	66	....	....	22, 963	28, 304	60, 848
Confectionery	9	16, 000	16	2	1	7, 263	30, 050	48, 900
Cotton goods	2	251, 000	47	162	31	58, 000	160, 125	280, 250
Flouring- and grist-mill products	60	391, 000	119	....	1	25, 073	1, 026, 480	1, 338, 316

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

PENNSYLVANIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
DAUPHIN—continued.								
Foundery and machine-shop products	9	$282, 500	242	5	3	$91, 900	$172, 013	$328, 500
Furniture	19	50, 700	86			23, 547	33, 023	76, 534
Iron and steel	16	6, 368, 692	2, 425		83	976, 946	5, 714, 076	8, 383, 390
Iron forgings	1	35, 000	90			45, 300	138, 000	190, 000
Leather, curried	13	80, 800	23		2	8, 350	119, 366	154, 096
Leather, tanned	16	220, 500	56		4	18, 607	201, 810	271, 201
Liquors, distilled	3	24, 000	9			2, 800	22, 500	35, 000
Liquors, malt	4	100, 000	24			11, 160	63, 620	115, 400
Lumber, planed (see also Sash, doors, and blinds)	6	207, 500	62		2	26, 337	60, 847	111, 619
Lumber, sawed	35	453, 940	299		17	73, 486	358, 212	545, 322
Marble and stone work	8	19, 400	28		1	8, 560	15, 200	41, 800
Printing and publishing	9	172, 550	192	43	5	103, 125	294, 150	465, 920
Saddlery and harness	22	18, 565	26		1	6, 235	17, 810	36, 110
Sash, doors, and blinds (see also Lumber, planed)	1	10, 000	16			3, 000	20, 000	30, 000
Soap and candles	2	11, 000	6			1, 332	13, 685	25, 000
Tinware, copperware, and sheet-iron ware	28	41, 034	48			14, 839	39, 824	76, 600
Tobacco, cigars and cigarettes	36	35, 110	86	11	5	26, 148	43, 028	99, 500
Woolen goods	2	29, 300	9	2		2, 200	14, 315	20, 000
DELAWARE:								
Brass castings	1	60, 000	20			13, 500	50, 000	75, 000
Bread and other bakery products	15	93, 250	34	4		18, 975	61, 150	99, 950
Brick and tile	13	147, 000	216		27	61, 850	25, 920	130, 825
Carriages and wagons	7	36, 300	54			20, 650	30, 400	65, 500
Confectionery	4	10, 500	7			3, 550	22, 205	33, 500
Cotton goods (see also Mixed textiles)	21	3, 849, 000	1, 112	1, 170	716	863, 641	2, 130, 076	3, 848, 965
Cutlery and edge tools	2	17, 500	56			27, 000	21, 500	58, 000
Drugs and chemicals	1	30, 000	5			2, 665	46, 110	50, 180
Dyeing and finishing textiles	1	1, 000, 000	360	43	165	195, 000	499, 700	1, 627, 447
Dyestuffs and extracts	1	200, 000	35			17, 454	175, 000	250, 000
Flouring- and grist-mill products	35	185, 800	72			17, 404	390, 292	439, 830
Foundery and machine-shop products	4	207, 500	189			77, 217	115, 000	225, 280
Grease and tallow	1	3, 000	4			1, 820	31, 260	40, 000
Housefurnishing goods	1	30, 000	30	15	5	10, 000	10, 000	22, 000
Iron and steel	3	597, 895	485		8	174, 795	388, 666	590, 275
Iron pipe, wrought	1	300, 000	250			75, 280	563, 869	639, 149
Kaolin and ground earths	1	50, 000	25		3	10, 000	5, 000	25, 000
Leather, dressed skins	1	30, 000	50			25, 000	75, 000	114, 000
Leather, tanned	1	20, 000	20	1		11, 000	32, 000	48, 000
Lumber, sawed	13	113, 000	65		4	13, 390	98, 785	157, 660
Marble and stone work	5	14, 000	14			8, 180	13, 900	29, 900
Mixed textiles (see also Cotton goods; Woolen goods)	19	1, 634, 000	679	606	305	500, 110	1, 663, 334	2, 776, 001
Paper	6	265, 500	80	40	3	44, 300	243, 100	470, 962
Printing and publishing	5	43, 000	41	1		14, 880	14, 000	36, 900
Saddlery and harness	10	23, 700	14			5, 725	12, 400	25, 600
Sash, doors, and blinds	4	29, 500	37			10, 500	56, 000	87, 000
Shipbuilding	4	2, 005, 000	889			622, 451	1, 000, 100	1, 806, 799
Soap and candles	1	5, 000	3			1, 200	16, 000	20, 000
Tinware, copperware, and sheet-iron ware	15	60, 750	32			14, 436	33, 020	60, 750
Tobacco, cigars and cigarettes	7	16, 500	14			4, 599	11, 105	22, 341
Woolen goods (see also Mixed textiles; Worsted goods)	29	2, 542, 000	1, 249	826	520	768, 140	2, 672, 596	4, 489, 510
Worsted goods (see also Woolen goods)	2	375, 000	81	170	31	84, 290	484, 049	675, 191
ELK:								
Flouring- and grist-mill products	9	39, 200	8			1, 865	31, 610	35, 779
Leather, curried	3	10, 560	4			1, 625	16, 678	20, 987
Leather, tanned	6	1, 587, 250	470			162, 575	1, 148, 470	1, 793, 910
Lumber, sawed	34	640, 900	539			58, 796	274, 230	454, 191
ERIE:								
Agricultural implements	4	112, 000	86		5	26, 527	47, 500	136, 175
Boots and shoes	1	75, 000	76	16	8	50, 000	88, 000	150, 000
Brass castings	2	450, 000	306		24	134, 900	252, 500	502, 000
Bread and other bakery products	4	33, 000	14		2	9, 300	29, 870	60, 026
Brick and tile	13	20, 700	107		7	18, 448	12, 697	45, 905
Brooms and brushes	5	10, 375	24		8	7, 600	18, 700	32, 800
Carriage and wagon materials	1	34, 000	15			8, 212	21, 000	36, 000
Carriages and sleds, children's	1	30, 000	14		2	7, 100	10, 004	22, 000
Carriages and wagons	5	35, 500	53		3	11,425	67, 900	115, 500
Cars, railroad, street, and repairs	1	245, 550	170		30	67, 000	394, 722	503, 827
Cheese and butter (factory)	22	37, 000	28	12		5, 098	65, 021	93, 064
Clothing, men's	12	135, 500	104	150		63, 370	160, 900	266, 240
Clothing, women's	1	6, 000		40		4, 500	11, 000	20, 000
Cooperage	15	28, 905	77		8	13, 852	35, 431	58, 503
Electroplating	2	7, 000	33			12, 000	5, 500	25, 000
Flouring- and grist-mill products	36	531, 900	115			48, 821	1, 289, 013	1, 475, 154
Foundery and machine-shop products	18	1, 326, 453	1, 209		60	525, 338	1, 418, 900	2, 313, 927
Furniture	12	70, 200	57	1	1	20, 150	31, 100	82, 990
Handles, wooden	3	23, 500	40			11, 050	13, 200	31, 000
Hardware	2	41, 500	56			20, 464	32, 000	184, 464
Iron and steel	2	325, 000	229		6	97, 309	368, 076	499, 186
Iron forgings	1	28, 200	45		5	19, 275	53, 000	75, 500
Leather, curried	11	25, 700	11			3, 800	57, 037	72, 606
Leather, tanned	17	222, 000	86			33, 071	293, 005	435, 218
Liquors, malt	9	220, 500	54			26, 357	120, 345	218, 810

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

PENNSYLVANIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years	Children and youths.			
ERIE—continued.								
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	6	$380,000	82		4	$29,509	$156,200	$242,850
Lumber, sawed	102	279,920	347		22	63,624	221,947	394,701
Malt	3	158,000	47			14,829	199,631	255,588
Marble and stone work	3	19,800	13			4,544	12,453	20,890
Matches	1	116,500	15	5		7,800	46,875	62,500
Musical instruments and materials (not specified)	2	130,000	103	1	9	77,300	79,375	187,000
Paper	2	59,000	34	2	1	13,640	84,500	118,000
Printing and publishing	13	166,800	102	18	53	61,960	81,125	188,750
Pumps, not including steam pumps	7	73,500	34			11,490	33,539	57,501
Roofing and roofing materials	1	29,800	6		2	2,650	49,860	54,620
Saddlery and harness	15	41,740	26			9,190	36,985	59,205
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	11	101,400	64		2	27,080	47,478	89,460
Scales and balances	1	15,000	20			11,000	10,120	25,384
Soap and candles	1	20,000	2			1,800	16,800	22,000
Tinware, copperware, and sheet-iron ware	18	59,250	39			19,396	27,000	63,100
Tobacco, cigars and cigarettes	13	40,765	49	7	13	19,231	56,130	98,922
Washing-machines and clothes-wringers	1	125,000	50		45	30,000	125,000	200,000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	3	28,200	17		2	7,623	30,700	48,700
Wooden ware	3	120,000	119		65	64,250	99,800	196,000
Woolen goods	6	57,200	30	3	3	6,500	63,907	77,758
FAYETTE:								
Brick and tile	10	77,450	271		42	74,871	60,320	198,830
Coke	44	1,956,450	1,067	3	5	493,332	1,064,661	2,067,876
Flouring- and grist-mill products	49	234,600	71			20,262	493,747	565,717
Foundery and machine-shop products	7	107,800	95			33,738	97,316	144,740
Glass	3	171,800	310		3	137,958	84,043	361,315
Iron and steel	5	1,158,000	716		23	348,619	480,376	766,831
Kaolin and ground earths	1	4,000	20			10,000	12,000	30,000
Leather, curried	6	18,650	11			3,490	107,643	126,862
Leather, tanned	9	53,150	30			11,110	118,060	163,150
Liquors, distilled	4	137,857	35			15,000	140,500	210,000
Lumber, planed	2	39,000	30			14,500	61,000	80,000
Lumber, sawed	31	93,950	102			16,341	65,175	111,878
FOREST:								
Flouring- and grist-mill products	4	35,050	4			1,045	20,994	26,726
Leather, tanned	1	400,000	138	3	1	54,600	247,000	334,000
Lumber, sawed	20	727,100	180		1	36,027	148,903	252,905
FRANKLIN:								
Agricultural implements	6	76,800	80			26,320	30,650	83,300
Carriages and wagons	10	32,150	74			23,399	31,000	70,500
Clothing, men's	5	8,850	19	7		5,910	17,700	27,500
Flouring- and grist-mill products	83	385,772	83			14,350	818,478	902,663
Foundery and machine-shop products	6	465,200	401		1	110,765	230,185	435,960
Furniture	9	41,750	35			10,145	10,710	29,130
Iron and steel	6	383,000	209		11	48,974	179,326	320,794
Leather, curried	11	18,400	9			1,751	24,365	30,965
Leather, tanned	17	146,800	37		3	11,450	127,202	171,125
Lumber, sawed	40	82,790	68			13,308	64,546	113,272
Paper	3	61,000	44	6		14,500	72,000	98,300
Saddlery and harness	13	8,100	20			4,875	9,760	20,420
Tinware, copperware, and sheet-iron ware	13	16,800	26			6,687	23,025	37,601
Tobacco, cigars and cigarettes	7	8,100	31	1	3	6,300	9,560	23,700
Woolen goods	6	107,000	75	28	2	40,694	133,118	228,547
FULTON:								
Flouring- and grist-mill products	27	91,383	14			1,770	119,666	134,919
Leather, tanned	6	118,085	43			8,952	70,350	105,360
Lumber, sawed	8	9,450	18			3,143	19,370	27,925
GREENE:								
Carriages and wagons	2	8,500	18			5,700	12,000	24,000
Flouring- and grist-mill products	23	114,000	51			6,364	230,981	254,928
Liquors, distilled	3	133,640	12			5,250	50,000	74,500
Lumber, sawed	21	38,450	51			8,127	42,605	68,102
Stone- and earthen-ware	4	36,125	69		11	15,600	7,450	36,800
HUNTINGDON:								
Flouring- and grist-mill products	55	446,550	70	1	1	20,138	663,774	727,554
Iron and steel	7	2,065,916	419		7	102,363	455,400	668,393
Leather, curried	8	67,000	13			5,085	126,844	161,197
Leather, tanned	12	346,900	69	1		26,670	351,706	453,318
Lumber, planed	2	27,000	13			4,100	10,720	20,200
Lumber, sawed	32	110,350	84		1	14,000	108,796	152,095
Stationery goods	1	12,000	13			3,500	36,000	50,000
INDIANA:								
Brick and tile	5	43,700	129		24	42,420	11,112	70,010
Flouring- and grist-mill products	44	231,700	33			8,237	383,605	434,258
Foundery and machine-shop products	7	72,000	42			11,064	13,800	38,600
Leather, curried	10	20,857	4		1	1,700	48,374	64,104
Leather, tanned	17	37,200	20			5,945	50,139	72,400
Lumber, planed	7	49,060	28			9,328	26,700	52,913
Lumber, sawed	58	225,825	182		7	37,031	166,611	255,945
Paper	2	60,000	21			6,337	10,477	26,198
Saddlery and harness	10	14,730	15			3,430	10,925	20,705
Woolen goods	6	28,600	18	10	14	6,150	26,669	42,086

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

PENNSYLVANIA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
JEFFERSON:								
Flouring- and grist-mill products	20	$144, 350	5			$1, 000	$217, 162	$238, 675
Leather, tanned	11	18, 500	9			987	13, 044	20, 630
Lumber, sawed	76	968, 714	397	1	10	78, 745	368, 390	577, 773
JUNIATA:								
Flouring- and grist-mill products	28	143, 400	25		1	4, 283	166, 741	189, 234
Lumber, sawed	13	20, 200	24			6, 235	37, 492	53, 325
LACKAWANNA:								
Brass castings	1	31, 000	10			4, 500	8, 000	24, 000
Bread and other bakery products	12	99, 200	46	4	5	24, 408	67, 863	120, 394
Carriages and wagons	6	28, 000	41			18, 800	16, 200	45, 360
Clothing, men's	4	19, 000	9	14		3, 500	17, 500	24, 000
Clothing, women's	1	50, 000	4	300	23	90, 000	115, 000	235, 000
Coffee and spices, roasted and ground	3	18, 500	8			3, 000	26, 504	36, 424
Coffins, burial cases, and undertakers' goods	2	22, 000	30		2	12, 955	45, 588	62, 430
Confectionery	3	19, 000	14	4	2	6, 225	23, 500	34, 500
Cutlery and edge tools	2	25, 000	35			14, 625	13, 315	34, 924
Flouring- and grist-mill products	19	284, 050	39			21, 021	615, 085	684, 832
Foundery and machine-shop products	8	948, 000	554		6	224, 786	381, 221	736, 690
Furniture	13	36, 581	40	1	3	17, 040	27, 340	65, 450
Grease and tallow	3	3, 200	4			1, 285	17, 140	24, 000
Gunpowder	2	300, 000	67		3	33, 110	145, 000	294, 214
Iron and steel	4	2, 294, 000	1, 534		62	605, 953	4, 792, 978	5, 400, 085
Leather, tanned	7	320, 700	201		2	63, 600	500, 587	665, 898
Liquors, malt	4	180, 000	36			14, 992	82, 453	149, 915
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	4	73, 000	37		3	16, 873	28, 620	51, 050
Lumber, sawed	31	160, 800	162		3	33, 275	204, 055	324, 135
Marble and stone work	5	12, 900	24			9, 296	16, 761	33, 095
Oil, illuminating, not including petroleum refining	1	20, 000	30			12, 000	51, 000	89, 000
Printing and publishing	12	81, 100	91	3	34	51, 176	44, 658	117, 017
Saddlery and harness	8	20, 300	18			5, 424	20, 247	36, 836
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	1	20, 000	2			800	23, 000	25, 000
Silk and silk goods	1	36, 000	32	97	40	38, 000	155, 000	229, 500
Slaughtering and meat-packing, not including retail butchering establishments.	1	100, 000	35		2	15, 750	232, 000	265, 940
Tinware, copperware, and sheet-iron ware	17	103, 725	55		3	24, 184	51, 875	106, 485
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	1	44, 176	8	26		7, 933	75, 139	98, 672
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	11	27. 750	75	15		28, 140	47, 550	92, 450
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	2	35, 000	42			14, 000	10, 000	44, 000
LANCASTER:								
Agricultural implements	14	187, 800	162		1	45, 328	73, 366	161, 707
Boxes, cigar	12	25, 625	24	34	10	12, 779	30, 984	57, 487
Boxes, wooden, packing	3	55, 400	24			4, 886	13, 900	21, 950
Bread and other bakery products	38	45, 280	50	4	10	18, 079	90, 886	150, 971
Brick and tile	29	104, 300	212	3	42	46, 552	24, 690	100, 784
Brooms and brushes	6	19, 350	34	1	1	14, 360	25, 725	56, 760
Carpets, rag	15	16, 075	29	3	1	7, 595	18, 705	32, 430
Carriage and wagon materials	8	79, 100	89		4	31, 565	69, 460	132, 500
Carriages and wagons	31	213, 700	360	5	14	115, 351	167, 945	359, 270
Clothing, men's	20	142, 165	149	60		52, 802	153, 395	251, 895
Combs	1	25, 000	37	4		14, 444	17, 280	41, 231
Confectionery	11	92, 800	35	19	4	17, 505	45, 890	82, 010
Cork cutting	2	70, 000	29	31	21	19, 000	170, 000	196, 000
Cotton goods	5	1, 382, 000	484	737	240	298, 734	857, 505	1, 654, 132
Dyeing and finishing textiles	1	25, 000	26	2		6, 600	25, 000	46, 000
Flouring- and grist-mill products	212	1, 983, 806	336			68, 971	3, 387, 356	3, 816, 170
Foundery and machine-shop products	25	366, 130	352		5	125, 220	170, 631	402, 505
Furniture	47	169, 500	144		3	42, 553	66, 009	167, 977
Hand-knit goods	4	15, 500	14	7	5	6, 948	19, 102	29, 300
Iron and steel	18	2, 407, 500	1, 491		114	444, 305	1, 757, 828	2, 663, 223
Leather, curried	19	154, 850	58			21, 728	285, 721	346, 667
Leather, tanned	24	224, 900	86	1	1	29, 972	300, 918	391, 602
Lime	16	16, 000	47		1	6, 871	9, 284	33, 397
Liquors, distilled	5	38, 400	5			2, 000	13, 600	21, 000
Liquors, malt	15	232, 200	59		2	18, 727	112, 365	187, 275
Lumber, sawed	35	226, 350	112	2		28, 857	178, 322	250, 319
Malt	1	175, 000	14			5, 500	70, 000	82, 000
Marble and stone work	7	61, 400	28		4	11, 711	24, 349	48, 132
Paper	2	105, 000	30	9	2	15, 500	95, 000	154, 000
Printing and publishing	8	184, 200	175	17	21	68, 318	51, 967	160, 470
Saddlery and harness	49	88, 405	99			26, 798	57, 641	122, 433
Sash, doors, and blinds	5	72, 000	83			29, 210	60, 500	110, 800
Shirts	2	8, 700	8	29	1	11, 150	20, 400	39, 450
Slaughtering and meat-packing, not including retail butchering establishments.	2	20, 000	6			2, 675	53, 450	63, 675
Tinware, copperware, and sheet-iron ware	47	123, 730	110		1	41, 846	79, 835	158, 949
Tobacco, cigars and cigarettes	175	344, 216	683	222	100	191, 284	283, 920	795, 803
Watches	1	293, 000	108	73		57, 957	18, 286	98, 710
Wool hats (see also Woolen goods)	6	135, 000	186	48	24	69, 000	215, 948	332, 800
Woolen goods (see also Wool hats)	7	47, 440	30	7	6	6, 852	45, 635	57, 671

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

PENNSYLVANIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
LAWRENCE:								
Brick and tile	6	$31,000	56	....	9	$12,570	$11,280	$36,650
Clothing, men's	6	21,900	22	26	....	16,000	22,500	51,700
Coke	2	38,500	19	....	3	3,004	4,046	20,651
Flouring- and grist-mill products	11	133,200	30	....	....	12,262	302,335	327,957
Foundery and machine-shop products	5	84,500	76	....	....	25,300	55,470	98,800
Glass	2	62,000	122	....	3	46,900	42,637	102,511
Iron and steel	9	1,514,895	812	....	59	483,976	2,019,474	2,864,509
Iron pipe, wrought	1	20,000	64	....	6	26,000	120,000	148,000
Lime	3	66,000	106	....	3	22,711	21,428	58,778
Lumber, planed	2	17,981	38	....	....	9,600	14,800	28,000
Lumber, sawed	20	44,200	64	....	....	12,966	78,700	116,810
Paper	1	21,000	6	1	1	2,000	14,000	20,000
LEBANON:								
Agricultural implements	5	18,300	33	....	....	6,100	8,750	32,800
Bread and other bakery products	7	8,350	14	....	1	3,015	15,517	28,350
Carriages and wagons	9	65,300	69	....	....	16,680	26,600	52,900
Flouring- and grist-mill products	38	349,600	91	....	....	20,097	563,053	643,170
Foundery and machine-shop products	6	331,912	529	....	14	137,027	605,565	802,059
Furniture	10	36,200	36	....	....	8,470	19,150	41,550
Iron and steel	13	1,428,628	488	....	13	230,134	1,250,411	1,904,489
Leather, curried	5	12,000	4	....	....	1,236	16,790	23,275
Leather, tanned	6	48,700	14	....	....	3,291	40,925	59,200
Lumber, planed (see also Sash, doors, and blinds)	3	26,000	48	....	....	11,500	37,005	55,050
Lumber, sawed	7	25,470	16	....	2	6,800	24,559	38,650
Sash, doors, and blinds (see also Lumber, planed)	2	29,200	34	....	1	10,821	21,051	50,885
Tinware, copperware, and sheet-iron ware	8	12,400	23	....	....	7,278	19,700	36,000
Tobacco, cigars and cigarettes	16	23,405	125	13	1	19,151	92,786	136,250
LEHIGH:								
Agricultural implements	9	24,000	25	....	1	4,734	8,130	22,367
Boots and shoes	3	275,000	143	78	55	98,862	337,182	482,004
Bread and other bakery products	20	17,000	44	3	1	13,277	70,876	102,985
Brick and tile	16	156,849	164	....	53	45,281	82,436	196,066
Carriage and wagon materials	6	22,800	9	....	3	2,175	10,450	21,900
Carriages and wagons	15	85,200	100	....	1	29,360	52,860	110,690
Cars, railroad, street, and repairs	1	125,000	147	....	....	11,000	147,564	163,836
Clothing, men's	10	88,775	51	144	....	43,919	110,721	172,017
Confectionery	4	6,550	11	1	5	5,244	19,441	56,455
Fertilizers	2	37,000	5	....	2	2,150	31,900	47,775
Flouring- and grist-mill products	70	561,274	79	....	1	24,708	803,070	959,174
Foundery and machine-shop products	16	542,350	458	2	34	156,844	709,514	1,025,096
Furniture	8	85,100	85	....	5	31,114	40,952	83,681
Hosiery and knit goods	4	110,000	51	215	29	32,750	71,000	137,000
Iron and steel	9	9,514,850	2,552	....	121	890,926	5,631,985	8,578,871
Iron nails and spikes, cut and wrought	1	25,000	8	....	2	2,194	38,300	44,769
Iron pipe, wrought	1	25,415	10	....	....	5,164	16,954	29,976
Leather, curried	19	78,737	25	....	2	9,324	234,007	274,995
Leather, tanned	18	368,637	81	....	1	28,608	422,323	551,399
Liquors, malt	6	90,000	24	....	....	8,625	51,745	86,240
Lumber, sawed	15	38,560	15	....	....	3,155	26,780	43,973
Mantels, slate, marble, and marbleized	3	27,500	15	....	2	15,400	16,000	37,800
Marble and stone work	8	40,800	32	....	1	11,466	18,666	41,895
Printing and publishing	7	99,000	59	....	11	24,222	24,905	72,066
Saddlery and harness	12	15,100	13	1	2	4,426	13,525	26,126
Stationery goods	3	80,000	102	17	17	39,000	52,000	128,000
Tinware, copperware, and sheet-iron ware	15	15,700	27	....	....	7,762	13,821	31,403
Tobacco, cigars and cigarettes	36	144,175	205	71	4	65,116	146,527	258,118
LUZERNE:								
Agricultural implements	4	60,400	22	....	1	3,051	17,700	25,559
Bread and other bakery products	16	48,850	53	7	8	16,471	107,489	173,429
Brick and tile	8	33,335	80	....	4	14,680	9,235	36,820
Carriages and wagons	6	27,500	47	....	....	14,237	18,000	55,600
Clothing, men's	9	33,050	30	27	....	17,713	38,310	65,359
Clothing, women's	1	10,000	....	27	28	10,644	10,000	25,000
Coffins, burial cases, and undertakers' goods	2	61,000	41	....	....	2,630	37,500	62,200
Fire-arms	1	40,000	78	....	....	33,000	12,000	55,000
Flouring- and grist-mill products	49	420,850	81	....	....	29,823	696,273	792,840
Foundery and machine-shop products	12	498,950	419	....	....	154,338	274,434	542,960
Furniture	7	25,500	17	....	....	6,948	8,940	22,100
Gunpowder	1	300,000	14	8	....	7,000	75,000	125,000
Hosiery and knit goods	2	120,500	54	146	12	33,196	157,186	280,003
Leather, curried	4	32,550	18	....	....	6,925	94,870	122,550
Leather, tanned	9	117,700	60	....	....	20,203	202,265	262,277
Liquors, malt	6	333,000	67	....	....	30,650	162,174	278,624
Lumber, planed (see also Sash, doors, and blinds)	5	70,000	27	....	....	11,600	31,600	54,600
Lumber, sawed	63	609,500	283	....	7	81,272	336,567	542,366
Marble and stone work	2	19,500	22	....	....	5,650	7,300	31,800
Mineral and soda waters	3	15,200	9	....	....	3,575	10,500	20,625
Paper	2	24,500	26	6	....	11,463	42,500	74,800
Printing and publishing	4	10,800	30	1	....	12,372	8,970	26,500
Saddlery and harness	15	29,100	28	....	....	9,412	19,595	40,055
Sash, doors, and blinds (see also Lumber, planed)	1	20,000	26	....	4	5,000	10,000	20,000
Tinware, copperware, and sheet-iron ware	15	32,050	41	....	2	16,128	29,500	56,306

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

PENNSYLVANIA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
LUZERNE—continued.								
Tobacco, cigars and cigarettes	5	$9,700	26	....	6	$9,254	$17,246	$33,298
Wire	1	300,000	33	....	....	19,808	101,528	127,708
Wirework	2	7,000	13	....	....	4,000	12,500	22,000
LYCOMING:								
Agricultural implements	6	55,500	31	....	....	6,515	18,469	51,362
Boot and shoe findings	1	5,000	2	18	....	2,390	17,500	25,000
Boots and shoes	2	19,000	27	1	....	12,200	28,462	48,590
Bread and other bakery products	12	16,700	22	1	2	8,290	39,916	65,856
Boxes, wooden, packing	3	31,000	57	....	15	22,154	96,483	126,578
Carriages and wagons	9	21,700	35	....	....	16,025	21,300	47,262
Clothing, men's	5	40,500	27	29	....	18,371	46,000	77,000
Confectionery	6	17,500	10	2	3	3,604	22,790	32,388
Dyestuffs and extracts	1	100,000	20	....	....	7,981	29,490	86,222
Flouring- and grist-mill products	35	311,450	72	....	1	16,531	513,482	585,557
Foundery and machine-shop products	16	291,500	235	....	1	97,375	144,869	304,827
Furniture	8	206,190	227	....	22	95,749	212,338	387,645
Glue	1	82,000	20	15	....	9,860	70,000	125,000
Iron and steel	4	170,000	92	....	4	25,700	47,974	104,740
Leather, curried	11	19,500	10	....	....	3,973	36,459	47,090
Leather, tanned	21	475,500	247	....	2	94,570	885,178	1,230,444
Liquors, malt	5	91,000	14	....	1	5,228	21,422	40,232
Lumber, planed (see also Sash, doors, and blinds)	6	264,000	185	....	....	47,195	316,735	504,454
Lumber, sawed	184	3,924,688	1,996	....	117	440,960	2,559,456	3,907,069
Marble and stone work	4	13,600	34	....	....	11,900	18,562	33,600
Paints	3	13,100	8	....	....	2,900	20,650	31,800
Printing and publishing	7	66,609	77	....	17	36,673	14,400	72,350
Saddlery and harness	21	22,750	21	....	....	5,957	19,550	39,299
Sand and emery paper and cloth	1	15,000	6	15	....	4,000	20,000	30,000
Sash, doors, and blinds (see also Lumber, planed)	4	265,000	232	....	25	89,769	359,158	505,195
Tinware, copperware, and sheet-iron ware	14	26,200	22	....	1	7,590	27,725	52,425
Woolen goods	7	147,000	60	27	16	18,700	132,340	210,097
MCKEAN:								
Bread and other bakery products	5	6,350	14	4	....	3,972	14,650	23,520
Cooperage	11	18,400	106	2	....	52,858	147,600	252,618
Cutlery and edge tools (see also Tools)	3	41,000	29	....	....	23,897	24,574	78,800
Dyestuffs and extracts	1	80,000	30	....	....	18,000	8,000	32,000
Flouring- and grist-mill products	6	33,000	12	....	....	3,210	108,810	124,299
Foundery and machine-shop products	15	50,250	146	....	....	72,039	113,300	251,519
High explosives	10	26,025	38	....	....	19,837	140,783	209,220
Leather, curried	1	25,000	14	....	....	5,000	29,300	36,000
Leather, tanned	3	283,000	82	....	....	32,073	357,742	434,734
Lumber, planed	2	5,000	18	....	....	5,500	14,300	28,800
Lumber, sawed	67	696,300	664	....	2	175,158	520,537	915,763
Printing and publishing	4	37,200	61	1	2	28,392	33,940	102,460
Pumps, not including steam pumps	2	6,000	8	....	....	6,240	30,000	42,500
Saddlery and harness	5	5,300	13	....	....	3,225	31,100	52,900
Tinware, copperware, and sheet-iron ware	12	14,350	31	....	....	12,440	28,900	55,400
Tobacco, cigars and cigarettes	2	6,000	19	....	2	12,400	13,500	33,500
Tools (see also Cutlery and edge tools)	2	17,000	27	....	....	13,860	9,000	35,500
MERCER:								
Carriages and wagons	9	56,500	71	....	....	22,942	52,675	88,748
Clothing, men's	10	22,600	22	24	1	14,935	21,938	43,447
Cooperage	4	6,800	17	....	....	6,420	12,934	22,894
Flax, dressed	1	8,000	....	....	14	5,600	3,000	20,000
Flouring- and grist-mill products	37	319,300	76	....	....	18,986	579,261	652,405
Foundery and machine-shop products	12	129,800	122	....	2	40,531	73,472	152,378
Furniture	4	18,100	21	....	1	9,501	13,156	25,900
Iron and steel	18	2,725,284	1,812	....	165	896,485	3,946,881	5,832,729
Leather, curried	5	8,400	5	....	....	900	17,440	22,400
Lumber, planed	2	18,000	16	....	....	6,000	27,000	38,000
Lumber, sawed	85	260,082	354	....	9	64,690	435,413	645,640
Saddlery and harness	10	22,800	26	....	....	6,590	16,800	35,900
Tinware, copperware, and sheet-iron ware	14	28,450	35	....	....	12,220	21,200	44,600
Woolen goods	4	39,000	18	4	8	5,500	32,657	47,600
MIFFLIN:								
Carriages and wagons	4	9,900	31	....	....	6,600	8,300	21,000
Cutlery and edge tools	1	200,000	180	....	....	60,000	220,000	300,000
Flouring- and grist-mill products	22	190,100	38	....	....	9,416	240,105	285,377
Furniture	6	24,600	22	....	....	5,975	9,500	24,200
Iron and steel	4	625,000	314	....	10	149,284	590,214	990,170
Leather, curried	5	8,000	4	....	....	1,150	26,510	32,585
Leather, tanned	7	117,500	29	....	1	11,822	268,325	338,500
Lumber, sawed	10	37,350	59	....	2	9,426	50,986	81,035
Woolen goods	4	72,900	43	12	13	9,435	48,797	75,240
MONROE:								
Boot and shoe findings	1	10,000	17	14	4	7,377	11,057	22,548
Emery wheels	1	200,000	23	....	....	17,928	11,473	60,485
Flouring- and grist-mill products	31	144,790	33	....	....	7,132	265,144	306,878
Foundery and machine-shop products	3	37,000	20	....	....	7,077	5,775	20,500
Glass	1	30,000	65	....	15	25,000	36,120	80,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

PENNSYLVANIA—Continued.

Counties and industries	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
MONROE—continued.								
Leather, curried	2	$22, 500	17			$6, 000	$106, 690	$121, 800
Leather, tanned	7	523, 500	199			68, 875	856, 494	1, 051, 275
Lumber, sawed	19	455, 500	181		21	64, 676	123, 366	304, 630
Woolen goods	2	110, 000	30	41	14	18, 500	200, 600	249, 036
MONTGOMERY:								
Agricultural implements	13	256, 145	138		5	63, 770	95, 332	214, 581
Brass castings	1	25, 000	14			7, 000	60, 000	75, 000
Bread and other bakery products	20	83, 400	44	3	5	15, 781	82, 715	126, 997
Brick and tile	28	168, 100	232		41	44, 649	34, 275	135, 184
Carpets, other than rag (see also Woolen goods)	1	8, 000	21	6	15	4, 500	23, 538	35, 000
Carriages and wagons	12	63, 700	95		3	33, 883	35, 210	87, 050
Cheese and butter (factory)	7	43, 705	21	1	1	4, 844	96, 738	119, 621
Clothing, men's	14	67, 600	147	825		119, 950	941, 100	1, 107, 060
Clothing, women's	3	12, 300	6	19		2, 475	14, 000	21, 500
Confectionery	3	20, 850	10	1		5, 026	25, 800	32, 879
Cotton goods (see also Mixed textiles)	7	683, 250	209	271	163	133, 393	236, 902	423, 517
Cutlery and edge tools (see also Hardware)	4	109, 850	74		2	31, 557	31, 397	75, 908
Dyeing and finishing textiles	1	500, 000	78	15	57	50, 000	100, 000	270, 000
Fertilizers	2	33, 000	14			3, 380	26, 800	34, 680
Flouring- and grist-mill products	115	1, 004, 100	213			52, 167	1, 640, 089	1, 866, 107
Foundery and machine-shop products	18	478, 873	378		2	158, 401	207, 806	461, 052
Glass	1	100, 000	70		5	26, 000	40, 000	72, 000
Grease and tallow	5	5, 900	8			2, 189	81, 870	91, 376
Gunpowder	2	26, 000	5			1, 500	18, 000	22, 500
Hardware (see also Cutlery and edge tools)	1	80, 000	100			35, 000	110, 000	270, 000
Iron and steel	19	5, 245, 613	2, 927		46	1, 301, 610	4, 593, 563	7, 194, 821
Iron nails and spikes, cut and wrought	1	100, 000	37	13		20, 000	32, 000	55, 000
Leather, curried	11	27, 500	7			1, 530	46, 471	57, 525
Leather, tanned	11	88, 500	27		1	9, 560	92, 858	125, 431
Liquors, malt	2	25, 000	11			3, 087	16, 680	25, 724
Lumber, planed (see also Sash, doors, and blinds)	6	142, 750	92			33, 139	64, 228	110, 923
Lumber, sawed	20	60, 550	33			7, 510	61, 640	91, 004
Marble and stone work	7	36, 450	36			13, 870	22, 385	50, 750
Mixed textiles (see also Cotton goods; Woolen goods)	9	1, 190, 000	364	560	266	370, 978	1, 176, 937	2, 029, 640
Oil, linseed	4	18, 200	6			1, 135	18, 100	25, 220
Paper	6	329, 500	134	58		76, 650	298, 650	537, 230
Paving materials	1	50, 000	18			4, 000	12, 000	36, 000
Printing and publishing	7	86, 000	62		7	22, 800	25, 177	61, 404
Saddlery and harness	22	20, 850	33		1	7, 016	20, 030	41, 159
Sash, doors, and blinds (see also Lumber, planed)	6	33, 000	24			6, 057	14, 109	25, 500
Shirts	2	57, 500	52	328	32	53, 500	111, 480	205, 000
Shoddy (see also Mixed textiles)	2	35, 000	30	6	9	17, 044	90, 000	142, 000
Tinware, copperware, and sheet-iron ware	21	96, 150	63			21, 716	43, 851	88, 015
Tobacco, cigars and cigarettes	50	114, 690	378	233	95	145, 096	280, 685	475, 634
Woolen goods (see also Carpets, other than rag; Mixed textiles)	14	1, 963, 000	636	719	342	529, 058	1, 991, 362	3, 103, 641
MONTOUR:								
Flouring-and grist-mill products	11	70, 500	15		2	5, 792	119, 276	134, 794
Foundery and machine-shop products	5	115, 552	111			50, 726	107, 002	195, 932
Iron and steel	7	1, 973, 632	1, 236	1	144	473, 744	2, 110, 377	2, 751, 088
Leather, tanned	5	57, 750	18			6, 180	61, 080	76, 800
Lumber, planed	1	25, 000	30		3	7, 500	16, 000	27, 000
Lumber, sawed	4	21, 500	42			2, 220	13, 780	20, 000
NORTHAMPTON:								
Agricultural implements	8	91, 200	74		2	24, 155	34, 520	75, 048
Brass castings	2	40, 000	20			6, 042	29, 561	42, 108
Bread and other bakery products	13	60, 300	24	2		9, 376	52, 884	85, 342
Brick and tile	11	40, 980	73		18	11, 794	5, 857	28, 985
Brooms and brushes	2	10, 253	12	2	5	6, 050	18, 174	31, 683
Carriages and wagons	13	60, 300	95		1	27, 700	46, 825	96, 000
Cars, railroad, street, and repairs	1	180, 000	236		6	70, 448	497, 822	574, 270
Clothing, men's	16	26, 650	33	26		16, 787	26, 750	67, 966
Confectionery	8	12, 750	11	6	2	6, 110	14, 365	40, 800
Cordage and twine	1	90, 000	12		53	11, 000	117, 000	160, 000
Cotton goods	2	170, 000	109	150		45, 000	102, 000	175, 000
Fertilizers	1	3, 000	2			500	2, 500	25, 000
Flouring- and grist-mill products	74	669, 611	144			37, 528	1, 192, 619	1, 386, 675
Foundery and machine-shop products	10	82, 050	63			23, 470	60, 761	114, 495
Furniture	14	108, 250	103			34, 100	66, 555	128, 037
Hardware	3	69, 000	48		5	15, 248	26, 000	60, 521
Iron and steel	10	6, 375, 000	3, 078		142	1, 207, 126	6, 221, 028	9, 263, 865
Leather, curried	5	29, 250	8	1		2, 325	51, 395	63, 277
Leather, tanned	3	30, 250	7			2, 125	36, 180	45, 710
Liquors, malt	5	140, 000	33			11, 475	68, 995	114, 992
Lumber, planed	6	46, 387	51		2	16, 535	39, 950	75 225
Lumber, sawed	21	75, 050	44		5	11, 488	65, 865	103, 797
Marble and stone work	13	56, 000	65			19, 613	40, 290	88, 888
Paints	3	16, 000	10			3, 834	22, 050	32, 300
Printing and publishing	9	78, 800	102	2	29	39, 110	28, 040	94, 600
Saddlery and harness	19	53, 042	61			16, 610	35, 860	73, 390
Stationery goods	11	47, 000	142	2	14	43, 825	36, 757	95, 392
Tinware, copperware, and sheet-iron ware	24	48, 250	39		1	11, 850	22, 250	51, 920
Tobacco, cigars and cigarettes	36	31, 422	66	4	2	19, 481	31, 964	83, 688
Woolen goods	1	20, 000	6	94		3, 000	21, 555	26, 000
Zinc	1	1, 000, 000	172		8	77, 020	115, 859	227, 280
NORTHUMBERLAND:								
Boots and shoes	1	23, 400	15	1		7, 300	15, 290	26, 782
Boxes, wooden, packing	1	50, 000	8		7	6, 000	18, 000	30, 000
Carriages and wagons	6	26, 200	56		1	19, 600	19, 600	49, 500
Cars, railroad, street, and repairs	1	100, 000	353		2	115, 500	523, 470	673, 170
Flouring- and grist-mill products	39	306, 400	59			14, 942	447, 918	519, 082

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

PENNSYLVANIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
NORTHUMBERLAND—continued.								
Foundery and machine-shop products	6	$78,000	65	....	3	$21,715	$22,200	$57,600
Furniture	9	51,700	63	....	....	17,865	37,710	64,697
Iron and steel	5	745,000	490	....	23	193,949	446,768	724,559
Leather, curried	16	32,700	20	....	3	7,123	95,695	131,380
Leather goods	1	15,000	25	....	....	5,350	9,000	36,000
Leather, tanned	16	174,200	57	....	6	20,658	365,740	492,810
Lumber, planed (see also Sash, doors, and blinds)	3	38,800	37	....	15	12,870	22,500	42,500
Lumber, sawed	16	200,200	148	....	24	39,235	135,242	231,770
Sash, doors, and blinds (see also Lumber, planed)	1	25,000	45	....	5	16,000	68,000	96,000
Tinware, copperware, and sheet-iron ware	9	12,650	15	....	....	3,416	10,100	20,300
PERRY:								
Flouring- and grist-mill products	33	177,360	30	....	....	4,365	239,074	280,579
Iron and steel	5	590,000	438	....	25	174,918	544,554	786,156
Leather, curried	9	110,850	17	....	1	6,182	210,526	251,350
Leather, tanned	11	240,150	48	....	....	15,447	297,660	400,839
Lumber, planed	2	19,000	23	....	....	6,200	8,500	39,500
Lumber, sawed	27	85,750	145	....	5	38,076	197,512	285,169
PHILADELPHIA (see Table VI).								
PIKE:								
Carriage and wagon materials	2	13,000	14	....	....	3,800	8,000	22,000
Flouring- and grist-mill products	7	35,500	6	....	....	620	50,539	56,553
Leather, tanned	4	90,500	42	....	....	11,000	90,000	136,750
Lumber, sawed	21	98,900	54	....	....	7,824	46,470	70,937
Watch cases	2	23,000	70	....	2	35,000	42,000	105,000
Wood, turned and carved	2	30,500	30	....	5	11,500	12,500	27,000
POTTER:								
Cheese and butter (factory)	9	10,345	12	3	....	1,590	17,128	26,629
Flouring- and grist-mill products	9	22,800	9	....	....	1,524	70,130	72,331
Leather, tanned	2	63,487	44	....	....	15,976	155,700	184,596
Lumber, sawed	42	84,200	159	1	....	17,119	58,265	107,368
SCHUYLKILL:								
Boots and shoes	5	40,440	80	16	3	33,800	55,170	110,546
Bread and other bakery products	9	13,800	12	....	....	3,955	16,281	29,588
Carriages and wagons	6	24,300	42	....	1	14,355	13,500	37,650
Clothing, men's	24	145,500	128	158	4	57,938	137,435	236,938
Explosives and fireworks	2	13,500	5	45	31	15,065	1,980	28,782
Flouring- and grist-mill products	47	370,900	87	....	....	26,538	701,015	779,876
Foundery and machine-shop products	18	523,100	305	....	4	100,929	151,432	326,859
Furniture	18	74,700	30	....	....	10,594	13,679	33,180
Gunpowder	4	212,000	65	....	....	29,461	167,264	224,950
Leather, curried	10	15,400	2	....	....	625	22,430	27,560
Leather, tanned	12	106,100	36	1	....	11,165	103,743	141,080
Iron and steel	14	2,211,000	1,300	....	60	416,919	1,909,366	2,519,921
Iron bolts, nuts, washers, and rivets	1	105,000	43	....	5	14,500	156,000	211,000
Liquors, malt	8	272,000	78	....	....	27,730	138,650	252,093
Lumber, sawed	23	57,650	49	....	....	8,618	56,334	89,349
Printing and publishing	3	42,000	67	4	1	23,955	31,089	69,869
Saddlery and harness	10	8,850	13	....	....	4,536	11,618	25,450
Shipbuilding	3	20,000	36	....	....	13,100	38,900	59,100
Slaughtering and meat-packing, not including retail butchering establishments.	1	100,000	18	....	....	8,500	103,500	115,000
Soap and candles	4	68,378	18	....	2	6,404	29,688	48,944
Tinware, copperware, and sheet-iron ware	26	72,425	51	....	1	16,651	36,505	74,082
Tobacco, cigars and cigarettes	38	96,850	111	1	4	35,806	45,564	122,687
Tools	1	30,000	22	....	....	13,407	15,244	29,813
Wirework	6	26,500	26	....	....	8,700	30,100	49,900
SNYDER:								
Flouring- and grist-mill products	27	192,700	39	....	....	7,029	302,057	325,224
Leather, tanned	7	30,950	14	....	1	4,735	51,375	92,460
Lumber, sawed	22	55,700	60	....	4	13,738	75,560	128,896
SOMERSET:								
Brick and tile	1	80,000	25	....	25	16,800	9,500	45,000
Cheese and butter (factory)	7	48,500	16	4	....	4,850	43,088	61,016
Flouring- and grist-mill products	46	154,490	31	....	....	5,321	323,221	353,792
Furniture	12	21,904	16	....	1	3,336	10,334	20,821
Leather, curried	17	19,630	4	....	....	584	18,005	22,449
Leather, tanned	18	42,425	16	....	....	4,450	27,879	44,281
Lumber, sawed	101	275,400	324	....	6	35,238	166,000	289,661
Woolen goods	8	49,500	37	9	15	7,730	25,774	38,205
SULLIVAN:								
Flouring- and grist-mill products	8	31,900	10	....	....	2,000	78,395	83,507
Leather, tanned	4	652,000	236	....	....	78,495	613,000	823,600
Lumber, sawed	32	147,745	78	....	....	10,784	38,227	70,810
SUSQUEHANNA:								
Agricultural implements	3	52,677	46	....	....	13,300	14,580	38,836
Cheese and butter (factory)	2	5,300	3	2	1	800	13,103	21,095
Drugs and chemicals	2	44,900	17	....	....	5,375	8,200	34,369
Flouring- and grist-mill products	39	161,000	57	....	1	10,256	291,408	332,822
Furniture	16	29,645	36	9	2	13,605	13,455	43,172

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

PENNSYLVANIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
SUSQUEHANNA—continued.								
Leather, curried	4	$103, 750	47			$18, 600	$317, 409	$412, 975
Leather, tanned	18	1, 099, 050	361			123, 424	1, 513, 246	1, 978, 579
Lumber, sawed	91	222, 150	257		3	43, 171	154, 538	282, 107
Sash, doors, and blinds	2	23, 000	6			2, 100	18, 800	30, 000
Tinware, copperware, and sheet-iron ware	8	41, 150	18			6, 850	25, 220	60, 550
Toys and games	2	44, 000	125	5		27, 250	21, 000	101, 000
Woolen goods	4	33, 000	9	9	3	2, 775	12, 952	21, 930
TIOGA:								
Coke	1	50, 000	69		4	25, 321	68, 411	100, 716
Flouring- and grist-mill products	22	133, 600	50			11, 991	245, 915	292, 157
Furniture	7	65, 900	35	7		10, 898	17, 291	37, 589
Glass	2	66, 000	43		2	23, 000	29, 515	54, 000
Leather, tanned	13	754, 000	326		1	112, 312	1, 488, 113	1, 879, 128
Lumber, sawed	86	469, 900	479		2	74, 794	312, 183	506, 035
Sash, doors, and blinds	4	36, 000	40			12, 300	14, 500	34, 600
UNION:								
Agricultural implements	2	63, 000	55			11, 000	22, 010	55, 700
Carriages and wagons	7	7, 050	24			3, 945	11, 025	22, 580
Flouring- and grist-mill products	16	146, 500	25		1	5, 318	178, 528	215, 952
Iron and steel	1	125, 000	24		4	7, 368	50, 303	93, 760
Leather, tanned	7	18, 500	9			1, 585	12, 220	23, 700
Lumber, planed	1	10, 000	18			5, 000	11, 597	20, 000
Lumber, sawed	11	96, 200	58			11, 906	65, 278	117, 331
Shipbuilding	1	44, 000	20			6, 050	44, 000	50, 600
Woolen goods	1	87, 500	29	18		14, 564	64, 369	128, 036
VENANGO:								
Bread and other bakery products	1	3, 700	[illegible]		1	3, 912	24, 046	30, 345
Carriages and wagons	5	22, 000	27		2	16, 559	14, 700	38, 070
Flouring- and grist-mill products	22	152, 400	38			16, 828	363, 847	409, 527
Foundery and machine-shop products	12	276, 946	356		4	126, 739	183, 399	485, 988
Liquors, malt	4	40, 000	10			3, 700	18, 316	33, 302
Lumber, planed	2	11, 500	19			9, 400	20, 000	34, 600
Lumber, sawed	25	80, 650	125			19, 225	84, 745	135, 095
Tinware, copperware, and sheet-iron ware	5	102, 950	119	15		44, 650	86, 996	142, 685
WARREN:								
Clothing, men's	3	7, 500	23			9, 600	11, 000	25, 900
Flouring- and grist-mill products	15	94, 150	30			7, 825	145, 398	165, 065
Foundery and machine-shop products	3	28, 000	18			8, 350	24, 000	48, 000
Furniture	4	31, 400	22			9, 850	8, 700	27, 500
Leather, curried	4	106, 750	21			4, 000	257, 075	274, 005
Leather, tanned	12	1, 518, 750	639			214, 305	1, 697, 588	2, 392, 194
Lumber, sawed	125	725, 980	788	1	38	141, 247	552, 516	862, 026
Patent medicines and compounds	2	35, 300	12	16		7, 925	21, 300	41, 200
Saddlery and harness	7	17, 200	13			5, 925	13, 900	24, 500
Sash, doors, and blinds	2	85, 000	48			13, 500	57, 000	76, 000
Tinware, copperware, and sheet-iron ware	4	12, 500	14			9, 050	12, 800	29, 500
Tobacco, cigars and cigarettes	8	18, 500	40	2	2	23, 100	21, 350	51, 625
Wooden ware	1	30, 000	35			16, 800	20, 000	51, 000
WASHINGTON:								
Brooms and brushes	1	8, 200	10		5	5, 000	10, 000	25, 000
Carriages and wagons	4	93, 200	67			24, 550	52, 250	99, 484
Clothing, men's	15	53, 320	51			41, 150	89, 000	155, 300
Flouring- and grist-mill products	53	229, 776	80			13, 350	493, 434	547, 333
Foundery and machine-shop products	6	26, 000	19			6, 695	11, 020	23, 650
Leather, curried	6	15, 600	4			1, 675	24, 756	33, 810
Leather, tanned	6	20, 100	6			2, 225	20, 610	29, 050
Liquors, distilled	5	43, 200	5			2, 200	21, 200	31, 700
Lumber, planed	3	38, 500	24			8, 400	33, 825	48, 600
Lumber, sawed	36	147, 888	61		2	12, 714	80, 206	128, 603
Marble and stone work	4	17, 500	13			7, 200	6, 500	21, 300
Paper	1	25, 000	33	1	4	11, 836	39, 000	59, 330
Saddlery and harness	17	10, 600	20			5, 769	19, 656	35, 850
Shipbuilding	11	58, 000	96			54, 710	164, 980	234, 520
Tinware, copperware, and sheet-iron ware	6	19, 100	13			5, 040	13, 100	27, 600
Tobacco, cigars and cigarettes	5	10, 000	10			6, 100	14, 785	29, 923
Woolen goods	3	27, 500	14	7		1, 775	22, 604	27, 850
WAYNE:								
Boots and shoes	1	28, 000	43	2		20, 200	54, 900	92, 000
Clothing, men's	4	32, 500	15	14		8, 500	20, 000	36, 000
Cutlery and edge tools	1	12, 000	17			8, 000	6, 000	20, 000
Flouring- and grist-mill products	26	162, 010	42			12, 079	242, 768	286, 706
Glass	2	230, 000	214	14	84	104, 000	71, 294	257, 000
Handles, wooden	4	34, 575	44			13, 875	19, 895	51, 200
Leather, tanned	15	1, 386, 300	421			150, 685	1, 206, 470	1, 754, 950
Liquors, malt	2	35, 000	10			3, 300	18, 125	32, 935
Lumber, sawed	90	529, 371	463			77, 459	249, 691	437, 312
Shipbuilding	7	21, 100	51			21, 256	36, 600	65, 450
Tinware, copperware, and sheet-iron ware	7	27, 200	18			7, 348	18, 100	36, 025
Tobacco, cigars and cigarettes	2	8, 000	13		4	3, 680	14, 000	40, 000
Woolen goods	3	56, 000	22	16	6	11, 800	58, 650	83, 710

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

PENNSYLVANIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
WESTMORELAND:								
Boots and shoes	1	$5,500	18	3	....	$7,800	$9,000	$22,000
Brick and tile	17	168,350	259	....	79	92,650	47,727	233,305
Carriages and wagons	6	35,230	41	....	....	18,840	14,207	45,955
Cars, railroad, street, and repairs	2	75,500	70	....	....	38,000	122,000	175,000
Clothing, men's	14	20,960	29	32	1	17,875	36,730	73,160
Coke	23	1,578,625	881	....	37	331,075	726,863	1,410,946
Flouring- and grist-mill products	55	396,730	74	....	....	17,704	596,336	674,085
Foundery and machine-shop products	6	24,054	25	....	1	9,844	14,180	38,526
Iron and steel	2	307,000	198	....	12	130,686	284,249	582,792
Leather, curried	11	10,790	2	....	1	939	20,055	25,795
Leather, tanned	13	39,800	19	....	....	5,186	35,011	51,640
Liquors, distilled	6	372,700	61	....	....	27,500	311,450	458,000
Liquors, malt	3	15,000	6	....	....	2,725	15,296	27,160
Lumber, planed	7	51,000	66	....	2	21,760	75,000	210,900
Lumber, sawed	21	85,750	81	....	3	13,615	71,900	112,857
Paper	4	276,000	146	14	19	55,387	225,000	395,280
Saddlery and harness	14	20,250	19	....	....	5,150	20,566	37,600
Salt	6	29,000	41	....	2	13,675	10,453	27,050
Tinware, copperware, and sheet-iron ware	13	20,325	26	....	....	10,375	23,100	38,475
Woolen goods	6	57,000	17	6	1	2,351	17,059	23,828
WYOMING:								
Flouring- and grist-mill products	23	229,400	33	....	....	7,586	318,335	388,634
Leather, curried	3	36,500	23	....	....	9,192	366,908	398,250
Leather, tanned	6	177,150	102	....	1	31,391	465,650	754,230
Liquors, malt	2	38,000	12	....	....	3,915	22,326	38,525
Lumber, sawed	42	123,400	101	....	....	16,108	60,804	106,671
YORK:								
Agricultural implements	9	368,000	380	....	35	134,530	340,235	553,208
Boots and shoes	1	50,000	30	15	....	21,000	58,100	90,000
Boxes, cigar	13	11,500	19	11	9	4,477	14,753	25,614
Bread and other bakery products	13	37,810	36	1	3	11,542	56,470	82,620
Brick and tile	21	33,850	103	....	33	23,337	12,898	49,770
Carpets, rag	2	25,000	41	....	17	14,400	51,092	66,500
Carriages and wagons	8	43,243	58	....	5	20,196	19,834	50,731
Cars, railroad, street, and repairs	2	100,000	207	....	....	63,193	310,432	410,750
Clothing, men's	9	30,450	25	42	1	15,462	49,715	75,317
Confectionery	6	20,500	10	6	....	2,104	11,379	21,414
Cotton goods	1	30,000	13	35	23	10,000	10,602	25,000
Dyestuffs and extracts	1	40,000	16	....	....	6,000	50,000	75,000
Fertilizers	2	11,500	2	....	....	465	25,650	32,200
Flavoring extracts	2	22,800	30	....	2	8,524	28,080	41,000
Flouring- and grist-mill products	136	717,650	160	....	....	31,482	1,262,692	1,413,364
Foundery and machine-shop products	9	220,700	204	....	25	81,490	154,692	315,690
Furniture	23	43,300	47	....	....	12,601	20,487	48,900
Iron and steel	3	225,000	35	....	....	11,505	54,533	100,000
Leather, curried	18	59,075	11	....	....	3,605	91,970	114,085
Leather, tanned	22	180,930	46	....	1	15,851	193,544	263,907
Lime	9	24,335	39	....	....	14,650	20,425	41,403
Liquors, distilled	5	53,256	7	....	....	3,200	31,500	47,206
Liquors, malt	5	26,500	7	....	2	2,641	13,203	24,006
Lumber, planed (see also Sash, doors, and blinds)	3	66,400	41	5	1	14,009	31,743	63,073
Lumbere, sawed	40	167,800	114	....	3	26,258	150,390	213,269
Marble and stone work	10	15,100	19	....	....	4,870	12,025	24,228
Matches	1	15,000	6	29	....	7,738	50,262	65,000
Paper	2	165,000	33	68	....	25,000	128,700	250,000
Printing and publishing	8	56,000	54	....	14	18,420	24,450	64,100
Saddlery and harness	30	22,425	33	....	3	7,744	20,540	42,363
Sash, doors, and blinds (see also Lumber, planed)	2	69,000	50	1	....	18,700	40,580	70,400
Soap and candles	2	22,000	10	....	....	3,560	26,260	38,241
Tinware, copperware, and sheet-iron ware	34	45,660	50	....	2	13,601	40,330	74,800
Tobacco, cigars and cigarettes	153	211,114	424	203	50	121,936	280,988	504,176
Whips	3	35,000	40	8	6	15,100	33,400	65,500
Woolen goods	6	36,000	19	9	7	5,939	26,767	39,600

RHODE ISLAND.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
BRISTOL:								
Boxes, fancy and paper	1	$1,500	4	16	....	$6,000	$9,000	$20,000
Bread and other bakery products	4	9,500	9	....	....	4,768	11,060	22,480
Brick and tile	1	100,000	195	....	....	32,000	24,000	75,000
Cotton goods	5	1,458,000	438	514	258	279,966	761,394	1,326,092
Flouring- and grist-mill products	1	50,000	10	....	....	5,000	70,500	82,500
Foundery and machine-shop products	2	16,500	25	....	....	15,675	9,500	51,750
Rubber and elastic goods	1	700,000	670	320	....	305,715	1,600,000	2,180,000
Shipbuilding	3	47,300	74	....	....	45,980	61,960	135,340
KENT:								
Bread and other bakery products	3	27,000	13	....	....	5,420	24,634	35,192
Cotton goods	19	3,257,928	1,423	1,419	847	787,999	1,812,596	3,266,748
Drugs and chemicals	3	24,000	10	....	....	3,450	11,300	21,300
Dyeing and finishing textiles	6	1,890,000	864	212	201	456,988	1,009,803	3,571,000
Flouring- and grist-mill products	13	41,000	9	....	....	2,677	95,856	105,551

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

RHODE ISLAND—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
KENT—continued.								
Foundery and machine-shop products	5	$264, 000	208	2		$89, 366	$146, 880	$274, 780
Lumber, sawed	13	30, 700	25			3, 645	20, 184	34, 325
Woolen goods	5	590, 000	259	82	56	110, 016	662, 295	940, 960
NEWPORT:								
Bread and other bakery products	3	36, 000	19		1	19, 600	28, 625	59, 175
Clothing, men's	6	22, 500	18	21	2	11, 578	22, 618	45, 231
Cotton goods	2	240, 000	74	163	53	64, 112	142, 144	252, 990
Flouring- and grist-mill products	6	26, 300	8			1, 943	35, 500	42, 125
Furniture	7	37, 500	60	9	3	36, 109	73, 667	126, 932
Printing and publishing	4	34, 000	26	1	4	9, 272	7, 275	20, 225
Sash, doors, and blinds	3	56, 500	27			12, 800	19, 000	37, 500
Shipbuilding	9	21, 400	155			93, 805	132, 515	228, 370
Tinware, copperware, and sheet-iron ware	4	31, 500	15	1		11, 300	16, 700	36, 600
PROVIDENCE:								
Belting and hose, leather	4	74, 000	27		1	12, 250	83, 925	130, 150
Bookbinding and blank-book making	7	52, 400	44	26	1	27, 935	28, 800	86, 500
Boot and shoe findings	2	20, 000	22	11	12	7, 324	37, 250	54, 500
Boots and shoes, rubber	2	325, 000	508	130	51	225, 025	1, 031, 339	1, 455, 420
Boxes, fancy and paper	4	42, 400	28	112	2	53, 990	47, 851	115, 665
Boxes, wooden, packing	6	69, 800	76		1	30, 034	89, 396	151, 000
Brass castings	10	105, 900	63			33, 080	119, 930	182, 163
Bread and othery bakery products	36	184, 100	244	26		124, 005	482, 402	729, 906
Bridges	2	50, 000	28			12, 800	15, 993	58, 294
Brooms and brushes	10	23, 000	30	28	2	15, 008	31, 585	58, 700
Cardboard	2	100, 000	33	8	15	26, 378	172, 644	271, 441
Carriages and wagons	47	149, 505	164		1	85, 371	114, 910	271, 659
Clothing, men's	44	846, 377	424	556	35	401, 639	1, 097, 906	1, 900, 499
Clothing, women's	7	21, 400	6	59		18, 555	94, 825	137, 880
Coffee and spices, roasted and ground	5	42, 000	19			10, 676	121, 536	156, 194
Coffins, burial cases, and undertakers' goods	11	47, 000	47	4	1	23, 458	54, 923	109, 293
Collars and cuffs, paper	1	15, 000	4	16		7, 000	96, 000	126, 000
Confectionery	9	25, 800	29	12	4	17, 809	52, 988	102, 950
Cooperage	3	20, 732	27		2	14, 884	27, 150	60, 560
Corsets	2	8, 000	6	39	10	13, 500	15, 200	39, 850
Cotton goods (see also Mixed textiles)	83	22, 520, 574	5, 841	6, 911	2, 713	4, 120, 961	9, 512, 335	17, 912, 515
Cotton ties	1	8, 000	35			10, 990	65, 220	101, 613
Cutlery and edge tools (see also Hardware)	4	25, 550	45			15, 889	16, 660	45, 360
Drugs and chemicals (see also Patent medicines and compounds)	8	443, 500	225	70		137, 524	570, 536	821, 828
Dyeing and finishing textiles	10	4, 022, 560	1, 282	218	199	636, 739	1, 245, 259	3, 303, 254
Dyestuffs and extracts	4	144, 000	40			19, 195	162, 500	221, 705
Electroplating	10	65, 600	58	1	2	36, 162	136, 372	208, 164
Enameling	9	123, 000	93	45	9	44, 816	59, 263	136, 175
Engraving and die-sinking	24	17, 900	52	5	10	34, 941	6, 423	76, 764
Fancy articles	4	21, 500	25	6	2	11, 367	35, 084	70, 382
Files	9	540, 600	484	11	25	206, 220	226, 525	659, 178
Fire-arms	1	360, 000	553		23	264, 248	550, 785	991, 111
Flouring- and grist-mill products	14	441, 800	68			35, 363	741, 291	862, 313
Foundery and machine-shop products	82	4, 438, 067	4, 028	107	74	1, 905, 432	2, 483, 999	5, 757, 094
Furniture (see also Mattresses and spring beds; Upholstering)	16	220, 750	316	7	2	165, 850	416, 084	691, 705
Gas and lamp fixtures	3	91, 000	46	9	6	26, 500	34, 600	86, 600
Glass, cut, stained, and ornamented	2	11, 000	9	18		7, 936	7, 600	23, 140
Gold and silver, reduced and refined, not from the ore	6	138, 000	25			18, 627	1, 366, 471	1, 421, 100
Grease and tallow	1	10, 000	10			5, 700	75, 000	85, 700
Hairwork	7	21, 050		18	2	5, 300	18, 930	34, 945
Hardware (see also Cutlery and edge tools)	7	164, 800	217		9	101, 059	93, 484	254, 243
Hooks and eyes	2	250, 188	40	31	8	26, 738	85, 086	118, 278
Iron and steel	3	630, 000	200		75	130, 969	375, 347	488, 040
Iron bolts, nuts, washers, and rivets	1	130, 000	83		4	33, 562	86, 761	165, 880
Iron nails and spikes, cut and wrought	1	105, 000	6		4	5, 000	60, 000	134, 000
Iron pipe, wrought	3	125, 000	150			82, 412	172, 375	275, 222
Ivory and bone work	4	36, 000	60	6	2	35, 230	17, 375	72, 667
Jewelry	148	2, 836, 620	2, 568	714	188	1, 688, 616	2, 590, 611	5, 650, 133
Lapidary work	7	22, 000	39	2	2	16, 682	11, 200	42, 333
Lead, bar, pipe, sheet, and shot	2	65, 000	83		5	52, 092	110, 350	200, 563
Leather, curried	3	71, 400	29			15, 476	186, 250	227, 125
Leather goods	3	45, 600	38		3	19, 420	63, 950	96, 815
Leather, tanned	4	368, 600	113			55, 694	509, 370	638, 000
Liquors, malt	3	160, 000	88			38, 785	233, 052	392, 163
Lithographing (see also Printing and publishing)	2	80, 000	37	5	1	31, 760	34, 929	109, 642
Looking-glass and picture frames	10	38, 200	25	2	2	13, 151	39, 260	72, 745
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	6	84, 000	63			28, 309	23, 910	69, 912
Lumber, sawed	19	92, 000	89		13	26, 136	83, 915	175, 310
Marble and stone work	32	336, 200	340	1	5	148, 067	100, 615	350, 100
Mattresses and spring beds (see also Furniture)	4	29, 700	21	6		9, 356	80, 260	113, 656
Mineral and soda waters	5	22, 400	20		1	7, 809	17, 340	46, 375
Mixed textiles (see also Cotton goods; Woolen goods)	8	1, 071, 000	540	429	94	320, 121	997, 002	1, 696, 762
Models and patterns	6	16, 500	26		1	16, 089	16, 280	42, 432
Oil, cottonseed and cake	1	125, 000	32	3		14, 899	415, 820	458, 085
Paints	2	58, 000	7		1	4, 167	50, 000	69, 800

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

RHODE ISLAND—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed: Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
PROVIDENCE—continued.								
Patent medicines and compounds (see also Drugs and Chemicals)	23	$473, 500	105	23	6	$71, 909	$329, 864	$770, 442
Paving materials	2	252, 000	55	...	...	19, 500	47, 000	98, 000
Plated and britannia ware (see also Silverware)	2	1, 025, 000	310	15	...	189, 200	611, 300	972, 000
Printing and publishing (see also Lithographing)	23	302, 450	356	17	64	261, 542	204, 220	629, 150
Rubber and elastic goods	1	10, 000	17	...	...	8, 000	17, 000	37, 000
Saddlery and harness	39	63, 550	97	17	2	46, 294	71, 266	164, 377
Safes, doors, and vaults, fire-proof	2	132, 000	14	...	...	8, 480	10, 100	29, 090
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	6	87, 000	98	...	10	43, 711	151, 080	239, 949
Screws	1	3, 250, 000	467	356	241	239, 157	504, 684	1, 367, 672
Sewing machines and attachments	2	61, 000	17	...	...	11, 560	37, 000	112, 960
Shipbuilding	8	152, 500	83	...	...	51, 077	57, 883	133, 331
Shoddy (see also Mixed textiles)	4	48, 000	44	26	6	17, 290	131, 754	187, 045
Silverware (see also Plated and britannia ware)	2	83, 000	42	...	...	18, 448	66, 280	111, 000
Slaughtering and meat-packing, not including retail butchering establishments.	9	598, 000	178	...	7	97, 362	3, 449, 816	3, 876, 740
Soap and candles	8	39, 136	15	...	...	5, 398	83, 325	100, 850
Starch	1	30, 000	4	...	...	2, 000	60, 000	75, 000
Stationery goods	4	24, 300	21	6	...	16, 898	23, 910	56, 425
Tinware, copperware, and sheet-iron ware	57	162, 400	238	2	3	129, 633	226, 023	483, 240
Tobacco, cigars and cigarettes	42	43, 375	102	68	1	49, 814	84, 522	179, 402
Trunks and valises	4	23, 200	14	...	4	7, 321	14, 937	36, 246
Upholstering (see also Furniture)	5	6, 100	7	3	...	4, 505	26, 978	42, 210
Upholstering materials	2	28, 000	77	6	32	25, 781	36, 000	69, 500
Washing-machines and clothes-wringers	1	75, 000	62	...	3	17, 685	124, 024	220, 986
Watch and clock materials	3	13, 500	55	18	8	24, 645	18, 750	62, 750
Watch cases	1	100, 000	28	...	2	26, 019	49, 560	123, 900
Wire	1	15, 000	10	40	...	15, 000	45, 000	73, 000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	8	58, 000	106	...	25	51, 263	52, 200	133, 900
Woolen goods (see also Mixed textiles; Worsted goods)	25	5, 793, 700	3, 032	1, 798	856	1, 783, 866	6, 252, 488	10, 477, 736
Worsted goods (see also Woolen goods)	11	4, 567, 416	1, 559	1, 739	706	1, 222, 350	3, 941, 383	6, 177, 754
WASHINGTON:								
Bread and other bakery products	5	13, 500	16	2	2	4, 596	14, 417	22, 435
Carriages and wagons	4	32, 000	28	...	...	9, 650	15, 350	29, 600
Cordage and twine	2	25, 000	24	...	...	7, 950	48, 000	70, 000
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	24	1, 784, 232	695	560	167	370, 895	1, 071, 680	1, 851, 116
Flouring- and grist-mill products	14	20, 500	10	...	...	1, 887	38, 714	45, 501
Foundery and machine-shop products	5	105, 300	150	...	1	61, 670	47, 105	198, 083
Hosiery and knit goods (see also Cotton goods; Woolen goods)	1	6, 000	6	24	9	8, 400	14, 838	36, 000
Lumber, planed	2	56, 000	21	...	...	8, 500	39, 000	65, 000
Lumber, sawed	17	21, 550	25	...	...	3, 362	16, 789	30, 944
Mixed textiles (see also Cotton goods; Woolen goods)	8	520, 000	277	234	69	167, 947	523, 097	1, 022, 060
Shipbuilding	2	6, 500	6	...	...	3, 800	14, 500	20, 000
Woolen goods (see also Mixed textiles)	20	2, 065, 000	1, 021	768	249	587, 025	2, 223, 646	3, 991, 754

SOUTH CAROLINA.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ABBEVILLE:								
Flouring- and grist-mill products	35	$95, 800	63	...	...	$9, 267	$264, 379	$305, 626
Lumber, sawed	18	19, 950	42	...	...	4, 791	19, 935	38, 818
AIKEN:								
Cotton goods	2	1, 900, 000	395	437	301	235, 454	1, 029, 704	1, 630, 037
Flouring- and grist-mill products	33	43, 200	48	...	...	4, 992	82, 589	98, 999
Lumber, sawed	25	35, 100	59	...	...	5, 750	19, 300	38, 791
ANDERSON:								
Cotton goods	1	40, 000	19	26	11	7, 000	31, 000	52, 000
Flouring- and grist-mill products	39	80, 645	41	...	...	6, 680	153, 072	177, 039
Lumber, sawed	20	41, 700	40	...	...	3, 443	28, 180	45, 043
BARNWELL:								
Flouring- and grist-mill products	40	64, 200	58	...	...	6, 769	97, 933	116, 223
Lumber, sawed	22	40, 000	70	...	2	8, 553	36, 938	67, 200
BEAUFORT:								
Fertilizers	5	485, 300	904	...	1	190, 288	271, 694	564, 446
Flouring- and grist-mill products	8	13, 300	16	...	...	1, 921	33, 772	40, 623
Lumber, sawed	2	45, 000	10	...	...	2, 500	22, 943	32, 500
CHARLESTON:								
Bagging, flax, hemp, and jute	1	100, 000	35	66	8	23, 473	96, 736	148, 000
Bags, other than paper	1	7, 500	1	10	5	1, 100	35, 000	40, 000
Bread and other bakery products	10	59, 850	65	...	16	28, 695	120, 860	172, 185
Clothing, men's	6	40, 100	35	4	4	11, 500	25, 700	47, 300
Cotton compressing	4	530, 000	230	...	...	62, 900	65, 000	198, 000
Fertilizers	20	2, 941, 000	1, 471	10	69	350, 259	1, 015, 231	2, 066, 662
Flouring- and grist-mill products	9	64, 100	36	...	...	14, 345	211, 750	249, 010
Foundery and machine-shop products	5	111, 700	177	...	28	59, 150	96, 100	174, 900
Liquors, malt	1	75, 000	6	...	...	2, 917	13, 446	22, 240
Lumber, planed	6	82, 000	167	...	34	35, 450	121, 950	189, 000
Lumber, sawed	12	166, 700	77	...	15	31, 582	184, 159	334, 150
Marble and stone work	5	14, 700	16	...	4	10, 900	17, 000	34, 000
Mineral and soda waters	3	4, 500	13	...	...	4, 059	7, 800	20, 250
Printing and publishing	10	116, 700	144	33	8	88, 772	80, 150	249, 320
Saddlery and harness	6	5, 150	19	...	4	9, 030	27, 001	43, 650

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

SOUTH CAROLINA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
CHARLESTON—continued.								
Shipbuilding	15	$45, 300	89	....	....	$53, 490	$54, 350	$140, 600
Tar and turpentine, not including farm products	25	93, 800	1, 203	11	25	134, 516	82, 330	369, 525
Tinware, copperware, and sheet-iron ware	10	7, 300	35	....	3	9, 296	16, 576	36, 176
Tobacco, cigars and cigarettes	8	8, 600	33	....	1	13, 411	9, 240	30, 520
Upholstering	4	13, 400	11	4	....	6, 000	30, 420	49, 600
CHESTER:								
Flouring- and grist-mill products	18	44, 000	28	....	....	4, 467	132, 932	151, 301
CHESTERFIELD:								
Tar and turpentine, not including farm products	22	47, 100	425	1	6	60, 412	46, 300	162, 300
CLARENDON:								
Flouring- and grist-mill products	13	16, 500	11	....	....	1, 452	21, 621	26, 146
Lumber, sawed	5	11, 500	24	....	....	3, 750	24, 900	39, 660
Tar and turpentine, not including farm products	11	39, 950	292	....	....	41, 762	15, 650	98, 892
COLLETON:								
Fertilizers	2	65, 000	300	....	....	36, 000	10, 154	59, 405
Lumber, sawed	12	44, 000	70	....	....	14, 540	67, 566	101, 405
Tar and turpentine, not including farm products	9	25, 890	286	35	10	51, 366	38, 400	120, 000
DARLINGTON:								
Flouring- and grist-mill products	19	33, 500	31	....	....	3, 993	117, 921	133, 172
Lumber, sawed	13	19, 600	45	....	....	5, 818	28, 543	48, 558
Tar and turpentine, not including farm products	12	25, 600	148	....	....	27, 392	35, 543	88, 200
EDGEFIELD:								
Flouring- and grist-mill products	42	82, 050	60	....	....	7, 054	163, 589	191, 300
Lumber, sawed	18	33, 700	79	....	2	13, 200	89, 170	126, 875
FAIRFIELD:								
Flouring- and grist-mill products	10	16, 400	17	....	....	2, 615	41, 680	50, 447
Lumber, sawed	12	25, 950	52	....	....	6, 000	16, 527	31, 074
Tar and turpentine, not including farm products	1	5, 000	38	....	....	8, 000	14, 000	26, 000
GEORGETOWN:								
Flouring- and grist-mill products	4	20, 200	10	....	....	1, 490	23, 025	30, 345
Lumber, sawed	4	106, 500	45	....	....	15, 500	175, 270	222, 500
Rice cleaning and polishing	2	68, 000	94	20	20	18, 000	13, 500	50, 000
Tar and turpentine, not including farm products	11	36, 175	133	....	....	25, 237	53, 700	129, 046
GREENVILLE:								
Carriages and wagons	1	26, 000	40	....	....	11, 000	18, 000	34, 000
Cotton goods	5	632, 900	167	196	185	102, 938	615, 013	991, 491
Flouring- and grist-mill products	53	75, 065	59	....	....	7, 543	158, 545	182, 997
Lumber, planed	3	18, 000	35	....	....	12, 700	13, 000	33, 000
Lumber, sawed	19	17, 490	56	....	....	4, 888	16, 111	33, 755
HAMPTON:								
Flouring- and grist-mill products	10	9, 900	13	....	....	1, 183	37, 435	39, 677
Lumber, sawed	9	54, 800	132	....	....	23, 250	82, 410	161, 700
Tar and turpentine, not including farm products	4	30, 500	118	....	5	17, 000	17, 500	48, 500
HORRY:								
Tar and turpentine, not including farm products	21	62, 145	148	1	1	33, 505	88, 245	216, 950
KERSHAW:								
Flouring- and grist-mill products	15	24, 750	14	....	....	1, 691	31, 495	38, 230
Tar and turpentine, not including farm products	9	64, 700	480	....	....	28, 400	104, 500	158, 000
LANCASTER:								
Flouring- and grist-mill products	15	45, 740	15	....	....	1, 647	121, 629	143, 151
Lumber, sawed	6	7, 850	19	....	....	2, 489	20, 960	30, 650
LAURENS:								
Flouring- and grist-mill products	28	53, 605	44	....	....	5, 965	144, 823	162, 958
Lumber, sawed	15	18, 850	40	....	....	2, 745	17, 665	26, 250
LEXINGTON:								
Cotton goods	1	52, 200	10	10	11	3, 850	16, 620	30, 000
Flouring- and grist-mill products	30	40, 400	24	....	....	3, 284	95, 260	109, 587
Lumber, sawed	29	39, 450	74	....	4	8, 396	28, 495	60, 020
MARION:								
Flouring- and grist-mill products	33	63, 465	54	....	....	6, 025	117, 268	135, 488
Lumber, sawed	15	32, 875	58	....	1	4, 247	16, 107	28, 876
Tar and turpentine, not including farm products	20	40, 750	311	1	....	30, 080	36, 880	127, 940
MARLBOROUGH:								
Flouring- and grist-mill products	17	30, 700	36	....	....	4, 325	96, 610	109, 909
Lumber, sawed	15	28, 650	49	....	1	6, 325	27, 396	45, 672
NEWBERRY:								
Flouring- and grist-mill products	16	30, 250	28	....	....	4, 550	101, 765	116, 960
Lumber, sawed	10	22, 500	39	....	3	4, 889	41, 510	65, 800
OCONEE:								
Flouring- and grist-mill products	23	36, 200	32	....	....	4, 030	69, 027	79, 653
Leather, tanned	4	21, 450	18	....	....	2, 475	12, 960	21, 500
Lumber, sawed	11	21, 400	64	....	7	7, 100	16, 435	49, 360
ORANGEBURGH:								
Flouring- and grist-mill products	8	12, 400	18	....	....	741	23, 650	26, 508
Lumber, sawed	21	32, 100	66	....	....	6, 558	37, 201	58, 415
Tar and turpentine, not including farm products	3	5, 500	140	....	....	11, 500	9, 200	30, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

SOUTH CAROLINA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
PICKENS:								
Flouring- and grist-mill products	26	$22,000	24			$2,206	$73,693	$84,070
Lumber, sawed	12	8,550	22		1	2,484	14,405	22,285
RICHLAND:								
Bread and other bakery products	5	7,700	15			4,350	23,232	31,450
Flouring- and grist-mill products	19	19,790	28	1		3,271	69,205	79,458
Foundery and machine-shop products	5	58,000	82		3	22,354	30,639	89,202
Printing and publishing	4	16,000	50	2	4	27,175	9,300	50,200
SPARTANBURGH:								
Carriages and wagons	2	26,700	33			10,900	15,000	55,000
Cotton goods	4	145,000	69	97	76	30,952	111,288	183,601
Flouring- and grist-mill products	37	73,875	35			5,701	223,120	253,379
Lumber, sawed	29	35,150	43			5,502	35,930	60,145
SUMTER:								
Flouring- and grist-mill products	32	35,614	68			6,499	100,400	116,840
Lumber, sawed	17	33,600	40			9,336	41,921	67,055
Tar and turpentine, not including farm products	14	41,480	376	3	8	42,522	44,875	146,065
UNION:								
Flouring- and grist-mill products	23	45,420	44			5,413	122,731	143,863
Lumber, sawed	9	40,600	23			2,897	25,640	37,400
WILLIAMSBURGH:								
Flouring- and grist-mill products	11	22,700	17		1	1,203	20,999	25,640
Lumber, sawed	8	31,000	33			7,550	63,384	88,900
Tar and turpentine, not including farm products	20	34,610	242			27,348	62,800	127,514
YORK:								
Flouring- and grist-mill products	36	96,700	60		2	7,196	279,859	321,171
Lumber, sawed	12	14,850	22		1	2,900	16,950	30,100
Saddlery and harness	4	10,400	11			3,755	13,085	22,222

TENNESSEE.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
BEDFORD:								
Cotton goods	1	$60,000	13	30	20	$5,460	$15,339	$20,000
Flouring- and grist-mill products	18	110,450	38			8,313	312,162	359,208
Liquors, distilled	5	14,000	6			1,800	13,975	22,175
Lumber, sawed	18	37,550	82		2	11,164	34,120	71,485
BLOUNT:								
Cotton goods	1	35,000	8	30	1	3,102	23,593	31,461
Flouring- and grist mill-products	12	49,715	17			2,479	96,182	111,194
Lumber, sawed	6	8,200	19		2	2,550	12,651	23,980
Woolen goods	2	10,500	8	4		4,500	11,100	20,000
BRADLEY:								
Flouring- and grist-mill products	11	41,300	17			4,165	161,505	182,016
Lumber, sawed	6	15,900	28			4,970	21,525	35,950
CANNON:								
Flouring- and grist-mill products	7	34,000	12			1,950	60,745	79,115
Lumber, sawed	5	7,650	22			2,575	18,610	30,750
CARROLL:								
Flouring- and grist-mill products	13	50,200	28			5,950	87,475	105,728
Lumber, sawed	8	18,200	26			2,926	11,205	20,715
CARTER:								
Flouring- and grist-mill products	20	20,600	27			5,361	99,514	115,021
Iron and steel	2	48,000	260	3		6,205	25,325	52,565
Lumber, sawed	13	12,600	27			4,845	20,550	38,185
Woolen goods	2	16,500	15	9	5	5,000	27,915	46,370
CHEATHAM:								
Flouring- and grist-mill products	6	18,350	8			2,800	35,503	45,497
Gunpowder	1	100,000	12			6,000	25,000	40,000
Lumber, sawed	9	18,034	30		3	4,225	16,960	27,260
COFFEE:								
Carriage and wagon materials	1	15,500	14		2	5,000	19,000	25,000
Flouring- and grist-mill products	2	10,000	4			1,200	24,415	28,180
Lumber, sawed	4	26,500	29		2	4,150	11,850	22,500
Mixed textiles (see also Woolen goods)	1	35,000	15	8	5	7,500	52,780	79,000
Woolen goods (see also Mixed textiles)	2	35,500	23	8	5	7,500	55,980	83,000
CROCKETT:								
Flouring- and grist-mill products	6	27,500	23			5,170	76,750	98,765
Lumber, sawed	8	23,160	40			3,960	12,870	24,050
DAVIDSON:								
Bags, paper	1	50,000	10	12	3	6,480	71,300	88,005
Bookbinding and blank-book making	4	49,000	20	21	3	12,650	41,125	74,200
Boots and shoes	3	6,000	23		3	9,905	17,191	35,826
Boxes, wooden, packing	2	7,500	12		8	5,245	9,481	21,000
Bread and other bakery products	9	90,700	77	6	7	32,040	165,674	250,967
Brick and tile	5	132,000	264		86	73,920	41,060	146,938
Brooms and brushes	3	1,900	16	2	7	3,055	13,660	21,675
Carriages and wagons	9	385,500	515			68,550	404,400	780,331
Clothing, men's	4	15,500	20	203	10	22,600	57,200	97,875
Coffee and spices, roasted and ground	2	19,000	6			2,625	132,450	142,475

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC: 1880.

TENNESSEE—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
DAVIDSON—continued.								
Coffins, burial cases, and undertakers' goods	4	$6, 850	10			$4, 750	$14, 250	$38, 550
Confectionery	3	24, 000	14	73	10	11, 500	113, 000	146, 225
Cooperage	6	6, 300	53			19, 105	24, 140	63, 650
Cotton goods	1	575, 000	87	175	72	62, 017	190, 928	319, 522
Flouring- and grist-mill products	14	419, 100	137			61, 242	1, 526, 756	1, 810, 567
Foundery and machine-shop products	13	143, 300	206		7	69, 755	288, 786	487, 407
Furniture	7	189, 000	278	7	105	105, 178	244, 445	489, 625
Leather, curried	3	36, 000	18			7, 300	169, 362	187, 010
Leather, tanned	6	60, 800	36		3	19, 300	128, 315	187, 991
Liquors, distilled	1	2, 500	20			10, 600	65, 900	100, 400
Looking-glass and picture frames	4	11, 500	25		4	8, 164	15, 375	31, 675
Lumber, sawed	27	375, 800	541		45	126, 400	332, 690	651, 722
Marble and stone work	5	25, 500	92			32, 240	36, 425	114, 446
Mineral and soda waters	2	12, 500	24			7, 500	26, 875	62, 775
Oil, cottonseed and cake	2	275, 000	148			22, 000	167, 000	215, 000
Patent medicines and compounds	7	61, 500	31		3	11, 769	37, 750	80, 300
Printing and publishing	17	495, 400	222	32	40	163, 314	144, 437	436, 981
Pumps, not including steam pumps	1	125, 000	75			14, 923	100, 090	149, 500
Saddlery and harness	12	32, 900	133	1	10	43, 275	133, 950	236, 530
Slaughtering and meat-packing, not including retail butchering establishments.	4	76, 000	169			23, 600	464, 032	567, 676
Tinware, copperware, and sheet-iron ware	12	118, 150	148		2	47, 003	101, 870	254, 698
Trunks and valises	2	11, 000	23		12	7, 950	9, 700	28, 700
Wooden ware	1	62, 430	97		25	32, 500	84, 000	146, 550
DE KALB:								
Flouring- and grist-mill products	13	32, 985	21			2, 138	84, 360	98, 834
Lumber, sawed	9	10, 100	25			2, 988	16, 220	27, 370
DICKSON:								
Flouring- and grist-mill products	5	16, 900	5			700	29, 084	33, 775
Iron and steel	1	150, 000	130	5	15	40, 000	21, 300	70, 000
Lumber, sawed	7	15, 900	29		1	3, 820	15, 000	28, 500
DYER:								
Flouring- and grist-mill products	3	13, 500	6			1, 100	89, 950	105, 300
Lumber, sawed	8	24, 700	51		3	8, 800	47, 000	73, 780
FRANKLIN:								
Flouring- and grist-mill products	14	45, 700	19			4, 104	90, 696	104, 737
Lumber, sawed	17	33, 200	69		1	8, 477	27, 275	51, 437
GIBSON:								
Agricultural implements	4	20, 750	28			8, 890	9, 600	26, 500
Carriages and wagons	4	11, 800	33			11, 500	9, 000	31, 140
Flouring- and grist-mill products	15	73, 250	41			10, 482	231, 518	266, 132
Lumber, sawed	11	36, 650	55		2	9, 722	41, 213	72, 510
GILES:								
Cotton goods	1	12, 000	10	10	21	2, 500	13, 500	20, 000
Flouring- and grist-mill products	29	87, 375	48			8, 441	167, 685	202, 696
Lumber, sawed	18	31, 950	69		8	9, 470	36, 985	61, 510
GREENE:								
Flouring- and grist-mill products	37	62, 700	43			5, 411	145, 211	171, 523
Lumber, sawed	23	19, 350	38			3, 852	18, 640	37, 210
Woolen goods	2	24, 000	16	9	1	5, 500	23, 340	51, 400
GRUNDY:								
Cars, railroad, street, and repairs	1	10, 000	32			18, 000	17, 000	36, 000
Coke	1	125, 000	79			24, 000	60, 700	120, 000
HAMBLEN:								
Flouring- and grist-mill products	17	48, 225	20			4, 751	131, 885	147, 360
HAMILTON:								
Agricultural implements	1	14, 000	15		5	3, 000	8, 000	25, 000
Boxes, wooden, packing	1	16, 000	20		6	7, 750	15, 000	25, 000
Brick and tile	5	47, 000	147		33	29, 800	29, 950	77, 600
Cars, railroad, street, and repairs	1	160, 000	150			45, 000	139, 500	200, 000
Flouring- and grist-mill products	8	46, 300	28			7, 849	117, 021	138, 946
Foundery and machine-shop products	6	107, 000	129		8	39, 982	45, 500	135, 000
Furniture	2	18, 000	31			7, 250	9, 000	35, 000
Iron and steel	6	1, 272, 000	1, 119		85	329, 410	835, 892	1, 324, 350
Leather, tanned	2	202, 500	103			31, 040	657, 000	909, 100
Lumber, planed	2	38, 000	50		8	19, 000	65, 000	112, 560
Lumber, sawed	7	38, 700	78		15	20, 535	56, 300	92, 800
Patent medicines and compounds	1	25, 000	7	7	3	7, 032	12, 500	40, 000
Pumps, not including steam pumps	1	30, 000	27		3	5, 060	20, 000	35, 000
Tinware, copperware, and sheet-iron ware	1	10, 000	20			7, 000	20, 000	35, 000
HARDEMAN:								
Flouring- and grist-mill products	20	48, 450	29			4, 579	78, 245	93, 692
HAWKINS:								
Flouring- and grist-mill products	25	43, 700	26			5, 010	143, 883	163, 615
HAYWOOD:								
Brick and tile	2	5, 250	28		4	15, 250	6, 100	30, 500
Flouring- and grist-mill products	9	31, 950	27			5, 269	124, 012	178, 841
Lumber, sawed	8	24, 850	32			4, 285	15, 260	29, 225
Slaughtering and meat-packing, not including retail butchering establishments.	1	2, 500	8			1, 600	57, 900	65, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

TENNESSEE—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
HENDERSON:								
Flouring- and grist-mill products	13	$22,550	13			$1,144	$63,226	$75,637
HENRY:								
Carriages and wagons	1	20,000	17			7,000	8,000	20,000
Cotton goods	3	78,000	21	47	5	11,288	36,894	62,220
Flouring- and grist-mill products	21	79,700	59			11,099	289,665	365,672
Lumber, sawed	10	22,200	36			5,589	24,850	41,818
Tobacco, chewing, smoking, and snuff	4	101,000	24	10	10	7,950	36,400	58,000
HICKMAN:								
Cotton goods	1	110,000	17	36	20	12,600	57,520	84,075
Flouring- and grist-mill products	9	23,400	12			2,185	55,985	69,698
HUMPHREYS:								
Flouring- and grist-mill products	9	37,500	12			2,948	72,882	98,882
Lumber, sawed	10	21,324	68		2	6,250	10,315	22,860
Woolen goods	1	20,000	7	4	2	2,966	13,997	23,028
JEFFERSON:								
Flouring- and grist-mill products	8	38,700	21			2,975	132,910	162,950
KNOX:								
Brick and tile	3	8,250	42		12	10,850	5,400	21,600
Confectionery	2	33,000	20			5,900	43,000	55,000
Flouring- and grist-mill products	32	117,100	48		1	15,041	372,035	441,617
Foundery and machine-shop products	3	74,000	85			33,606	123,179	172,982
Furniture	5	43,800	73		1	21,100	18,100	47,700
Iron and steel	1	230,000	115		110	73,786	142,390	213,250
Leather, curried	3	11,200	5			1,400	20,082	23,400
Leather, tanned	4	33,850	13			3,390	27,975	40,550
Lumber, sawed	16	18,600	49		4	7,280	33,090	57,752
Printing and publishing	3	29,500	32	3	6	14,500	12,500	39,000
Saddlery and harness	3	56,300	86		20	25,360	41,300	81,000
Sash, doors, and blinds	3	156,000	41	1	3	55,400	100,700	194,500
Tinware, copperware, and sheet-iron ware	4	75,100	45		5	17,800	60,000	97,000
LAWRENCE:								
Cotton goods	3	100,100	52	78	30	23,832	52,461	93,735
Flouring- and grist-mill products	10	28,450	12			2,513	57,775	67,036
LINCOLN:								
Flouring- and grist-mill products	26	84,400	39			7,718	218,545	250,807
Liquors, distilled	4	12,000	8			2,325	20,375	30,000
Lumber, sawed	16	33,800	72			7,260	35,861	66,125
Woolen goods	3	31,500	10	10	8	5,000	27,042	35,323
LOUDON:								
Cotton goods	1	15,000	6	15	7	4,836	15,148	31,035
Flouring- and grist-mill products	14	98,000	17			5,544	118,927	140,220
Furniture	1	32,000	39		4	12,000	15,000	60,000
Lumber, sawed	10	12,100	21		1	3,274	12,509	23,475
MACON:								
Carriage and wagon materials	1	10,000	10			3,000	6,000	25,000
Flouring- and grist-mill products	9	27,025	20			2,147	50,051	57,514
Lumber, sawed	10	15,750	28		1	2,905	21,579	36,025
MCMINN:								
Flouring- and grist-mill products	20	79,100	29			5,210	104,570	128,478
Woolen goods	4	52,000	11	12	5	7,250	31,600	52,000
MADISON:								
Carriages and wagons	5	13,950	26			7,500	24,750	41,700
Flouring- and grist-mill products	13	36,500	27			4,480	147,317	199,118
Oil, cottonseed and cake	1	100,000	78	2		20,000	85,000	150,000
MARION:								
Brick and tile	2	56,723	51			8,887	9,040	21,231
Coke	2	56,021	18			7,820	30,029	42,493
Foundery and machine-shop products	1	54,000	63		2	26,000	45,000	90,000
Iron and steel	1	210,626	140		8	51,457	184,818	305,257
Lumber, sawed	3	11,485	16		1	3,956	15,845	24,650
MARSHALL:								
Flouring- and grist-mill products	13	46,650	26			3,896	80,831	92,943
Lumber, sawed	10	19,600	42			5,290	27,995	44,500
MAURY:								
Flouring- and grist-mill products	25	144,050	46			12,130	261,281	314,067
Furniture	2	12,400	26			10,000	7,760	20,500
Lumber, sawed	21	53,350	92			11,465	57,180	95,910
Saddlery and harness	4	18,911	16			6,676	11,380	24,685
MEIGS:								
Flouring- and grist-mill products	10	28,550	9			2,026	72,775	87,049
MONROE:								
Flouring- and grist-mill products	18	35,850	23			2,962	43,247	51,322
MONTGOMERY:								
Agricultural implements	1	20,000	20			5,000	11,500	24,000
Brick and tile	4	11,600	100		35	16,000	5,800	32,000
Carriages and wagons	3	34,500	34		3	12,500	14,000	32,000
Flouring- and grist-mill products	9	99,000	42			10,850	222,310	262,438
Lumber, planed	2	27,000	45		15	21,000	42,000	70,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

TENNESSEE—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Average number of hands employed. Females above 15 years.	Average number of hands employed. Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
MONTGOMERY—continued.								
Lumber, sawed	3	$9,000	30			$6,160	$20,070	$32,800
Tobacco stemming	5	113,000	60	45	53	22,000	146,000	194,000
MOORE:								
Flouring- and grist-mill products	3	10,500	6			868	18,487	20,630
Liquors, distilled	9	50,500	17			5,250	47,250	74,250
OBION:								
Flouring- and grist-mill products	10	37,350	27			6,036	103,730	118,760
Furniture	4	160,000	113		36	60,550	104,500	223,000
Lumber, sawed	18	50,150	159			38,304	143,760	235,132
PERRY:								
Flouring- and grist-mill products	7	11,600	7			1,433	33,760	42,248
Leather, curried	3	16,000	9			2,500	57,290	66,050
Leather, tanned	5	23,800	20		1	4,700	60,812	95,075
ROANE:								
Coke	1	19,000	17			7,000	41,500	50,000
Flouring- and grist-mill products	13	35,450	17			2,231	48,809	55,102
Iron and steel	2	700,000	370		30	70,000	98,250	162,500
Lumber, sawed	12	19,800	41			5,845	23,825	39,480
ROBERTSON:								
Cooperage	8	8,000	32			8,620	8,425	30,250
Flouring- and grist-mill products	21	68,000	43			5,650	181,983	208,607
Liquors, distilled	9	223,500	45			15,120	144,975	216,000
Lumber, sawed	14	23,650	45			6,845	29,020	50,540
RUTHERFORD:								
Carriages and wagons	3	12,500	33			22,500	12,000	48,500
Flouring- and grist-mill products	17	73,300	37			6,922	237,369	268,576
Lumber, sawed	17	38,350	94		7	14,275	46,570	87,810
Wooden ware	1	35,000	33		7	9,000	70,000	100,000
SHELBY:								
Bread and other bakery products	7	16,800	33		1	10,650	37,200	68,000
Brick and tile	3	20,000	76			22,000	10,600	45,000
Carriages and wagons	6	178,400	158	2	1	51,250	55,250	176,500
Clothing, men's	8	32,100	85	39		63,600	65,000	175,500
Clothing, women's	1	30,000	18			7,000	24,000	40,000
Confectionery	5	32,500	53	3	2	18,050	110,500	160,000
Cotton compressing	1	500,000	150			100,000	150,000	300,000
Cotton-ties	1	50,000	25		15	13,684	66,378	101,538
Flouring- and grist-mill products	17	47,200	46			7,140	123,503	147,624
Foundery and machine-shop products	9	140,800	189	2	9	83,114	91,274	252,400
Furnishing goods, men's	1	5,000	12			2,500	10,000	20,000
Grease and tallow	1	10,000	8			2,570	49,586	67,105
Leather, curried	1	8,000	2			1,000	24,600	30,000
Leather, tanned	2	14,700	6			2,700	19,500	31,000
Liquors, malt	1	40,000	20			7,067	32,066	54,344
Lumber, planed (see also Sash, doors, and blinds)	1	20,000	30			14,500	21,985	45,820
Lumber, sawed	12	211,700	202		2	27,610	233,100	339,360
Marble and stone work	6	22,200	26			9,100	12,150	38,900
Mineral and soda waters	2	28,000	22		1	4,800	25,000	59,000
Oil, cottonseed and cake	6	560,000	418	2	18	121,340	560,000	870,000
Printing and publishing	4	92,000	101	6	5	67,246	52,939	165,714
Saddlery and harness	5	18,100	39			18,400	35,850	75,820
Sash, doors, and blinds (see also Lumber, planed)	1	5,000	20			15,000	15,000	35,000
Slaughtering and meat-packing, not including retail butchering establishments.	1	26,500	50			22,400	497,760	743,800
Soap and candles	2	30,500	10			4,005	22,500	33,000
Tinware, copperware, and sheet-iron ware	10	104,500	88	10		42,899	99,500	203,000
Trunks and valises	2	19,500	18			9,700	16,000	40,000
Upholstering	4	55,000	22	3		11,445	7,308	34,000
SMITH:								
Flouring- and grist-mill products	13	43,300	37			4,577	116,105	136,533
Lumber, sawed	11	31,600	36			3,245	26.020	41,460
STEWART:								
Flouring- and grist-mill products	8	19,600	18			1,573	43,548	49,672
Iron and steel	3	570,000	271		50	27,825	34,461	47,000
SULLIVAN:								
Cotton goods	2	50,000	14	30	15	9,336	48,495	80,000
Flouring- and grist-mill products	31	76,250	37			6,273	153,129	174,311
Lumber, sawed	24	29,050	62		2	10,700	38,348	72,044
SUMNER:								
Cotton goods	1	100,000	40	38	26	17,863	74,000	103,800
Flouring- and grist-mill products	6	15,500	10			1,608	51,934	61,897
Lumber, sawed	16	31,525	73			8,543	35,725	62,552
TIPTON:								
Flouring- and grist-mill products	5	12,800	14			2,040	39,175	45,909
Lumber, sawed	6	15.200	25			3,511	19,800	31,800
WARREN:								
Carriage and wagon materials	1	27,000	20		8	7,000	8,000	27,000
Cotton goods	1	7,500	12	35	15	9,500	30,801	45,000
Flouring- and grist-mill products	15	40,800	23			4,730	93,374	106,644
Lumber, sawed	12	46,050	37		1	4,705	25,995	41,250
Woolen goods	1	47,253	13	14		4,320	27,253	38,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

TENNESSEE—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
WASHINGTON:								
Agricultural implements	1	$13, 000	25			$4, 552	$6, 000	$27, 100
Flouring- and grist-mill products	34	106, 500	51			8, 000	214, 128	250, 339
Lumber, sawed	13	14, 450	25			3, 495	16, 434	28, 848
WEAKLEY:								
Flouring- and grist-mill products	12	56, 300	52			6, 314	103, 875	122, 137
Lumber, sawed	16	27, 350	110		5	12, 553	32, 393	68, 242
WHITE:								
Flouring- and grist-mill products	8	27, 700	7			1, 635	39, 660	44, 448
Lumber, sawed	8	13, 700	35			7, 360	23, 821	45, 500
WILLIAMSON:								
Flouring- and grist-mill products	11	71, 500	53			10, 314	248, 985	301, 270
Lumber, sawed	9	24, 400	50		1	5, 900	28, 336	47, 880
WILSON:								
Carriages and wagons	2	4, 500	19		1	4, 500	10, 000	22, 000
Flouring- and grist-mill products	23	111, 500	58			14, 977	235, 168	299, 562
Lumber, sawed	20	47, 000	139		10	16, 448	57, 359	101, 197

TEXAS.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ANDERSON:								
Foundery and machine-shop products	1	$20, 000	17			$15, 000	$10, 000	$60, 000
Lumber, sawed	7	12, 650	69			7, 200	18, 650	38, 000
ARANSAS:								
Slaughtering and meat-packing, not including retail butchering establishments.	1	200, 000	125			47, 000	253, 100	453, 100
AUSTIN:								
Brick and tile	2	2, 200	42			9, 200	5, 300	20, 500
Flouring- and grist-mill products	22	35, 500	48			3, 036	35, 862	44, 623
BASTROP:								
Flouring- and grist-mill products	27	51, 275	87			4, 607	70, 849	84, 004
BELL:								
Flouring- and grist-mill products	15	97, 861	43			6, 742	196, 481	231, 666
BEXAR:								
Carriages and wagons	3	12, 000	12		3	6, 064	7, 000	20, 980
Flouring- and grist-mill products	3	40, 000	19			10, 100	162, 600	205, 000
Ice, artificial	2	54, 000	12			9, 755	9, 000	35, 000
Leather, curried	2	10, 500	3			1, 290	19, 177	25, 800
Printing and publishing	4	27, 700	46	2	26	29, 520	16, 500	71, 000
Saddlery and harness	6	30, 300	26		4	11, 650	19, 800	44, 700
BOSQUE:								
Flouring- and grist-mill products	5	27, 000	40			4, 680	138, 577	154, 984
BOWIE:								
Lumber, sawed	8	172, 000	121			38, 140	208, 900	380, 200
BROWN:								
Flouring- and grist-mill products	3	16, 719	11			1, 965	106, 300	136, 370
CALDWELL:								
Flouring- and grist-mill products	15	44, 150	30			4, 366	97, 292	109, 589
CASS:								
Flouring- and grist-mill products	21	24, 550	26			2, 620	26, 726	33, 341
Lumber, sawed	19	109, 150	205		1	53, 230	160, 550	278, 800
COLLIN:								
Flouring- and grist-mill products	16	104, 200	53			12, 069	197, 854	239, 456
COMAL:								
Flouring- and grist-mill products	2	35, 000	4			1, 200	67, 500	77, 000
Saddlery and harness	11	10, 200	13			3, 375	11, 300	23, 650
Woolen goods	1	97, 500	28	8		25, 700	44, 435	80, 500
COMANCHE:								
Flouring- and grist-mill products	5	28, 100	16			4, 450	99, 450	114, 177
COOKE:								
Brick and tile	6	8, 325	47		10	12, 700	6, 205	29, 100
Flouring- and grist-mill products	10	34, 150	30			5, 264	112, 917	121, 310
CORYELL:								
Flouring- and grist-mill products	6	30, 500	17			3, 800	79, 200	91, 240
DALLAS:								
Bread and other bakery products	4	5, 250	12		1	5, 425	17, 800	35, 300
Brick and tile	4	33, 000	58		4	23, 900	12, 750	54, 600
Carriages and wagons	4	8, 500	19			7, 450	15, 300	33, 000
Confectionery	4	4, 600	9			2, 650	16, 400	24, 600
Flouring- and grist-mill products	11	101, 700	58			11, 250	305, 810	352, 561
Foundery and machine-shop products	3	14, 000	34			14, 500	28, 200	55, 000
Ice, artificial	1	50, 000	10			7, 000	6, 000	35, 000
Lumber, planed	2	25, 000	40			17, 000	109, 600	168, 000
Printing and publishing	10	56, 200	61	8	17	32, 200	94, 500	160, 300
Saddlery and harness	4	51, 200	18			11, 550	85, 800	108, 200

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

TEXAS—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
DALLAS—continued.								
Tinware, copperware, and sheet-iron ware	7	$11,300	22			$10,960	$21,700	$41,70
Tobacco, cigars and cigarettes	2	8,100	21	4		14,000	35,400	57,00
DENTON:								
Flouring- and grist-mill products	7	54,150	24			4,037	62,556	73,30
ELLIS:								
Flouring- and grist-mill products	11	29,200	40			11,606	139,717	166,913
EL PASO:								
Flouring- and grist-mill products	3	18,500	19			5,200	81,630	103,163
FANNIN:								
Agricultural implements	2	7,000	25		1	9,000	6,150	22,000
Flouring- and grist-mill products	21	72,175	56			7,923	110,069	130,874
Furniture	2	11,100	9			2,600	9,000	20,600
FAYETTE:								
Flouring- and grist-mill products	30	37,498	69			3,232	44,243	52,415
Sash, doors, and blinds	1	8,000	10			6,000	17,000	27,000
GALVESTON:								
Bread and other bakery products	8	15,200	19			13,511	59,300	96,300
Carriages and wagons	2	18,500	12			7,900	20,000	35,000
Clothing, men's	1	8,000	40			13,000	23,000	42,500
Confectionery	3	61,500	18		3	15,300	86,000	146,600
Cooperage	8	18,300	42			35,850	81,000	147,000
Flouring- and grist-mill products	4	97,000	22			15,290	257,168	313,340
Foundery and machine-shop products	4	76,000	57			32,336	51,500	103,000
Furniture	11	7,450	8		3	5,425	4,225	23,600
Patent medicines and compounds	3	9,000	6			5,250	16,500	35,500
Printing and publishing	5	287,000	107	6	21	112,593	52,738	236,500
Saddlery and harness	5	19,900	13			9,525	24,600	42,850
Sash, doors, and blinds	2	40,000	24			22,000	268,500	330,000
Tinware, copperware, and sheet-iron ware	9	51,000	32			29,000	84,500	150,000
Tobacco, cigars and cigarettes	18	15,700	56			43,950	53,200	178,850
GRAYSON:								
Confectionery	2	4,000	11		1	4,000	14,500	22,000
Flouring- and grist-mill products	22	167,250	88			23,825	232,012	284,104
Oil, cottonseed and cake	1	40,000	30			10,000	80,000	100,000
GREGG:								
Lumber, sawed	9	104,200	167			29,770	90,175	155,988
GRIMES:								
Flouring- and grist-mill products	15	35,400	38			3,659	50,796	61,611
Lumber, sawed	6	27,700	67	1		12,600	38,645	69,300
Oil, cottonseed and cake	1	40,000	48			6,600	11,250	28,000
HARRIS:								
Bread and other bakery products	5	7,800	16		1	7,124	46,146	75,918
Brick and tile	6	34,000	115		13	32,224	22,000	75,400
Carriages and wagons	4	30,000	34		1	21,800	38,500	75,000
Clothing, men's	5	21,400	27	2		15,634	19,750	54,100
Fertilizers	1	25,000	25			10,000	80,000	100,000
Flouring- and grist-mill products	2	56,000	19			7,302	112,500	150,000
Foundery- and machine-shop products	3	170,000	103		5	43,550	76,500	163,098
Ice, artificial	2	114,000	23			11,100	10,325	35,000
Lumber, planed	4	42,000	43		4	22,500	95,500	140,000
Lumber, sawed	4	36,000	84		4	16,425	48,480	87,300
Marble and stone work	1	10,000	7			3,000	10,000	20,000
Printing and publishing	2	22,000	19		11	15,750	3,800	40,000
Shipbuilding	3	19,300	35			24,590	26,250	55,500
Tinware, copperware, and sheet-iron ware	5	7,600	17		4	8,772	8,150	25,590
HARRISON:								
Foundery and machine-shop products	1	15,000	45		2	9,600	14,451	20,580
Lumber, sawed	10	20,000	120		1	26,900	74,025	132,650
Printing and publishing	1	5,000	13		1	10,400	6,000	20,000
HILL:								
Flouring- and grist-mill products	11	29,400	34			3,929	62,919	75,553
HOPKINS:								
Flouring- and grist-mill products	10	47,200	45			7,975	93,485	109,235
HUNT:								
Flouring- and grist-mill products	10	33,150	29			4,093	62,578	72,905
JEFFERSON:								
Lumber, planed	1	15,000	40			20,000	55,000	85,000
Lumber, sawed	6	255,000	243		27	93,000	223,250	380,500
KAUFMAN:								
Flouring- and grist-mill products	12	46,000	34		1	6,850	260,534	319,154
Saddlery and harness	3	11,400	14			5,000	7,400	20,000
LAMAR:								
Flouring- and grist-mill products	11	35,550	27			2,381	89,361	104,191
Furniture	2	12,000	36	4		14,500	17,000	37,000
LIBERTY:								
Lumber, sawed	8	45,500	122		2	39,400	118,886	199,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

TEXAS—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
LIMESTONE:								
Brick and tile	5	$7, 550	77	2	11	$14, 070	$6, 210	$33, 220
Flouring- and grist-mill products	10	20, 700	43			4, 956	68, 288	78, 541
McLENNAN:								
Brick and tile	4	23, 000	81		9	18, 100	10, 400	37, 500
Carriages and wagons	2	16, 000	25			9, 000	8, 500	20, 500
Flouring- and grist mill products	14	60, 200	37			10, 970	209, 754	242, 265
Tinware, copperware, and sheet-iron ware	3	18, 300	16			8, 200	11, 500	26, 000
MARION:								
Agricultural implements	1	7, 500	45		5	22, 500	21, 500	75, 000
Iron and steel	1	40, 000	140			27, 720	23, 580	36, 000
MONTGOMERY:								
Lumber, sawed	32	162, 070	400			105, 200	271, 885	484, 150
ORANGE:								
Lumber, sawed	8	212, 000	310		3	122, 500	301, 700	512, 900
PARKER:								
Flouring- and grist-mill products	10	66, 700	41			11, 701	203, 760	235, 773
RED RIVER:								
Flouring- and grist-mill products	21	54, 150	60			5, 187	76, 416	100, 155
Lumber, sawed	12	37, 000	75			14, 080	36, 005	64, 450
TARRANT:								
Flouring- and grist-mill products	15	73, 270	54			12, 097	280, 480	322, 828
Saddlery and harness	3	23, 000	23			11, 800	16, 411	38, 500
TRAVIS:								
Bread and other bakery products	5	25, 300	11	1	1	4, 905	19, 900	29, 500
Carriages and wagons	2	12, 500	19			8, 000	14, 000	27, 500
Flouring- and grist-mill products	8	79, 300	21			8, 308	134, 315	183, 243
Foundery and machine-shop products	5	6, 700	14			7, 050	11, 850	16, 300
Ice, artificial	2	70, 000	10		5	7, 500	8, 000	34, 000
Lime	2	65, 000	42			15, 900	7, 550	39, 200
Patent medicines and compounds	1	10, 000	6		2	4, 600	7, 500	20, 000
Printing and publishing	7	34, 600	34	1	8	26, 870	26, 400	62, 500
Saddlery and harness	6	15, 550	26			15, 053	30, 900	59, 600
Sash, doors, and blinds	2	45, 000	31			15, 500	10, 500	36, 000
Tinware, copperware, and sheet-iron ware	4	31, 400	20		1	12, 550	37, 750	60, 600
UPSHUR:								
Flouring- and grist-mill products	10	10, 332	17			2, 528	38, 652	46, 662
Lumber, sawed	10	34, 267	111			24, 660	64, 320	112, 850
VAN ZANDT:								
Flouring- and grist-mill products	9	48, 700	28			4, 052	86, 470	104, 673
Salt	1	75, 000	15	1	1	7, 500	7, 500	24, 000
WALKER:								
Flouring- and grist-mill products	11	12, 950	27			1, 771	29, 885	35, 064
Lumber, sawed	8	31, 700	128			20, 200	62, 950	103, 000
WALLER:								
Oil, cottonseed and cake	1	75, 000	46	2	2	7, 000	60, 000	90, 000
WOOD:								
Flouring- and grist-mill products	16	46, 275	55			3, 738	66, 802	81, 730
Lumber, sawed	13	50, 300	123			28, 000	82, 675	140, 600
Saddlery and harness	3	7, 700	7			3, 472	13, 000	23, 500

UTAH TERRITORY.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
BEAVER:								
Charcoal	4	$16, 000	53			$18, 000	$27, 960	$60, 280
Flouring- and grist-mill products	2	11, 000	3			1, 200	28, 100	34, 020
Lumber, sawed	6	24, 200	36			14. 875	33, 180	53, 650
BOX ELDER:								
Boots and shoes	2	4, 500	14	5	1	8, 700	12, 573	24, 553
Flouring- and grist-mill products	4	45, 000	8			3, 500	46, 235	59, 210
Woolen goods	1	30, 000	15	1	5	6, 600	8, 092	20, 525
CACHE:								
Flouring- and grist-mill products	9	59, 000	19			8, 509	111, 720	137, 415
Lumber, sawed	10	46, 000	46		2	8, 120	23, 222	41, 020
DAVIS:								
Flouring- and grist-mill products	7	49, 000	13			4, 855	84, 640	98, 420
SALT LAKE:								
Boots and shoes	3	53, 350	86	26	35	39, 650	87, 732	146, 726
Bread and other bakery products	9	28, 200	17	6	4	11, 912	63, 120	96, 672
Brick and tile	10	109, 325	58		26	18, 067	11, 641	48, 812
Carriages and wagons	5	11, 400	25		1	14, 980	13, 515	36, 600
Confectionery	3	7, 000	3	1		1, 475	16, 860	26, 180
Clothing, men's	2	4, 500	11	25		11, 000	17, 700	33, 000
Furniture	4	25, 350	22	4	4	13, 250	18, 325	49, 387
Flouring- and grist-mill products	12	140, 000	27			10, 650	231, 940	275, 195
Foundery and machine-shop products	7	87, 000	64	9	2	42, 171	44, 510	117, 770
Leather, curried	2	10, 600	3			2, 000	21, 525	31, 450

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

UTAH TERRITORY—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
SALT LAKE—continued.								
Leather, tanned	2	$20, 600	8	....	....	$4, 150	$13, 200	$21, 800
Liquors, malt	6	111, 500	37	....	1	17, 148	63, 130	114, 560
Lumber, sawed	15	39, 200	49	....	1	7, 730	38, 040	56, 325
Printing and publishing	7	159, 660	118	13	17	94, 861	72, 054	214, 625
Saddlery and harness	11	23, 300	30	....	4	14, 230	42, 195	66, 067
Salt	4	7, 400	24	3	2	16, 932	600	50, 600
Sash, doors, and blinds	1	15, 000	10	....	....	7, 900	13, 200	26, 100
Soap and candles	2	18, 200	4	....	1	2, 498	51, 142	58, 360
Tinware, copperware, and sheet-iron ware	3	32, 000	24	....	5	21, 200	47, 400	85, 070
Woolen goods	2	28, 000	24	19	6	8, 849	14, 122	20, 823
SANPETE:								
Flouring- and grist-mill products	9	30, 200	13	....	....	3, 560	116, 595	135, 490
Lumber, sawed	7	25, 200	28	....	....	4, 550	18, 750	27, 750
UTAH:								
Flouring- and grist-mill products	13	72, 100	19	....	....	4, 047	166, 133	206, 844
Furniture	8	17, 300	19	....	....	8, 530	6, 650	21, 563
Lumber, sawed	9	20, 200	33	....	....	3, 850	23, 255	36, 600
Woolen goods	2	231, 000	62	32	25	36, 700	82, 980	153, 746
WASHINGTON:								
Woolen goods	1	26, 000	22	15	5	4, 596	11, 095	22, 259
WEBER:								
Confectionery	1	10, 000	6	1	2	5, 000	16, 028	25, 000
Flouring- and grist-mill products	4	67, 000	18	....	....	9, 000	122, 600	148, 290
Saddlery and harness	1	5, 000	6	....	....	3, 000	14, 000	20, 000
Woolen goods	1	35, 000	14	5	3	4, 500	13, 522	30, 000

VERMONT.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ADDISON:								
Carriages and wagons	2	$12, 000	14	....	....	$4, 200	$6, 000	$28, 500
Cheese and butter (factory)	6	23, 500	9	5	....	2, 200	25, 504	34, 722
Coffins, burial cases, and undertakers' goods	1	17, 000	20	....	....	3, 500	35, 000	46, 400
Cutlery and edge tools	1	15, 000	15	....	....	6, 000	10, 625	20, 000
Flouring- and grist-mill products	14	119, 500	34	....	....	7, 915	223, 111	247, 367
Iron nails and spikes, cut and wrought	1	100, 000	21	3	6	10, 000	50, 000	80, 000
Leather, curried	1	15, 000	4	....	....	1, 600	29, 200	34, 300
Leather, tanned	1	15, 000	5	....	....	1, 600	22, 100	27, 200
Lime	2	9, 000	31	....	....	5, 680	12, 900	20, 200
Lumber, sawed	48	148, 600	141	....	6	23, 815	93, 555	167, 615
Sash, doors, and blinds	2	7, 000	9	....	....	3, 000	18, 500	25, 100
Window blinds and shades	1	25, 000	20	....	5	7, 500	30, 000	55, 000
Woolen goods	4	26, 500	14	5	....	4, 605	15, 985	24, 175
BENNINGTON:								
Boot and shoe findings	2	23, 000	25	17	1	12, 258	8, 150	24, 500
Charcoal	7	79, 000	114	....	....	32, 900	12, 000	59, 000
Cheese and butter (factory)	10	29, 650	15	3	1	3, 425	36, 793	50, 278
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	4	575, 096	111	167	110	89, 073	230, 418	427, 346
Flouring- and grist-mill products	10	55, 100	16	....	....	3, 730	54, 654	65, 130
Foundery and machine-shop products	6	130, 000	71	....	....	25, 942	44, 481	86, 500
Furniture	4	26, 000	22	....	....	6, 700	6, 200	21, 200
Furniture, chairs	4	75, 000	82	....	12	29, 000	42, 000	87, 500
Hardware	1	50, 000	25	....	....	10, 000	20, 000	80, 000
Hosiery and knit goods (see also Cotton goods; Woolen goods)	5	485, 000	133	222	18	18, 386	353, 219	579, 900
Kaolin and ground earths	5	18, 500	40	....	....	7, 800	4, 800	22, 900
Leather, curried	1	15, 000	13	....	....	4, 945	90, 388	99, 022
Leather, tanned	3	28, 000	22	....	....	8, 700	148, 605	174, 308
Lumber, sawed	55	288, 150	210	....	6	35, 433	191, 282	291, 415
Marble and stone work	5	265, 000	194	....	....	75, 000	48, 000	186, 000
Mixed textiles (see also Cotton goods; Woolen goods)	1	400, 000	226	126	72	110, 000	447, 000	670, 800
Paper	2	100, 000	29	22	....	16, 909	77, 975	117, 000
Patent medicines and compounds	1	5, 000	3	....	....	1, 500	3, 500	20, 000
Saddlery and harness	6	6, 850	10	....	....	3, 100	9, 900	25, 000
Shirts	2	4, 000	....	66	....	9, 200	16, 000	26, 600
Stone- and earthen-ware	1	30, 000	12	....	....	5, 000	5, 000	20, 000
Woolen goods (see also Mixed textiles)	1	400, 000	245	126	72	110, 000	447, 000	670, 800
CALEDONIA:								
Agricultural implements	3	49, 000	55	....	....	18, 600	23, 455	65, 800
Confectionery	1	30, 000	9	1	....	4, 500	40, 000	65, 000
Flouring- and grist-mill products	18	118, 250	27	....	....	6, 565	291, 570	330, 744
Foundery and machine-shop products	3	32, 000	20	....	....	7, 730	4, 750	26, 100
Furniture	2	5, 000	30	....	....	8, 640	32, 461	47, 900
Leather, curried	4	7, 400	4	....	....	1, 100	22, 809	27, 610
Leather, tanned	6	25, 000	10	....	....	3, 250	39, 325	52, 425
Lumber, planed	1	45, 000	40	....	....	12, 000	25, 000	50, 000
Lumber, sawed	50	384, 268	210	....	10	46, 160	229, 573	359, 232
Marble and stone work	8	86, 500	115	....	4	46, 230	66, 600	155, 250
Scales and balances	2	2, 651, 481	552	....	....	289, 420	140, 215	1, 769, 188
Tinware, copperware, and sheet-iron ware	6	22, 000	13	....	....	6, 450	13, 150	27, 200
Wood pulp	3	68, 000	39	....	....	13, 825	2, 000	49, 150
Woolen goods	3	41, 000	24	12	4	13, 250	26, 821	54, 460

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

VERMONT—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
CHITTENDEN:								
Boots and shoes	2	$37,000	50	1		$21,250	$45,888	$78,000
Boxes, wooden, packing	2	50,000	75		15	26,000	150,000	188,000
Brick and tile	5	86,500	96		5	21,650	8,050	41,500
Brooms and brushes	1	25,000	25		5	5,406	37,000	50,000
Cheese and butter (factory)	18	52,600	29	8		4,819	51,881	74,366
Coffee and spices, roasted and ground	2	5,000	5			1,400	40,000	46,500
Confectionery	2	9,000	7	5		3,350	14,500	21,000
Cooperage	6	9,700	19		2	5,000	6,800	21,200
Cotton goods	1	100,000	20	100	25	33,600	100,000	145,000
Flouring- and grist-mill products	11	103,506	29			10,977	207,911	245,412
Foundery and machine-shop products	4	230,000	142			60,500	66,000	166,000
Furniture	5	118,000	109		5	36,864	48,900	108,000
Furniture, chairs	1	8,000	16			5,000	10,000	20,000
Lasts	2	12,500	16			7,200	2,000	22,300
Leather, tanned	3	10,450	5			1,375	17,300	27,490
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	4	775,000	437		18	149,358	2,299,287	2,589,604
Lumber, sawed	25	153,000	89		4	18,181	69,677	119,310
Marble and stone work	5	248,000	292			93,500	209,000	356,500
Paper	1	10,000	15	3		4,200	20,170	26,000
Patent medicines and compounds	4	137,000	29	14		17,560	128,000	174,000
Printing and publishing	4	56,000	43	1	5	15,700	27,000	51,500
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and sawed).	5	91,500	152		55	57,100	184,000	277,000
Shirts	3	9,000	7	23		7,500	27,000	40,500
Tinware, copperware, and sheet-iron ware	9	60,000	68	6	1	24,850	51,800	91,700
Tobacco, cigars and cigarettes	3	9,500	16	4	1	6,800	16,520	28,480
Window blinds and shades	1	20,000	10		5	9,500	27,000	48,000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	2	47,000	44	4	45	22,000	22,000	62,000
Woolen goods	3	575,000	386	275	6	158,232	458,826	760,295
ESSEX:								
Flouring- and grist-mill products	1	7,500	3			700	19,700	24,000
Lumber, sawed	31	349,400	169		30	46,928	293,019	417,722
FRANKLIN:								
Flouring- and grist-mill products	17	89,350	27			6,731	177,243	205,869
Iron and steel	1	300,000	165			48,000	227,100	367,500
Leather, curried	3	12,500	8			2,400	97,489	103,000
Leather, tanned	9	59,000	25			6,250	138,506	171,110
Lime	4	21,050	46			14,548	16,778	51,178
Lumber, sawed	29	151,050	100		12	30,290	90,945	161,855
Saddlery and harness	13	11,530	18			5,130	11,290	23,850
Window blinds and shades	1	10,000	8			4,000	10,000	20,000
Woolen goods	2	30,000	14	10	3	5,800	17,179	30,000
LAMOILLE:								
Flouring- and grist-mill products	7	41,000	9			2,550	85,690	109,541
Leather, tanned	2	31,200	5			3,000	31,100	38,400
Lumber, sawed	45	208,850	182		2	27,597	122,905	202,753
Woolen goods	1	25,000	8	4		3,000	17,300	25,000
ORANGE:								
Flouring- and grist-mill products	19	83,900	30			3,900	228,715	265,382
Furniture	4	49,000	47			15,700	24,500	48,000
Lumber, sawed	50	124,000	137		5	12,953	76,478	124,937
Mixed textiles	2	27,000	22	16	1	11,200	55,325	80,000
Paper	1	50,000	15	3		6,300	23,500	38,000
Sash, doors, and blinds	2	40,000	33		2	11,000	31,000	50,000
Sporting goods	1	30,800	35	10		12,000	20,000	60,000
Woolen goods	5	31,000	27	18	1	11,900	59,953	86,671
ORLEANS:								
Boots and shoes	2	40,000	27	7		15,200	66,300	96,000
Flouring- and grist-mill products	15	74,900	21			5,456	166,172	198,384
Leather, tanned	4	25,000	11		1	2,250	32,057	43,750
Lumber planed (see also Wood, turned and carved)	1	10,000	14			4,000	21,000	28,000
Lumber, sawed	62	480,936	337		14	65,275	252,881	414,103
Starch	8	22,500	25			1,600	14,604	21,330
Tinware, copperware, and sheet-iron ware	7	13,300	10			3,175	11,976	20,800
Veneering	1	20,000	30	6	14	6,000	6,000	30,000
Wood, turned and carved (see also Lumber, planed)	1	20,000	35			13,000	22,000	50,000
RUTLAND:								
Agricultural implements	6	234,500	106	2		40,516	100,262	208,790
Bread and other bakery products	2	23,000	11	1		6,248	37,500	46,800
Carriages and sleds, children's	1	25,000	30		4	10,800	19,200	34,000
Carriages and wagons	5	34,500	36			13,300	14,800	41,500
Charcoal	1	65,000	100			30,000	10,000	60,000
Cheese and butter (factory)	39	73,150	58	7		9,811	146,102	200,339
Clothing, men's	4	7,800	4	24		8,540	19,791	34,756
Flouring- and grist-mill products	29	139,700	41			10,037	274,343	337,892
Foundery and machine-shop products	8	412,800	110	3	3	52,368	81,785	177,762
Iron and steel	1	30,000	25		1	2,035	13,800	24,800
Leather, tanned	3	17,750	7			1,900	25,200	32,270
Lumber, sawed	63	236,980	207		1	33,578	186,519	309,577
Mantles, slate, marble, and marbleized	6	22,000	47		6	21,900	29,500	73,500
Marble and stone work	17	209,000	285			115,860	166,137	455,033
Printing and publishing	2	6,000	19	5	3	10,000	21,500	36,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

VERMONT—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
RUTLAND—continued.								
Roofing and roofing materials	5	$215,000	90	2		$33,600	$52,400	$140,000
Saddlery and harness	10	20,850	23			8,086	21,150	36,950
Scales and balances	1	400,000	231			121,366	75,000	311,286
Tinware, copperware, and sheet-iron ware	12	47,175	48			21,200	35,825	84,675
Wood, turned and carved	8	59,940	112	8	29	36,109	21,456	70,818
Woolen goods	1	17,000	4	4	2	2,400	13,187	21,000
WASHINGTON:								
Agricultural implements	2	50,000	55			20,996	42,972	83,000
Bread and other bakery products	1	25,000	13			6,000	30,000	45,000
Clothing, men's	1	10,000	3	8		5,000	15,000	23,000
Flouring- and grist-mill products	21	95,530	28			6,323	330,348	381,286
Foundery and machine-shop products	5	148,500	93			41,856	54,700	131,316
Furniture	3	19,000	8			2,800	12,275	29,500
Leather, curried	3	40,000	15			5,550	133,111	150,700
Leather, tanned	5	93,000	41			16,790	167,400	230,336
Lumber, sawed	78	337,091	222		7	41,863	174,047	297,230
Marble and stone work	11	33,850	83			45,430	23,175	86,200
Plated and britannia ware	1	8,000	15			5,000	10,000	20,000
Tinware, copperware, and sheet-iron ware	12	43,375	18			5,745	18,550	37,600
Washing-machines and clothes-wringers	1	28,000	8			3,984	36,157	46,650
Woolen goods	7	180,726	60	52		28,841	121,678	166,721
WINDHAM:								
Agricultural implements	3	103,000	83			28,826	97,325	153,200
Baskets, rattan and willow ware	1	11,000	15			6,546	4,000	20,000
Carriages and sleds, children's	1	12,000	25	2	2	7,000	12,000	25,000
Clothing, men's	5	14,200	7	32		13,320	24,942	45,978
Flouring- and grist-mill products	24	75,875	22			6,155	215,469	254,068
Foundery and machine-shop products	5	15,375	26			11,245	8,130	36,425
Leather, curried	2	10,500	11			4,900	48,319	72,045
Leather, tanned	7	42,000	21			6,140	92,653	117,114
Lumber, sawed	72	157,775	148		3	17,430	104,660	172,322
Musical instruments, organs and materials	2	803,000	367	35		206,200	304,500	680,800
Paper	7	605,000	207	64		158,580	423,772	1,034,984
Saddlery and harness	11	7,750	10			3,442	13,078	25,010
Sewing machines and attachments	1	25,000	40			15,000	14,000	40,000
Shoddy	1	10,000	6			2,496	35,000	50,000
Tinware, copperware, and sheet-iron ware	7	18,950	17			6,920	16,521	35,165
Tobacco, cigars and cigarettes	3	15,600	22			10,825	16,300	33,375
Woolen goods	2	110,000	40	28	5	16,564	58,530	102,000
WINDSOR:								
Agricultural implements	8	124,700	106			42,081	63,000	144,940
Bread and other bakery products	3	47,000	25		1	11,000	38,030	99,130
Buttons	1	50,000	40	35	2	23,140	38,514	64,854
Carriages and sleds, children's	4	65,000	113	8	6	35,637	44,883	92,851
Clothing, men's	7	8,450	7	25		6,100	12,900	26,100
Cotton goods (see also Mixed textiles)	3	281,000	88	87	46	51,075	224,879	343,518
Flouring- and grist-mill products	40	147,350	44			10,550	326,215	371,913
Foundery and machine-shop products	10	142,000	97	3	1	37,857	63,304	144,025
Furniture, chairs	5	33,950	44		5	18,000	12,500	41,100
Leather, curried	2	6,500	4			1,150	28,665	32,854
Leather, tanned	6	76,500	28			10,725	111,700	154,300
Lumber, sawed	78	251,150	254			27,162	135,444	219,105
Mixed textiles (see also Cotton goods; Woolen goods)	3	344,000	109	110	9	69,000	341,800	523,803
Printing and publishing	7	19,200	25	13		10,607	8,590	28,224
Saddlery and harness	12	9,840	16			5,750	12,650	23,925
Tinware, copperware, and sheet-iron ware	15	31,800	28		2	10,700	27,068	51,750
Toys and games	5	31,500	45	1	1	10,910	27,069	52,171
Wooden ware	3	11,500	25	10		8,660	17,880	30,100
Woolen goods (see also Mixed textiles)	10	875,200	342	247	35	187,996	768,431	1,265,180

VIRGINIA.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ACCOMAC:								
Lumber, sawed	14	$31,100	48		1	$7,415	$29,230	$50,750
ALBEMARLE:								
Boots and shoes	1	2,000	10	5		5,000	13,830	25,000
Carriages and wagons	2	6,000	17			4,000	4,500	20,000
Flouring- and grist-mill products	28	92,650	54			7,248	135,230	157,125
Lumber, sawed	20	30,875	50			5,020	24,575	45,097
Woolen goods	2	82,000	34	22	3	17,195	74,390	103,666
ALEXANDRIA:								
Bread and other bakery products	6	18,050	26		9	10,042	68,100	90,800
Brick and tile	10	94,650	279		14	47,250	14,190	99,003
Clothing, men's	3	12,000	9	8		9,000	16,000	28,625
Confectionery	4	5,900	11			3,300	19,500	25,380
Drugs and chemicals	2	15,000	9			2,000	19,000	24,540
Fertilizers	2	13,000	11			2,735	18,000	24,500
Flouring- and grist-mill products	1	20,000	9			3,420	64,600	75,350
Foundery and machine-shop products	4	15,700	41			13,896	8,514	32,376
Leather, tanned	1	50,000	20			8,000	60,250	90,600
Liquors, malt	2	253,500	51			16,375	73,672	137,807

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

VIRGINIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
ALLEGHANY:								
Flouring- and grist-mill products	3	$20,000	5	....	....	$1,500	$37,240	$43,800
Iron and steel	2	1,000,000	144	....	6	62,468	76,179	168,920
AMELIA:								
Flouring- and grist-mill products	13	35,250	24	....	....	2,748	56,949	66,644
Lumber, sawed	9	31,700	24	....	....	2,295	10,830	20,400
AMHERST:								
Flouring- and grist-mill products	15	48,425	24	....	....	4,292	110,655	128,818
AUGUSTA:								
Carriages and wagons	4	16,100	45	....	....	15,500	38,000	67,000
Flouring- and grist-mill products	52	305,451	83	....	....	15,988	447,426	499,917
Foundery and machine-shop products	5	30,250	30	....	....	9,044	10,796	28,266
Leather, tanned	4	5,500	7	....	....	1,180	13,200	20,900
Liquors, distilled	9	102,300	13	....	....	4,175	39,000	58,725
Lumber, sawed	24	28,050	69	....	2	5,580	22,272	40,812
Sash, doors, and blinds	3	23,000	35	....	....	13,157	19,954	37,951
Windmills	1	7,000	15	....	....	5,000	20,000	30,000
Woolen goods	4	1,700	5	5	1	2,100	18,320	30,670
BEDFORD:								
Flouring- and grist-mill products	32	74,950	41	....	....	6,880	180,128	210,691
Lumber, sawed	27	31,125	79	....	2	7,963	37,469	59,145
Tobacco, chewing, smoking, and snuff	7	113,000	167	101	218	36,950	154,100	237,000
BOTETOURT:								
Flouring- and grist-mill products	28	84,500	31	....	....	3,682	150,800	167,628
Fruits and vegetables, canned and preserved	3	12,500	40	28	2	3,700	13,900	24,500
Lime	1	20,000	50	....	....	16,000	8,000	30,000
Lumber, sawed	23	22,100	36	....	....	3,695	28,550	44,201
BRUNSWICK:								
Flouring- and grist-mill products	21	37,300	36	....	....	3,669	77,660	91,160
BUCKINGHAM:								
Flouring- and grist-mill products	25	55,900	37	....	....	4,817	83,924	97,162
CAMPBELL:								
Bread and other bakery products	6	7,800	21	....	2	7,225	38,450	59,500
Carriages and wagons	1	30,000	30	....	....	9,600	15,000	35,000
Drugs and chemicals	2	53,500	35	....	....	13,000	46,000	70,800
Flouring- and grist-mill products	27	152,250	107	....	....	19,853	461,810	549,127
Kaolin and ground earths	2	6,000	24	....	....	8,250	10,500	24,050
Lumber, planed	1	10,000	48	....	2	13,345	35,000	50,000
Lumber, sawed	12	19,000	49	....	....	14,925	28,575	50,700
Printing and publishing	4	46,350	59	3	2	21,200	28,000	81,000
Tinware, copperware, and sheet-iron ware	5	28,300	26	....	....	8,980	22,350	40,750
Tobacco, chewing, smoking, and snuff	22	373,500	834	520	680	254,881	816,794	1,275,500
CAROLINE:								
Flouring- and grist-mill products	24	55,350	28	....	....	2,954	57,332	65,786
Lumber, sawed	15	46,450	84	....	31	11,345	20,636	44,490
CARROLL:								
Flouring- and grist-mill products	25	28,500	21	....	....	4,460	56,670	68,044
Lumber, sawed	10	15,300	40	....	....	3,505	11,010	23,030
CHARLOTTE:								
Flouring- and grist-mill products	13	37,600	26	....	....	3,575	78,912	89,206
CHESTERFIELD:								
Brick and tile	7	9,500	96	....	15	16,950	8,435	35,150
Cotton goods	2	260,000	73	162	114	58,787	181,501	293,150
Drugs and chemicals	1	13,000	8	....	....	1,480	15,740	22,200
Flouring- and grist-mill products	11	28,600	21	....	....	4,844	111,535	125,549
Kaolin and ground earths	1	32,000	30	....	....	12,000	4,000	20,000
Leather, tanned	2	14,000	9	....	....	1,600	24,425	32,400
Lumber, sawed	11	26,730	64	....	2	9,566	28,137	52,587
Paper	1	20,000	16	12	2	10,000	16,000	36,000
Tobacco, chewing, smoking, and snuff	1	7,000	28	3	9	6,000	30,000	37,000
Wooden ware	1	50,000	60	....	15	23,000	38,000	71,000
CLARKE:								
Flouring- and grist-mill products	11	26,100	15	....	....	1,580	66,375	73,948
Lumber, sawed	10	14,200	30	....	....	3,245	15,195	27,565
CULPEPER:								
Flouring- and grist-mill products	19	52,500	26	....	....	3,765	127,745	147,049
Lumber, sawed	8	15,300	38	....	....	5,025	20,570	35,410
CUMBERLAND:								
Flouring- and grist-mill products	11	36,000	15	....	....	2,387	123,820	146,979
DINWIDDIE:								
Agricultural implements	3	31,000	68	....	....	21,430	22,490	50,565
Bread and other bakery products	8	6,750	32	2	1	7,462	40,600	57,900
Clothing, men's	5	6,130	16	9	....	8,186	18,380	36,280
Cotton goods	6	930,100	201	368	167	111,052	458,890	747,812
Flouring- and grist-mill products	11	123,450	36	....	....	9,240	198,975	231,257
Foundery and machine-shop products	1	16,000	34	....	....	9,130	20,781	35,004
Printing and publishing	3	12,000	29	....	2	15,252	14,800	37,000
Slaughtering and meat-packing, not including retail butchering establishments.	1	4,000	6	....	....	1,250	33,800	37,500
Tinware, copperware, and sheet-iron ware	4	6,200	20	....	....	6,600	16,100	33,600
Tobacco, chewing, smoking, and snuff	14	658,500	1,516	864	562	347,345	2,395,196	3,194,245

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

VIRGINIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ELIZABETH CITY:								
Fertilizers	1	$36,000	35	....	....	$5,000	$30,000	$40,000
Fruits and vegetables, canned and preserved	2	3,700	60	112	21	10,500	10,300	26,300
Lumber, sawed	3	13,350	21	....	....	3,380	15,275	21,960
Shipbuilding	15	3,060	14	....	....	8,670	5,490	21,200
ESSEX:								
Drugs and chemicals	1	15,000	3	....	....	600	15,000	20,000
Flouring- and grist-mill products	10	29,000	11	....	....	1,180	23,315	26,695
Lumber, sawed	12	32,800	112	....	....	14,120	44,650	81,900
FAIRFAX:								
Flouring and grist-mill products	11	57,700	22	....	....	5,425	145,445	168,417
Lumber, sawed	9	29,500	21	....	....	3,668	20,615	35,130
FAUQUIER:								
Flouring- and grist-mill products	12	31,000	12	....	....	1,742	56,529	65,978
FLOYD:								
Flouring- and grist-mill products	35	46,750	33	....	....	4,620	99,570	115,645
Lumber, sawed	21	14,700	25	....	1	2,625	12,394	23,895
FLUVANNA:								
Flouring- and grist-mill products	13	26,685	16	....	....	1,205	52,130	58,610
FRANKLIN:								
Flouring- and grist-mill products	27	57,900	19	....	....	2,805	100,670	119,394
Lumber, sawed	11	16,275	32	....	....	4,079	13,175	26,540
Tobacco, chewing, smoking, and snuff	2	14,500	64	9	17	3,500	25,800	35,000
FREDERICK:								
Boots and shoes	1	40,000	35	20	5	11,681	13,000	48,000
Confectionery	3	10,700	11	....	1	5,400	16,050	27,800
Flouring- and grist-mill products	23	177,624	42	....	....	7,991	306,785	346,441
Furniture	2	3,600	18	....	....	5,600	9,720	20,100
Gloves and mittens (see also Woolen goods)	3	51,100	35	215	....	26,600	17,500	63,000
Leather, tanned	5	158,000	35	....	....	12,376	179,555	249,975
Mixed textiles (see also Woolen goods)	1	30,000	15	....	....	10,000	23,260	50,000
Paper	1	75,000	45	....	....	18,000	42,000	100,000
Tobacco, cigars and cigarettes	6	14,350	36	....	4	7,950	15,377	32,777
Woolen goods (see also Gloves and mittens; Mixed textiles)	6	135,000	68	5	1	20,440	92,210	143,093
GOOCHLAND:								
Flouring- and grist-mill products	14	58,500	15	1	1	2,594	79,345	89,103
Lumber, sawed	8	10,010	42	....	....	3,530	10,530	20,725
GRAYSON:								
Flouring- and grist-mill products	23	43,550	16	....	....	3,671	74,238	84,409
HALIFAX:								
Flouring- and grist-mill products	35	80,500	62	1	....	10,030	220,873	250,925
Lumber, sawed	19	26,350	49	....	1	3,824	15,248	30,920
Tobacco, smoking, chewing, and snuff	3	18,500	67	15	36	6,100	15,350	32,882
HANOVER:								
Flouring- and grist-mill products	24	46,050	30	....	....	3,933	51,310	60,889
Lumber, sawed	14	35,200	80	....	3	9,857	35,085	62,560
HENRICO:								
Agricultural implements	5	219,530	246	....	2	82,904	114,972	320,988
Bagging, flax, hemp, and jute	1	40,000	15	2	5	6,500	25,000	32,500
Bags, other than paper	1	12,000	4	10	26	6,000	18,000	35,000
Bags, paper	2	9,000	....	24	10	4,000	14,000	21,000
Boots and shoes	2	12,000	117	11	....	9,500	61,563	79,520
Boxes, cigars	3	6,100	15	9	5	5,700	21,500	35,600
Boxes, fancy and paper	3	18,000	52	87	102	48,596	26,210	107,410
Boxes, wooden, packing	8	97,600	121	....	12	51,671	114,482	206,011
Bread and other bakery products	20	59,000	74	14	1	30,311	148,540	23[illegible],060
Brick and tile	9	81,850	150	....	50	35,787	21,975	80,753
Brooms and brushes	2	18,000	44	....	4	8,800	32,000	55,000
Carriages and wagons	9	63,000	101	....	2	31,750	56,900	140,000
Clothing, men's	24	155,367	163	405	2	80,308	169,511	359,022
Coffee and spices, roasted and ground	5	46,000	36	1	1	13,060	143,000	241,000
Confectionery	13	69,700	63	7	6	23,687	98,624	151,450
Cooperage	16	33,875	239	....	9	36,840	89,922	155,782
Drugs and chemicals (see also Patent medicines and compounds)	7	142,500	247	....	3	39,200	160,250	247,790
Fertilizers	5	298,000	172	3	....	28,960	326,450	476,600
Flouring- and grist-mill products	11	1,242,300	203	....	....	81,015	2,171,212	2,470,902
Food preparations (see page 39)	1	15,000	16	3	1	5,300	36,000	52,000
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	13	523,500	1,044	....	61	287,993	541,898	1,056,351
Furniture	26	108,650	124	10	13	55,605	96,570	232,010
Grease and tallow	2	15,000	6	....	....	1,800	37,500	52,000
Hairwork	4	7,500	5	36	....	8,200	16,900	33,000
Iron bolts, nuts, washers, and rivets	1	30,000	40	....	60	30,000	180,000	240,000
Iron forgings	1	60,000	58	....	....	19,000	110,000	210,000
Iron and steel	3	702,000	1,004	....	50	336,311	1,173,801	1,973,916
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	2	32,000	25	....	2	10,000	19,700	42,650
Leather, tanned	2	20,000	11	....	....	3,650	22,500	31,000
Lithographing (see also Printing and publishing)	2	24,600	18	3	13	13,125	40,150	56,823
Looking-glass and picture frames	7	8,950	28	....	9	10,400	21,850	50,500
Lumber, planed (see also Sash, doors, and blinds)	1	3,000	16	....	....	5,000	100,000	130,000
Marble and stone work	7	20,400	56	....	....	24,200	28,600	71,100
Mineral and soda waters	2	8,000	12	....	4	4,900	7,200	21,000
Oil, lubricating	3	12,000	7	....	1	990	11,300	20,500

Table V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

VIRGINIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
HENRICO—continued.								
Paper	1	$75, 000	26	14		$12, 000	$70, 014	$125, 000
Patent medicines and compounds (see also Drugs and chemicals)	8	37, 000	32	1		10, 150	25, 900	52, 900
Printing and publishing (see also Lithographing)	18	187, 300	265	10	24	138, 745	125, 834	353, 325
Saddlery and harness	12	38, 100	74		9	37, 644	71, 020	141, 400
Sash, doors, and blinds (see also Lumber, planed)	6	73, 500	100			39, 092	201, 513	311, 184
Shipbuilding	4	3, 500	23			9, 300	8, 900	23, 500
Slaughtering and meat-packing, not including retail butchering establishments.	3	85, 000	47			12, 500	934, 100	1, 017, 000
Soap and candles	3	26, 000	17	1		7, 100	19, 400	38, 000
Tinware, copperware, and sheet-iron ware	26	88, 050	143		3	55, 800	135, 700	265, 500
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars, and cigarettes).	39	1, 383, 100	2, 838	1, 704	1, 179	895, 657	3, 109, 076	6, 580, 984
Tobacco, cigars, and cigarettes (see also Tobacco, chewing, smoking and snuff).	26	140, 430	261	19	78	76, 770	152, 980	343, 702
Tobacco stemming	27	435, 184	369	470	202	81, 215	767, 973	1, 074, 005
Trunks and valises	2	9, 000	24			8, 400	18, 000	41, 000
HENRY:								
Flouring- and grist-mill products	21	50, 100	28			3, 257	75, 011	88, 495
Tobacco, chewing, smoking, and snuff	14	173, 800	250	61	166	38, 055	164, 600	275, 900
ISLE OF WIGHT:								
Lumber, sawed	15	126, 800	128			20, 649	67, 830	114, 075
KING WILLIAM:								
Flouring- and grist-mill products	6	22, 200	6			1, 165	22, 956	28, 700
Fruits and vegetables, canned and preserved	1	5, 000	56			4, 000	50, 000	60, 000
Lumber, sawed	2	11, 000	22			7, 750	9, 900	21, 000
LOUDOUN:								
Flouring- and grist-mill products	32	121, 600	44			5, 956	190, 786	216, 809
Lumber, sawed	13	16, 700	30		1	2, 355	16, 741	28, 216
LOUISA:								
Drugs and chemicals	1	15, 000	17	2		3, 450	9, 000	20, 000
Flouring- and grist-mill products	21	50, 100	28			3, 435	100, 891	115, 684
Lumber, sawed	6	9, 200	36		4	3, 620	11, 735	22, 100
MADISON:								
Flouring- and grist-mill products	14	38, 500	20			3, 250	85, 754	94, 884
MECKLENBURG:								
Flouring- and grist-mill products	24	63, 400	41			5, 260	165, 000	188, 546
MONTGOMERY:								
Flouring- and grist-mill products	14	42, 300	14			2, 959	67, 695	83, 522
NANSEMOND:								
Lumber, sawed	8	33, 500	67			14, 210	50, 605	84, 900
NELSON:								
Flouring- and grist-mill products	19	62, 200	24			5, 616	83, 851	102, 715
NORFOLK:								
Agricultural implements	3	71, 000	10			8, 250	31, 200	49, 500
Bread and other bakery products	9	39, 200	66	15	7	25, 921	144, 000	200, 700
Brick and tile	6	39, 500	210		15	28, 600	8, 825	58, 500
Carriages and wagons	4	81, 200	68		5	27, 500	75, 500	123, 800
Clothing, men's	9	22, 800	40	39		37, 305	39, 200	100, 800
Flouring-and grist-mill products	6	98, 500	27			9, 662	293, 104	347, 737
Foundery and machine-shop products	5	75, 000	93		2	37, 800	34, 036	86, 350
Lumber, planed	2	18, 200	16			6, 315	40, 000	66, 500
Lumber, sawed	12	257, 750	432		14	108, 160	394, 120	599, 060
Printing and publishing	5	55, 600	73			41, 000	27, 300	94, 400
Saddlery and harness	2	3, 500	6			3, 187	24, 500	30, 000
Shipbuilding	6	52, 600	40			23, 891	24, 800	58, 500
Tinware, copperware, and sheet-iron ware	9	31, 000	71		3	33, 600	54, 173	108, 400
Tobacco, cigars, and cigarettes	7	5, 500	24		1	9, 850	9, 294	25, 000
NOTTOWAY:								
Flouring- and grist-mill products	8	27, 600	16			2, 470	54, 908	65, 133
Lumber, sawed	9	16, 000	27		1	2, 292	10, 060	20, 090
ORANGE:								
Flouring- and grist-mill products	9	43, 600	12			2, 591	76, 149	87, 891
PAGE:								
Flouring- and grist-mill products	19	48, 100	21			2, 870	86, 995	98, 207
Iron and steel	2	580, 000	235		15	80, 000	105, 068	200, 450
Lumber, sawed	17	16, 300	55		1	6, 001	28, 875	50, 155
PITTSYLVANIA:								
Boxes, wooden, packing	2	20, 000	31		4	5, 454	21, 653	41, 055
Cooperage	2	9, 000	22			6, 487	16, 000	30, 000
Flouring- and grist-mill products	22	75, 500	36			6, 267	129, 025	154, 452
Lumber, sawed	24	76, 950	220		4	34, 035	118, 160	192, 356
Printing and publishing	5	14, 050	24		2	9, 405	5, 000	23, 100
Sash, doors, and blinds	2	12, 000	16			5, 380	17, 000	26, 000
Tinware, copperware, and sheet-iron ware	5	8, 100	15			6, 900	32, 000	47, 800
Tobacco, chewing, smoking, and snuff	29	703, 400	825	351	516	233, 859	846, 581	1, 309, 127
PRINCE EDWARD:								
Flouring- and grist-mill products	11	19, 200	22			2, 823	55, 395	68, 112
Lumber, sawed	6	20, 900	32			4, 480	12, 100	22, 060

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

VIRGINIA—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
PULASKI:								
Flouring- and grist-mill products	10	$44,000	17	....	....	$1,829	$71,868	$91,750
RAPPAHANNOCK:								
Flouring- and grist-mill products	18	37,500	28	....	....	2,569	75,745	86,513
Leather, tanned	2	16,500	23	....	....	7,500	54,250	67,350
ROANOKE:								
Flouring- and grist-mill products	15	85,800	23	....	....	5,055	146,068	172,007
Tobacco, chewing, smoking, and snuff	6	61,500	72	37	70	17,400	70,100	107,900
Woolen goods	1	25,000	12	7	....	3,000	20,350	28,000
ROCKBRIDGE:								
Flouring- and grist-mill products	35	110,055	31	....	....	5,920	168,528	191,752
ROCKINGHAM:								
Agricultural implements	3	45,500	22	....	....	7,100	7,000	22,550
Fertilizers	3	24,100	[illegible]	....	....	975	14,800	21,500
Flouring- and grist-mill products	32	192,800	46	....	....	7,551	375,885	422,725
Leather, curried	6	7,950	5	....	....	1,100	20,989	25,100
Leather, tanned	8	88,150	26	....	....	7,946	83,010	112,600
Lumber, sawed	35	65,725	111	....	....	12,030	46,930	89,928
SCOTT:								
Flouring- and grist-mill products	29	26,152	29	....	....	3,961	95,979	111,242
SHENANDOAH:								
Flouring- and grist-mill products	35	162,100	45	....	....	6,941	321,932	368,299
Iron and steel	6	307,000	175	....	40	46,400	36,950	67,760
Leather, tanned	8	30,950	18	....	....	3,660	36,557	46,600
Lumber, sawed	36	56,125	82	....	4	10,625	45,470	78,509
SMYTH:								
Flouring- and grist-mill products	21	66,000	20	....	....	4,840	79,520	98,869
Foundery and machine-shop products	1	15,000	38	....	12	6,000	10,000	22,500
Lumber, sawed	24	36,350	49	....	2	7,553	22,365	44,796
Mixed textiles (see also Woolen goods)	1	53,000	13	17	....	6,000	34,800	58,500
Salt	1	1,000,000	76	....	....	14,219	39,000	127,678
Woolen goods (see also Mixed textiles)	2	54,250	29	17	....	6,000	38,726	63,250
SOUTHAMPTON:								
Flouring- and grist-mill products	21	26,000	30	....	....	3,452	48,890	59,599
Lumber, sawed	15	31,500	92	....	1	12,535	30,450	62,750
SPOTSYLVANIA:								
Agricultural implements	1	45,650	36	....	2	9,650	27,856	50,062
Boots and shoes	1	6,800	10	6	2	4,200	28,500	35,000
Fertilizers	1	15,000	11	....	....	2,500	20,000	28,400
Flouring- and grist-mill products	16	176,050	69	....	....	17,983	466,651	525,228
Lumber, sawed	11	14,200	39	....	....	3,435	15,287	29,060
Pickles, preserves, and sauces	1	20,000	5	25	10	5,000	15,000	35,000
Woolen goods	1	40,000	20	10	....	8,000	44,700	79,000
SURRY:								
Lumber, sawed	12	81,800	127	....	1	15,005	63,485	100,900
TAZEWELL:								
Flouring- and grist-mill products	17	52,700	24	....	....	4,858	75,021	87,957
Lumber, sawed	17	26,750	33	....	....	2,276	10,055	20,234
WARREN:								
Flouring- and grist-mill products	15	118,700	20	....	....	5,975	135,323	154,913
Leather, tanned	3	134,800	29	....	....	8,200	69,350	107,500
Lime	1	10,000	15	....	....	4,500	4,000	30,000
Lumber, planed	1	6,000	12	....	....	4,500	11,300	20,000
WASHINGTON:								
Flouring- and grist-mill products	35	74,500	35	....	....	6,297	111,811	139,384
Lumber, sawed	19	24,300	51	....	1	6,500	28,780	52,705
Tobacco, chewing, smoking, and snuff	2	51,800	20	....	28	10,400	40,800	92,500
Woolen goods	4	18,200	8	6	4	3,600	16,239	20,289
WYTHE:								
Flouring- and grist-mill products	15	123,800	26	....	....	5,042	88,103	102,626
Iron and steel	8	163,000	262	2	7	64,605	64,726	133,325
Lumber, sawed	12	13,800	37	....	....	3,609	15,881	27,924

WASHINGTON TERRITORY.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
COLUMBIA:								
Woolen goods	1	$40,000	18	8	3	$4,000	$52,000	$70,000
ISLAND:								
Lumber, sawed	1	100,000	50	....	....	15,000	160,000	250,000
JEFFERSON:								
Lumber, sawed	1	200,000	25	....	....	12,650	105,350	130,000
Shipbuilding	1	10,000	25	....	....	18,838	55,500	80,000
KITSAP:								
Lumber, sawed	5	1,475,100	256	....	....	107,075	543,400	785,500

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

WASHINGTON TERRITORY—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Average number of hands employed. Females above 15 years.	Average number of hands employed. Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
KING:								
Flouring- and grist-mill products	1	$5,000	5			$1,800	$18,000	$25,000
Foundery and machine-shop products	2	20,000	15			10,400	10,500	25,775
Furniture	2	17,500	15			6,790	5,300	20,280
Liquors, malt	2	30,000	9			4,359	16,511	29,300
Lumber, sawed	2	260,000	47			20,600	92,600	153,000
Sash, doors, and blinds	1	30,000	12			9,000	12,000	40,000
Shipbuilding	3	17,000	28			24,280	50,700	78,500
Tinware, copperware, and sheet-iron ware	2	5,500	7			6,500	15,000	27,000
PIERCE:								
Cooperage	1	10,000	72		3	30,000	10,000	48,000
Lumber, sawed	2	218,000	45			18,675	170,000	218,000
THURSTON:								
Lumber, sawed	4	66,050	12			5,440	15,190	29,700
WALLA WALLA:								
Furniture	4	26,200	18			9,700	20,000	60,200
Liquors, malt	4	28,500	12			3,447	12,873	23,160
Saddlery and harness	3	60,000	22			18,000	60,000	120,000

WEST VIRGINIA.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Average number of hands employed. Females above 15 years.	Average number of hands employed. Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
BARBOUR:								
Flouring- and grist-mill products	15	$38,970	33			$3,111	$48,807	$56,773
Lumber, sawed	5	6,900	16		2	3,915	10,777	20,450
BERKELEY:								
Flouring- and grist-mill products	22	110,100	29			6,855	209,826	237,068
Foundery and machine-shop products	3	27,100	21			9,000	15,150	38,900
Liquors, distilled	1	200,000	25			8,750	113,000	168,600
Lumber, planed	1	100,000	8			3,500	30,000	45,000
Lumber, sawed	19	28,300	44		3	6,164	21,108	40,275
BROOKE:								
Agricultural implements	1	30,000	15			6,000	3,500	21,500
Flouring- and grist-mill products	8	30,000	5			591	52,340	59,386
Glass	1	50,000	90	13	25	15,200	15,500	34,500
Paper	2	60,000	34	1		11,200	70,000	103,000
Woolen goods	1	8,000	10			1,850	8,880	20,000
CABELL:								
Flouring- and grist-mill products	9	24,300	15			2,120	57,774	68,720
Foundery and machine-shop products	3	7,500	55			20,445	36,750	67,500
Lumber, planed	3	15,500	25			7,600	10,600	34,000
Lumber, sawed	12	86,200	60		7	18,652	92,060	132,697
DODDRIDGE:								
Flouring- and grist-mill products	9	20,260	19			2,719	72,231	84,323
Lumber, sawed	18	36,100	93			25,137	82,600	141,398
FAYETTE:								
Coke	[illegible]	239,000	98		1	27,612	85,764	127,588
Flouring- and grist-mill products	7	8,850	6			825	18,528	21,352
Iron and steel	1	250,000	57			37,710	140,039	238,394
Lumber, sawed	10	49,100	67			17,063	50,120	94,520
GREENBRIER:								
Flouring- and grist-mill products	16	37,400	8			1,470	59,662	67,827
Lumber, sawed	8	73,310	55		3	7,530	19,755	37,050
HAMPSHIRE:								
Flouring- and grist-mill products	19	36,955	18			2,610	77,803	86,842
Leather, tanned	3	11,600	6			1,300	36,250	52,100
Lumber, sawed	19	15,976	38		2	5,601	13,227	26,370
HANCOCK:								
Brick and tile	13	181,200	167		8	70,602	23,119	131,600
Flouring- and grist-mill products	4	12,500	5			909	23,655	27,020
Lumber, sawed	5	14,200	17			3,965	12,850	23,800
HARRISON:								
Flouring- and grist-mill products	20	70,250	36			7,398	176,599	202,932
Foundery and machine-shop products	2	21,000	23			6,240	7,000	23,000
Leather, tanned	5	19,580	7			1,600	14,665	21,220
Lumber, planed	2	9,100	12			3,876	15,700	20,750
Lumber, sawed	20	42,556	66			12,575	43,128	78,765
JACKSON:								
Cooperage	9	3,000	20			5,400	9,150	21,650
Flouring- and grist-mill products	7	40,400	12			2,200	97,914	114,897
Lumber, sawed	18	27,475	59		2	11,300	33,333	59,325
Shipbuilding	1	3,000	12			6,100	65,000	73,000
JEFFERSON:								
Carriage and wagon materials	1	10,000	18		1	6,500	4,000	20,000
Flouring- and grist-mill products	21	226,850	60			13,510	296,753	349,634
Lumber, sawed	12	33,900	30			5,230	19,861	35,430
Paper	1	100,000	40		3	14,000	75,900	108,000
KANAWHA:								
Flouring- and grist-mill products	8	32,000	19			4,349	83,055	96,005
Leather, curried	1	2,000	3			1,000	19,290	21,840
Leather, tanned	2	6,000	15			5,264	13,350	22,690
Lumber, sawed	16	61,125	77		3	13,470	35,360	65,085
Salt	5	80,500	204		15	38,208	52,714	91,140

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

WEST VIRGINIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
KANAWHA—continued.								
Shipbuilding	4	$7, 500	26			$11, 480	$21, 300	$35, 000
Woolen goods	1	50, 000	21	15	6	7, 850	40, 900	60, 000
LEWIS:								
Flouring- and grist-mill products	10	51, 375	16			3, 076	92, 439	111, 567
Lumber, sawed	8	14, 620	32		1	6, 352	21, 426	36, 129
MARION:								
Flouring- and grist-mill products	22	103, 200	47			9, 504	218, 505	251, 959
Foundery and machine-shop products	3	23, 500	27			7, 100	6, 800	25, 000
Leather, tanned	3	43, 200	36			10, 000	106, 200	129, 240
Lumber, sawed	21	38, 300	81		3	18, 316	52, 174	94, 735
Stone- and earthen-ware	2	17, 000	40	2		12, 500	6, 900	23, 500
MARSHALL:								
Brooms and brushes	1	8, 000	33			4, 200	22, 000	29, 000
Carriages and wagons	1	50, 000	109			22, 872	99, 040	165, 000
Cooperage	2	6, 000	47		20	20, 750	62, 000	93, 500
Flouring- and grist-mill products	15	78, 900	21			4, 291	131, 331	145, 088
Iron and steel	3	745, 191	679		67	267, 785	686, 978	1, 180, 114
Leather, curried	3	4, 300	4			1, 460	25, 650	31, 300
Leather, tanned	3	10, 600	4			1, 900	18, 200	24, 600
Lumber, sawed	13	41, 800	56		16	17, 525	32, 525	68, 165
Whips	1	30, 000	90			16, 000	40, 000	60, 000
MASON:								
Drugs and chemicals	9	17, 100	24			7, 260	32, 590	78, 710
Flouring- and grist-mill products	10	35, 700	19	1		3, 075	117, 100	138, 571
Iron and steel	1	75, 000	160		15	26, 445	50, 284	97, 257
Leather, curried	2	2, 850	2			450	21, 150	26, 300
Leather, tanned	2	4, 500	3			800	15, 600	21, 800
Lumber, sawed	20	93, 525	129		22	23, 143	56, 059	109, 773
Salt	10	830, 000	498		19	122, 019	139, 399	289, 229
Shipbuilding	2	15, 500	39			20, 960	39, 100	67, 300
MINERAL:								
Clothing, men's	1	2, 500	15	3		8, 400	10, 000	20, 000
Flouring- and grist-mill products	6	18, 200	8			1, 092	24, 045	29, 597
Leather, tanned	1	25, 000	11			4, 000	35, 000	45, 000
Lumber, sawed	4	17, 728	14			4, 112	10, 875	21, 262
MONONGALIA:								
Flouring- and grist-mill products	21	86, 500	35			6, 022	149, 670	176, 164
Lumber, sawed	13	15, 500	36			4, 700	15, 958	27, 660
MONROE:								
Flouring- and grist-mill products	14	34, 500	13			2, 409	78, 896	91, 933
Lumber, sawed	11	43, 350	41			9, 883	31, 336	56, 395
Woolen goods	2	24, 000	19	6		5, 355	18, 501	33, 200
MORGAN:								
Leather, tanned	2	100, 000	95			42, 555	432, 000	618, 000
OHIO:								
Baking and yeast powders	1	3, 000	1	1		500	15, 000	20, 000
Brick and tile	8	33, 000	83		22	13, 249	3, 364	28, 760
Carriages and wagons	4	172, 000	78		1	36, 234	54, 000	145, 000
Clothing, men's	27	85, 000	160	10	15	47, 500	108, 000	220, 684
Confectionery	5	9, 050	18	2		6, 002	51, 300	64, 964
Cooperage	5	25, 800	63		32	42, 608	38, 339	89, 900
Dyeing and finishing textiles	1	30, 000	8			6, 500	42, 800	54, 000
Flouring- and grist-mill products	7	76, 500	15			6, 780	142, 753	161, 286
Foundery and machine-shop products	6	221, 500	198		1	89, 339	69, 471	228, 762
Furniture	3	48, 000	103		2	40, 616	31, 342	98, 827
Glass	3	500, 522	525	87	206	296, 450	192, 564	714, 000
Hardware	1	110, 000	60		40	27, 500	63, 000	190, 000
Iron and steel	7	2, 214, 425	2, 327		246	1, 098, 296	2, 472, 053	4, 306, 567
Iron nails and spikes, cut and wrought	1	60, 000	15	10	18	15, 000	30, 000	110, 000
Lamps and reflectors	1	20, 000	16	8	6	13, 000	36, 000	75, 000
Leather, curried	4	123, 200	58			34, 800	377, 258	447, 972
Leather, tanned	4	166, 000	61	1		21, 422	334, 740	378, 152
Liquors, malt	5	203, 017	85			33, 329	153, 982	276, 588
Lumber, planed (see also Sash, doors, and blinds)	4	148, 000	83		2	38, 990	173, 500	237, 400
Lumber, sawed	3	22, 250	12		2	1, 811	14, 110	22, 122
Marble and stone work	3	14, 750	30			12, 860	9, 600	33, 334
Printing and publishing	7	122, 500	127	15	35	67, 392	41, 864	165, 356
Saddlery and harness	6	16, 100	18			9, 572	23, 750	43, 450
Sash, doors, and blinds (see also Lumber, planed)	1	20, 000	20			7, 000	13, 000	35, 000
Shipbuilding	3	7, 500	9			6, 850	16, 800	27, 550
Shirts	4	1, 200		40		9, 200	20, 240	33, 890
Slaughtering and meat-packing, not including retail butchering establishments.	4	97, 361	25			11, 350	243, 440	270, 500
Tinware, copperware, and sheet-iron ware	11	40, 373	49		5	23, 393	49, 461	94, 405
Tobacco, cigars and cigarettes	46	125, 365	235	3	21	86, 864	220, 620	370, 818
PLEASANTS:								
Flouring- and grist-mill products	5	18, 500	9			1, 637	46, 331	55, 433
Leather, curried	1	3, 000	2			775	21, 400	25, 450
Leather, tanned	1	5, 000	2			1, 400	14, 652	20, 450
Lumber, sawed	8	21, 800	30		1	5, 787	22, 430	38, 512

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

WEST VIRGINIA—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
PRESTON:								
Coke	4	$74,000	54		3	$18,850	$48,850	$82,000
Flouring- and grist-mill products	27	69,300	29		1	4,956	113,187	139,318
Iron and steel	3	159,000	429		1	93,246	75,536	159,400
Lumber, sawed	27	48,330	84			15,282	52,234	94,298
RITCHIE:								
Flouring- and grist-mill products	14	38,107	17			2,799	74,035	84,720
Lumber, sawed	12	93,025	97			27,048	65,237	116,685
TAYLOR:								
Flouring- and grist-mill products	11	50,400	15			3,058	85,541	95,812
Iron and steel	1	250,000	35			12,000	56,000	63,500
Lumber, sawed	9	93,900	57		3	9,532	45,445	72,835
Woolen goods	1	20,000	5	7		2,085	13,500	20,000
TYLER:								
Flouring- and grist-mill products	15	26,710	24			3,105	100,503	119,639
Lumber, sawed	23	74,300	110		12	13,640	31,060	65,220
Woolen, goods	2	20,000	15	13	2	1,850	19,000	23,583
WAYNE:								
Flouring- and grist-mill products	11	15,000	12			1,917	52,187	60,352
Lumber, sawed	5	14,850	55		12	11,190	42,075	65,085
WETZEL:								
Flouring- and grist-mill products	11	33,400	24			3,839	88,655	106,174
Lumber, sawed	24	159,050	180		15	57,103	176,705	304,090
WIRT:								
Flouring- and grist-mill products	5	12,700	13			2,679	52,897	64,618
Lumber, sawed	8	40,200	60		2	14,495	57,275	91,455
WOOD:								
Clothing, men's	2	9,000	17	10		8,800	19,000	33,000
Cooperage	9	5,700	47			10,675	12,450	30,300
Drugs and chemicals	1	70,000	30		1	14,485	33,620	101,486
Flouring- and grist-mill products	12	116,700	49			16,188	203,625	244,943
Foundery and machine-shop products	5	22,300	29			11,100	10,600	30,500
Liquors, malt	1	15,000	8			2,679	12,504	20,675
Lumber, sawed	16	187,200	102		6	45,294	82,145	151,221
Saddlery and harness	3	6,500	10		1	1,785	13,000	22,500
Slaughtering and meat-packing, not including retail butchering establishments.	1	800	4			1,200	22,100	25,000
Tinware, copperware, and sheet-iron ware	3	26,500	19			8,000	20,000	32,000
Tobacco, cigars and cigarettes	7	4,750	25		4	9,800	13,550	27,400

WISCONSIN.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ASHLAND:								
Lumber, sawed	3	$88,000	58		8	$12,800	$62,500	$92,000
BARRON:								
Flouring- and grist-mill products	5	20,000	10			2,129	29,552	34,105
Lumber, sawed	11	71,500	54	7	4	10,700	78,982	124,410
BROWN:								
Agricultural implements	3	51,500	40		4	14,960	24,965	67,815
Carriages and wagons	4	17,000	29		1	9,500	19,400	37,500
Charcoal	7	32,800	78			24,965	40,140	78,325
Clothing, men's	6	9,450	28			11,830	18,850	40,500
Cooperage	3	30,400	73			41,100	50,900	103,400
Flouring- and grist-mill products	11	152,050	42			14,700	404,838	462,801
Foundery and machine-shop products	8	76,500	54		1	27,600	45,000	96,000
Furniture	6	9,800	22		1	8,100	9,900	20,800
Iron and steel	2	350,000	425			191,000	639,810	1,254,000
Leather, curried	1	40,000	10			4,000	65,500	100,000
Leather, tanned	1	20,000	6			2,000	55,000	65,000
Liquors, malt	5	113,000	25			12,443	53,645	95,650
Lumber, sawed	21	127,800	146	2	13	24,875	129,945	216,080
Saddlery and harness	6	7,000	14			3,955	14,700	25,100
Sash, doors, and blinds	5	98,300	97		1	34,750	106,300	175,500
Shipbuilding	4	13,500	53			24,600	54,500	83,000
Slaughtering and meat-packing, not including retail butchering establishments.	1	15,000	12			3,000	75,500	87,000
Tobacco, cigars and cigarettes	5	3,050	15		4	8,000	13,750	28,500
Wooden ware	1	60,000	130		10	50,000	79,000	150,000
BUFFALO:								
Flouring- and grist-mill products	11	62,450	19			4,996	112,705	130,553
Lumber, sawed	4	27,000	16		6	3,700	13,000	22,859
CALUMET:								
Cooperage	4	26,400	20			7,500	12,610	26,790
Flouring- and grist-mill products	9	78,175	18			4,993	243,433	276,396
Lumber, sawed	13	84,900	72	1		8,199	63,452	94,080
CHIPPEWA:								
Flouring- and grist-mill products	6	143,000	26			8,015	240,245	268,533
Liquors, malt	2	26,000	6			2,885	12,461	22,175
Lumber, sawed	14	569,275	303	2	12	80,430	380,654	562,556

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

WISCONSIN—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
CLARK:								
Flouring- and grist-mill products	6	$39, 700	20	....	....	$4, 581	$106, 095	$120, 620
Lumber, planed	1	3, 000	10	....	....	4, 000	12, 000	20, 000
Lumber, sawed	27	246, 100	170	1	[illegible]	41, 320	200, 800	313, 700
COLUMBIA:								
Cheese and butter (factory)	12	18, 450	11	2	....	2, 270	16, 790	25, 042
Clothing, men's	7	36, 300	26	24	....	16, 490	26, 700	54, 920
Flouring and grist-mill products	18	186, 000	41	....	....	13, 508	336, 382	418, 755
Liquors, malt	4	77, 000	11	....	....	4, 940	21, 217	37, 726
Marble and stone work	3	10, 200	12	....	....	5, 767	7, 518	21, 200
Sash, doors, and blinds	2	8, 000	12	....	....	4, 000	14, 000	36, 000
Tinware, copperware, and sheet-iron ware	13	14, 600	21	....	....	7, 460	13, 000	33, 900
CRAWFORD:								
Flouring- and grist-mill products	15	73, 700	12	....	....	3, 600	148, 168	176, 690
Liquors, malt	1	30, 000	8	....	....	3, 600	15, 943	28, 454
Lumber, sawed	14	151, 000	64	....	7	18, 950	105, 275	153, 975
Soap and candles	1	10, 000	8	1	1	3, 850	20, 000	30, 000
DANE:								
Agricultural implements	9	100, 000	96	....	....	33, 500	42, 295	127, 157
Bread and other bakery products	6	14, 800	16	1	2	7, 159	16, 018	26, 250
Carriages and wagons	21	88, 750	151	....	....	64, 149	105, 440	204, 515
Cheese and butter (factory)	15	17, 700	18	4	....	3, 159	28, 568	39, 502
Clothing, men's	5	43, 000	63	20	....	34, 552	65, 100	105, 500
Flouring- and grist-mill products	20	304, 000	74	....	2	23, 430	690, 328	794, 503
Furniture	7	15, 100	14	....	....	7, 630	22, 350	38, 470
Liquors, malt	7	91, 000	30	....	....	13, 875	59, 670	106, 540
Printing and publishing	5	60, 500	101	....	7	60, 650	35, 879	122, 000
Roofing and roofing materials	1	2, 000	25	....	....	13, 260	8, 160	22, 400
Saddlery and harness	15	27, 950	30	....	....	10, 832	36, 200	57, 267
Sash, doors, and blinds	10	32, 400	56	....	....	25, 715	57, 440	100, 360
Tinware, copperware, and sheet-iron ware	13	31, 050	31	....	....	13, 444	28, 302	59, 061
Tobacco, cigars and cigarettes	7	17, 550	26	1	4	13, 702	22, 800	48, 480
DODGE:								
Agricultural implements	6	335, 015	183	....	....	62, 650	101, 645	276, 466
Boots and shoes	1	100, 000	257	....	....	56, 872	407, 455	503, 797
Cheese and butter (factory)	18	21, 575	23	5	1	2, 950	39, 014	57, 193
Clothing, men's	6	10, 525	10	9	3	6, 250	13, 250	26, 100
Cooperage	11	11, 830	31	....	....	11, 385	20, 405	45, 250
Flouring- and grist-mill products	21	283, 950	65	....	....	20, 170	782, 395	858, 171
Furniture	10	31, 600	28	....	....	7, 675	9, 700	24, 200
Iron and steel	2	935, 000	70	....	....	9, 200	117, 993	81, 100
Liquors, malt	14	76, 100	17	....	....	6, 270	26, 987	48, 175
Lumber, sawed	8	39, 200	33	....	1	3, 450	22, 050	37, 263
Saddlery and harness	17	22, 250	17	....	1	5, 530	22, 740	37, 500
Tinware, copperware, and sheet-iron ware	12	37, 700	13	....	2	4, 925	16, 650	32, 200
Windmills	2	56, 000	32	....	....	15, 500	19, 800	48, 325
Woolen goods	2	228, 000	58	53	8	34, 500	174, 555	290, 000
DOOR:								
Flouring- and grist-mill products	4	27, 000	10	....	....	3, 550	86, 647	101, 405
Lumber, sawed	7	219, 000	129	....	20	33, 346	170, 090	258, 700
DUNN:								
Flouring- and grist-mill products	10	81, 200	31	....	....	7, 559	159, 011	182, 136
Foundery and machine-shop products	2	9, 000	11	....	....	6, 016	12, 600	22, 000
Lumber, sawed	18	430 400	445	8	32	144, 935	496, 575	802, 550
EAU CLAIRE:								
Flouring- and grist-mill products	9	88, 000	34	....	....	15, 100	421, 996	491, 482
Liquors, malt	3	40, 000	10	....	....	4, 843	20, 842	37, 186
Lumber, sawed	19	2, 523, 800	961	11	44	286, 660	1, 621, 816	2, 337, 387
Sash, doors, and blinds	1	40, 000	50	....	....	18, 000	24, 000	55, 000
Slaughtering and meat-packing, not including retail butchering establishments.	1	15, 000	9	....	....	3, 360	53, 500	63, 000
FOND DU LAC:								
Agricultural implements	8	207, 700	108	....	1	43, 239	79, 326	183, 000
Bread and other bakery products	3	26, 050	19	....	....	8, 087	51, 020	64, 802
Carriages and wagons	9	310, 637	192	....	2	79, 667	228, 468	357, 322
Cheese and butter (factory)	24	30, 250	30	7	....	5, 229	53, 969	77, 257
Clothing, men's	8	30, 700	52	32	....	28, 626	83, 900	128, 586
Drugs and chemicals	1	15, 000	4	3	....	2, 800	19, 000	25, 000
Flouring- and grist-mill products	31	456, 366	84	....	....	28, 763	785, 234	876, 506
Foundery and machine-shop products	3	62, 000	49	....	....	21, 823	29, 634	67, 586
Leather, curried	1	20, 000	8	....	....	3, 500	46, 375	55, 000
Leather, tanned	1	30, 000	17	....	....	6, 500	47, 750	58, 720
Liquors, malt	9	95, 500	25	....	....	11, 395	49, 210	87, 680
Lumber, sawed	11	430, 400	226	[illegible]	9	52, 376	412, 581	559, 975
Marble and stone work	5	13, 950	16	....	....	7, 264	7, 884	20, 164
Printing and publishing	7	29, 500	32	13	3	18, 830	17, 225	50, 508
Saddlery and harness	14	11, 300	26	....	1	9, 994	20, 613	39, 430
Sash, doors, and blinds	7	324, 000	344	17	41	137, 803	408, 314	653, 932
Tinware, copperware, and sheet-iron ware	14	21, 650	29	....	3	14, 265	34, 616	59, 981
Tobacco, cigars and cigarettes	7	9, 150	20	2	....	7, 738	13, 258	26, 726
Trunks and valises	1	1, 000	15	....	....	7, 200	10, 000	22, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

WISCONSIN—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
GRANT:								
Carriages and wagons	3	$22,500	17			$7,480	$7,500	$23,000
Cooperage	7	5,970	41			16,180	9,470	38,650
Flouring- and grist-mill products	26	158,400	43			10,160	316,538	369,459
Gunpowder	1	35,000	14			7,000	45,000	60,000
Liquors, malt	6	50,000	11			5,403	23,050	41,080
Saddlery and harness	9	9,265	19			5,274	12,175	27,320
GREEN:								
Agricultural implements	1	70,000	16			5,000	7,000	20,000
Carriages and wagons	7	23,000	35			15,400	34,688	61,500
Cheese and butter (factory)	47	41,025	63	2		13,902	141,033	210,078
Clothing, men's	7	14,800	10	21		8,610	14,100	25,200
Flouring- and grist-mill products	16	131,400	42			8,852	243,417	274,160
Liquors, malt	3	32,000	10			4,608	17,217	30,665
Lumber, sawed	8	26,000	24			3,180	15,025	28,650
Saddlery and harness	13	9,075	15			5,560	17,925	29,480
Woolen goods	4	51,000	29	19		7,250	14,030	24,425
GREEN LAKE:								
Boots and shoes	1	15,000	10	5		7,100	9,050	21,400
Carriages and wagons	6	19,900	40			15,665	27,500	53,300
Coffins, burial cases, and undertakers' goods	1	40,000	36	1	3	10,500	3,000	20,000
Flouring- and grist-mill products	7	123,000	44			18,400	346,941	383,881
Lumber, sawed	2	24,000	9	2	2	2,200	12,675	23,454
Woolen goods	1	34,000	12	7		4,700	14,340	24,000
IOWA:								
Flouring- and grist-mill products	25	122,950	45			12,123	305,998	370,432
Foundery and machine-shop products	2	11,500	11			5,500	8,315	21,400
Liquors, malt	3	32,000	8			3,331	14,296	25,484
Saddlery and harness	7	12,450	9			3,200	14,100	21,800
JACKSON:								
Flouring- and grist-mill products	11	102,000	21			9,710	262,537	310,871
Lumber, sawed	30	406,650	203	6		51,025	262,752	389,225
JEFFERSON:								
Agricultural implements	5	53,000	54			20,614	20,250	52,390
Boots and shoes	1	20,000	17		2	8,020	21,200	33,645
Bread and other bakery products	2	71,000	30	6		12,830	66,200	96,700
Brick and tile	9	49,800	108		20	22,570	14,675	60,940
Carriages and wagons	3	19,000	21			8,200	19,000	37,500
Cheese and butter (factory)	36	63,350	53	5		12,705	138,821	189,827
Clothing, men's	9	19,450	18	5	1	9,300	17,500	34,500
Flouring- and grist-mill products	21	385,500	98			35,492	870,718	997,072
Foundery and machine-shop products	3	16,000	14			5,872	9,695	24,600
Furniture, chairs	2	128,400	164	28	51	83,000	88,000	198,000
Leather, curried	2	9,500	7			2,500	37,357	48,200
Leather, tanned	2	8,500	7			2,280	26,100	36,270
Liquors, malt	9	123,700	40			18,461	79,330	141,661
Saddlery and harness	10	10,200	16			5,517	15,850	35,510
Sash, doors, and blinds	2	17,500	27		1	8,000	13,850	33,200
Slaughtering and meat-packing, not including retail butchering establishments.	1	50,000	36		4	4,049	111,440	131,440
Tinware, copperware, and sheet-iron ware	7	8,200	12			4,940	10,600	23,400
Tobacco, cigars and cigarettes	3	22,800	41			15,814	25,620	47,400
Wooden ware	2	14,000	11			3,000	8,500	28,000
Woolen goods	2	43,000	29	16		12,908	33,650	63,098
JUNEAU:								
Carriages and wagons	4	41,500	43		4	14,554	53,840	113,900
Flouring- and grist-mill products	8	99,500	24			9,714	262,703	304,004
Lumber, sawed	15	930,800	278	17	8	85,520	613,475	811,131
KENOSHA:								
Agricultural implements	2	40,000	10		2	3,137	13,250	35,083
Bread and other bakery products	1	1,200	6			3,536	10,000	24,640
Carriages and wagons	2	405,000	260		50	203,000	354,000	609,500
Cheese and butter (factory)	14	67,692	13	2		3,002	26,693	41,157
Flouring- and grist-mill products	6	72,200	18			7,215	156,400	186,100
Foundery and machine-shop products	2	41,000	31			16,250	39,068	64,500
Leather, curried	1	77,500	50			20,000	222,500	270,000
Leather, tanned	1	77,500	50			20,000	165,000	212,500
Liquors, malt	2	40,000	8			3,685	15,985	28,321
Malt	1	100,000	20			10,800	213,500	235,000
Mattresses and spring beds	1	25,000	20		3	7,247	9,718	22,216
KEWAUNEE:								
Agricultural implements	6	7,900	18			6,870	8,280	27,154
Flouring- and grist-mill products	9	89,500	32			10,585	173,825	199,310
Lumber, sawed	16	72,000	102	2	12	20,650	81,899	132,214
LA CROSSE:								
Agricultural implements	3	130,000	78			31,500	41,000	121,000
Carriages and wagons	5	32,400	28			13,700	14,300	43,000
Clothing, men's	8	25,800	24	4		11,650	14,550	33,500
Cooperage	3	29,600	45			19,700	46,000	71,240
Flouring- and grist-mill products	21	500,100	119		1	48,385	689,793	814,976

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

WISCONSIN—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
LA CROSSE—continued.								
Foundery and machine-shop products	5	$93,000	71	1	12	$32,500	$21,500	$104,000
Leather, curried	1	37,500	20			9,000	111,250	130,000
Leather, tanned	1	37,500	20			9,000	90,000	108,750
Liquors, malt	6	360,000	61			30,104	129,470	231,084
Lumber, sawed	11	1,435,500	373	44	51	142,500	795,661	1,023,647
Marble and stone work	3	70,000	28			13,500	8,220	32,875
Pumps, not including steam pumps	1	10,000	12			3,500	10,000	20,000
Sash, doors, and blinds	3	95,000	52			23,500	23,500	52,000
Shipbuilding	2	21,000	74			38,750	7,360	45,600
Slaughtering and meat-packing, not including retail butchering establishments.	3	90,000	18			5,800	128,425	153,000
Tobacco, cigars and cigarettes	4	22,750	20			7,800	10,750	27,950
LA FAYETTE:								
Flouring- and grist-mill products	9	100,800	23			5,530	175,492	204,392
LINCOLN:								
Flouring- and grist-mill products	1	12,000	2			46	25,350	28,520
Lumber, sawed	2	75,000	85	6		26,500	169,500	230,000
MANITOWOC:								
Agricultural implements	4	22,600	40			15,400	22,600	48,500
Brick and tile	15	16,000	70	5	36	14,018	6,555	35,950
Carriages and wagons	6	27,200	47			13,840	19,650	45,500
Cheese and butter (factory)	19	14,800	25		1	3,900	32,403	46,037
Clothing, men's	5	17,300	15	2		6,475	12,100	24,250
Cooperage	6	9,150	38		2	11,200	9,975	29,890
Flouring- and grist-mill products	30	284,700	111			32,618	825,584	942,947
Furniture	7	17,540	24			9,425	18,900	33,375
Furniture, chairs	1	200,000	300	50	25	120,108	126,528	266,000
Leather, curried	7	21,500	14		1	4,350	72,982	88,916
Leather, tanned	10	87,000	56			18,350	206,152	262,580
Liquors, malt	9	151,000	30			12,425	52,867	94,261
Lumber, sawed	25	69,000	72	2		12,175	65,435	106,510
Saddlery and harness	9	19,050	20		1	6,745	18,400	35,300
Sash, doors, and blinds	1	25,000	35			9,000	17,000	30,900
Shipbuilding	2	30,000	93			36,800	48,000	105,000
Tinware, copperware, and sheet-iron ware	8	13,450	13			5,250	11,700	23,600
MARATHON:								
Clothing, men's	5	4,300	6	5		3,950	14,500	22,600
Flouring- and grist-mill products	3	31,000	9			2,800	84,900	90,000
Liquors, malt	2	25,000	6			2,670	11,450	20,428
Lumber, planed	4	21,000	16			5,240	24,200	35,643
Lumber, sawed	40	1,274,800	669	27	35	220,026	1,025,436	1,489,178
MARINETTE:								
Flouring- and grist-mill products	1	18,000	6			3,500	156,000	199,100
Foundery and machine-shop products	1	85,000	70			41,786	75,000	160,000
Lumber, sawed	9	4,460,000	451		21	204,500	1,179,000	1,678,734
MARQUETTE:								
Flouring- and grist-mill products	11	167,300	20			5,825	137,288	157,386
Woolen goods	6	53,000	24	19	5	12,465	45,552	68,957
MILWAUKEE:								
Agricultural implements	2	25,000	25			7,500	5,450	21,450
Bags, paper	1	6,000	5	3	1	2,600	40,000	50,000
Baskets, rattan and willow ware	6	96,200	114	15	161	48,660	39,475	119,800
Bookbinding and blank-book making	7	21,700	56	47	18	31,505	26,681	78,713
Boots and shoes	9	259,800	372	55	8	129,780	333,297	554,599
Boxes, cigar	2	8,000	21	20		8,000	29,000	44,000
Boxes, fancy and paper	2	6,000	14	12	9	3,000	9,000	21,500
Boxes, wooden, packing	2	25,000	42	46		21,000	42,540	77,000
Brass castings	6	108,300	140	2	2	51,112	76,436	167,114
Bread and other bakery products	37	61,800	102	16	29	37,254	255,549	359,666
Brick and tile (see also Drain and sewer pipe)	6	336,500	371		43	93,720	80,976	234,208
Bridges	1	21,000	36			16,200	44,301	76,802
Brooms and brushes	4	13,000	50	5		15,240	16,720	47,620
Carpets, rag	5	5,100	19	25		4,900	12,550	22,350
Carriages and wagons	11	97,000	148		2	62,265	76,500	184,000
Cement	1	350,000	70			16,000	13,000	70,000
Clothing, men's	53	1,896,628	1,904	2,350	50	912,907	2,244,165	3,765,487
Clothing, women's	4	64,000	34	163		29,900	109,000	147,160
Coffee and spices, roasted and ground	9	257,621	125	19	15	89,550	693,042	931,640
Confectionery	4	144,054	110	30	20	43,542	378,370	474,922
Cooperage	40	143,250	528		35	234,315	338,280	681,245
Coppersmithing (see also Tinware, copperware, and sheet-iron ware).	3	41,500	20			10,692	22,870	44,392
Drain and sewer pipe (see also Brick and tile)	1	10,000	14			5,776	7,171	21,545
Drugs and chemicals	6	40,872	15	12		9,386	55,179	85,393
Flouring- and grist-mill products	13	1,086,000	273			138,066	3,836,455	4,251,150
Food preparations (see page 39)	2	30,000	4			2,550	32,500	40,000
Foundery and machine-shop products	30	1,286,445	1,437		30	673,392	1,173,907	2,252,784
Furnishing goods, men's	3	7,000	7	9	1	1,890	17,000	28,850
Furniture (see also Upholstering)	16	329,800	497	14	15	212,501	223,301	568,268
Furniture, chairs	2	119,180	75	15	10	26,662	52,000	128,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

WISCONSIN—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
MILWAUKEE—continued.								
Furs, dressed	3	$61, 000	14	38	5	$25, 000	$89, 500	$136, 000
Galvanizing	1	20, 000	12			6, 000	18, 000	27, 000
Glue	1	20, 000	27	8		8, 000	20, 000	35, 000
Hand-knit goods	5	26, 000	2	538	52	14, 500	45, 500	83, 000
Hardware (see also Tools)	5	11, 700	19		10	8, 600	14, 900	32, 160
Hats and caps, not including wool hats	3	26, 000	8	14		7, 500	17, 928	34, 000
Iron and steel	2	1, 300, 000	1, 470		65	763, 114	2, 927, 944	4, 973, 011
Jewelry	4	15, 000	18			8, 316	31, 000	47, 000
Leather, curried	17	800, 425	375			160, 441	1, 874, 595	2, 219, 978
Leather, dressed skins	5	71, 500	46			20, 900	67, 925	104, 581
Leather, tanned	17	1, 008, 525	407			173, 861	1, 612, 400	2, 101, 195
Lime	1	10, 000	30			4, 000	13, 200	35, 500
Liquors, distilled	5	392, 000	43			18, 250	204, 346	300, 509
Liquors, malt	16	5, 092, 909	1, 192			602, 432	2, 590, 430	4, 625, 543
Lithographing (see also Printing and publishing)	4	69, 125	116	2	13	57, 751	79, 640	166, 860
Looking-glass and picture frames	4	12, 975	10			7, 222	19, 900	35, 470
Lumber, planed (see also Sash, doors, and blinds)	3	70, 000	115	4	11	35, 000	50, 000	117, 000
Marble and stone work	11	95, 300	167		2	73, 256	106, 450	220, 396
Mineral and soda waters	6	34, 200	44	5	5	14, 208	31, 450	62, 950
Oil, linseed	1	70, 000	15			8, 000	130, 000	155, 000
Paints	1	30, 000	8			3, 100	47, 000	65, 000
Pickles, preserves, and sauces	2	14, 000	16	6		5, 500	20, 000	35, 000
Printing and publishing (see also Lithographing)	24	434, 700	518	43	48	268, 270	200, 486	675, 087
Refrigerators	2	5, 000	16			7, 100	17, 500	29, 950
Roofing and roofing materials	2	8, 000	16			7, 200	15, 000	28, 700
Saddlery and harness	30	74, 300	109		38	44, 951	113, 320	201, 025
Sash, doors, and blinds (see also Lumber, planed)	7	261, 000	512		18	139, 100	303, 000	557, 000
Shipbuilding	8	136, 500	227			110, 413	133, 963	301, 705
Slaughtering and meat-packing, not including retail butchering establishments.	7	789, 000	928		25	187, 596	5, 529, 618	6, 099, 486
Soap and candles	5	120, 000	50	4	11	24, 620	204, 100	280, 090
Starch	2	40, 000	32	12	9	14, 000	34, 500	56, 550
Stone- and earthen-ware	10	76, 700	70		2	17, 861	22, 855	68, 600
Straw goods	1	85, 000	125	275		50, 000	125, 000	250, 000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing).	29	95, 950	150		4	56, 687	106, 994	215, 544
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	3	331, 000	200	6	20	78, 500	786, 645	978, 281
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	56	238, 375	733	4	77	301, 934	344, 939	835, 506
Tools (see also Hardware)	1	15, 000	28			10, 000	4, 600	20, 000
Trunks and valises	4	183, 000	218		45	76, 720	115, 800	244, 600
Type founding	2	25, 000	23	3	15	19, 011	19, 000	45, 000
Upholstering (see also Furniture)	6	11, 900	46			22, 800	97, 500	146, 500
Vinegar	5	62, 000	32			18, 415	42, 000	149, 000
Wood preserving	1	100, 000	24			7, 000	20, 000	40, 000
MONROE:								
Carriages and wagons	4	21, 000	20			6, 200	13, 550	26, 250
Flouring- and grist-mill products	14	102, 900	45			16, 134	310, 839	352, 647
Lumber, sawed	11	169, 500	78	11	5	23, 250	108, 950	181, 340
Paper	1	35, 000	17	4		6, 000	18, 000	35, 000
OCONTO:								
Flouring- and grist-mill products	2	37, 000	7			2, 500	53, 800	63, 983
Lumber, sawed	18	1, 469, 950	438		6	119, 750	815, 850	1, 109, 455
OUTAGAMIE:								
Agricultural implements	1	40, 000	20			8, 000	12, 500	40, 000
Carriage and wagon materials	5	88, 000	66		22	35, 800	48, 800	122, 000
Carriages and wagons	3	12, 000	13			5, 800	8, 000	20, 000
Clothing, men's	5	8, 850	20	20	2	10, 850	19, 575	37, 000
Cooperage	5	4, 800	32			12, 850	20, 300	46, 500
Flouring- and grist-mill products	13	233, 000	64			24, 895	740, 390	857, 890
Foundery and machine-shop products	2	29, 000	19			7, 800	12, 500	27, 000
Furniture	2	25, 600	71		21	35, 375	22, 400	68, 300
Iron and steel	1	123, 218	98			36, 617	129, 720	230, 080
Iron nails and spikes, cut and wrought	1	50, 000	14		12	15, 000	25, 000	46, 000
Leather, tanned	2	62, 000	15			7, 075	75, 800	102, 600
Lumber, sawed	15	222, 500	110	6	18	39, 105	218, 664	312, 008
Paper (see also Wood pulp)	4	515, 000	183	72	17	113, 615	353, 250	603, 736
Saddlery and harness	8	12, 160	10			2, 810	15, 425	23, 850
Sash, doors, and blinds	4	27, 100	20			8, 100	8, 400	21, 700
Tinware, copperware, and sheet-iron ware	10	22, 850	16			7, 168	29, 780	44, 900
Tobacco, cigars and cigarettes	4	[illegible], 000	19		3	6, 100	11, 300	27, 200
Wood pulp	3	64, 000	47		1	16, 564	21, 948	76, 000
OZAUKEE:								
Flouring- and grist-mill products	10	204, 500	36			17, 293	628, 785	707, 847
Foundery and machine-shop products	6	89, 500	58	2	5	24, 390	32, 230	107, 686
Leather, tanned	3	18, 300	8			2, 750	20, 540	29, 000
Liquors, malt	5	56, 000	12			5, 585	24, 104	42, 928
Malt	1	15, 000	6			2, 500	45, 000	52, 000
Sash, doors, and blinds	2	40, 000	60		5	21, 500	27, 700	103, 500
PEPIN:								
Flouring and grist-mill products	4	30, 500	8			3, 036	72, 190	88, 000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

WISCONSIN—Continued.

Counties and industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
PIERCE:								
Flouring and grist-mill products	16	$262,000	56			$14,790	$517,740	$606,957
Lumber, sawed	28	178,400	82	2	3	18,026	126,480	181,510
POLK:								
Flouring- and grist-mill products	4	38,300	14			3,130	55,113	63,245
Lumber, sawed	15	134,350	106	1	7	31,920	147,585	219,680
PORTAGE:								
Flouring- and grist-mill products	8	72,000	25			9,250	334,775	389,909
Foundery and machine-shop products	3	25,000	25			15,000	16,050	40,000
Lumber, planed	4	66,000	54		3	11,500	114,318	168,318
Lumber, sawed	31	586,040	337	11	14	94,474	488,050	706,875
RACINE:								
Agricultural implements	11	1,901,730	799		43	423,300	708,901	2,025,710
Baskets, rattan and willow ware	1	18,000	42		20	16,000	15,000	34,000
Boots and shoes	4	81,000	138	37	9	86,000	171,358	287,332
Bread and other bakery products	7	13,150	12	1	2	4,982	16,150	28,750
Brick and tile	4	16,000	55		25	14,840	10,450	45,675
Carriages and wagons	5	1,158,000	867	5	22	370,750	965,750	1,604,600
Clothing, men's	9	48,900	44	20		18,129	45,450	77,875
Flouring- and grist-mill products	8	123,000	29			11,220	389,770	462,418
Foundery and machine-shop products	3	93,000	124	2	10	44,415	79,300	159,580
Furniture	7	34,500	19		3	7,900	16,300	43,940
Hardware	3	115,000	176	1	25	69,350	94,860	232,085
Leather, curried	4	70,500	51			29,040	351,000	396,000
Leather, tanned	5	80,500	65			31,650	269,500	321,500
Lime	2	22,000	24			6,800	15,250	29,800
Liquors, malt	7	65,500	15			6,975	29,999	53,563
Malt	1	25,000	5			1,770	20,000	29,000
Oil, linseed	1	90,000	13			6,000	120,000	160,000
Plated and britannia ware	1	60,000	52	15		35,000	20,000	55,000
Printing and publishing	5	35,500	29	10	4	17,960	20,015	46,695
Saddlery and harness	12	18,150	23	1	1	7,637	11,600	28,500
Sash, doors, and blinds	4	77,000	83		17	31,050	73,750	128,500
Tinware, copperware, and sheet-iron ware	11	49,500	30	2	1	13,825	40,615	69,875
Tobacco, cigars and cigarettes	8	11,450	21			6,561	14,500	29,236
Trunks and valises	1	30,000	85		15	35,000	65,000	125,000
Wirework	1	12,000	30			6,000	24,000	33,000
Woolen goods	1	271,828	49	90		33,600	136,834	240,000
RICHLAND:								
Cheese and butter (factory)	7	14,425	8	5		2,550	20,449	30,766
Flouring- and grist-mill products	19	82,400	29			10,120	214,880	261,748
Lumber, sawed	26	79,900	74		2	12,882	68,567	110,919
ROCK:								
Agricultural implements	7	358,850	226		15	106,070	164,507	358,794
Boots and shoes	3	58,000	76	41	5	45,960	141,080	211,000
Bread and other bakery products	5	2,450	6	4	1	2,932	14,900	27,950
Carriages and wagons	11	68,500	80			39,800	37,250	101,900
Cheese and butter (factory)	12	21,150	18	6		3,596	42,922	63,610
Clothing, men's	13	52,450	51	24		28,620	64,940	116,220
Cotton goods (see also Mixed textiles)	1	200,000	61	149	56	67,209	194,556	328,389
Flouring- and grist-mill products	24	254,500	108			35,987	1,088,777	1,242,474
Foundery and machine-shop products	5	206,000	195			91,099	140,140	285,898
Furniture	4	36,500	52			20,944	24,400	53,700
Gloves and mittens (see also Woolen goods)	1	15,000	5	35		7,200	15,000	29,000
Hardware, saddlery	1	10,000	5	1		2,700	17,000	28,000
Liquors, malt	4	36,000	10			4,875	20,923	37,363
Marble and stone work	6	6,710	17			7,525	6,792	21,504
Mixed textiles (see also Cotton goods; Woolen goods)	1	100,505	25	19	6	15,048	49,993	91,743
Paper	2	140,000	66	14		37,000	110,000	195,000
Printing and publishing	4	37,000	35	9	6	14,420	14,500	37,800
Roofing and roofing materials	1	100,000	35	15		20,000	50,000	90,000
Saddlery and harness	16	14,600	40			14,156	25,635	60,072
Sash, doors, and blinds	2	30,000	49		10	16,560	30,000	64,000
Scales and balances	1	25,000	25			8,000	15,000	50,000
Tinware, copperware, and sheet-iron ware	8	29,900	27			12,211	23,200	58,200
Tobacco, cigars and cigarettes	11	33,650	47	27	4	27,600	46,070	101,700
Windmills	3	37,200	121			43,800	53,000	123,000
Woolen goods (see also Gloves and mittens; Mixed textiles)	2	110,505	38	25	6	18,048	58,993	111,743
SAINT CROIX:								
Flouring- and grist-mill products	12	272,000	74			31,346	767,277	923,867
Foundery and machine-shop products	2	5,000	8			4,913	20,287	28,500
Lumber, sawed	20	372,566	96	2	7	37,566	239,925	349,743
SAUK:								
Cheese and butter (factory)	6	5,600	5	2		1,266	19,413	27,859
Flouring- and grist-mill products	16	158,600	38			11,407	504,406	574,610
Iron and steel	1	60,000	25			5,000	15,200	42,200
Liquors, malt	7	37,000	10			4,572	19,520	34,825
Lumber, sawed	18	75,364	56		7	12,106	64,936	106,385
Saddlery and harness	10	18,450	14			4,650	24,050	34,600
Woolen goods	1	50,000	19	16	1	13,940	39,500	85,000

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

WISCONSIN—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
SHAWANO:								
Flouring- and grist-mill products	4	$20, 300	9			$3, 411	$73, 727	$86, 027
Lumber, sawed	15	75, 800	65			9, 750	53, 965	84, 195
SHEBOYGAN:								
Agricultural implements	3	20, 200	24			7, 390	14, 475	36, 350
Brick and tile	5	14, 800	61		16	8, 611	5, 174	21, 472
Carriages and wagons	3	29, 000	27			10, 450	9, 700	30, 200
Cheese and butter (factory)	86	92, 335	101	9		20, 841	253, 555	361, 591
Cooperage	23	17, 655	50			15, 647	18, 210	41, 838
Flouring- and grist-mill products	23	237, 808	42			14, 680	415, 103	480, 692
Foundery and machine-shop products	7	62, 207	96	1	2	33, 728	40, 944	98, 274
Furniture	7	13, 150	36			10, 750	9, 895	26, 275
Furniture, chairs	4	142, 000	390	91	50	151, 736	98, 840	354, 240
Leather, curried	7	176, 200	101			41, 556	883, 492	1, 058, 000
Leather, tanned	7	192, 800	112			46, 360	707, 100	888, 757
Liquors, malt	6	84, 000	20			9, 215	39, 560	70, 546
Lumber, sawed	9	32, 200	21			3, 010	16, 996	27, 067
Sash, doors, and blinds	1	10, 000	22			4, 527	13, 497	25, 000
Tobacco, cigars and cigarettes	3	11, 500	17	3	3	5, 450	10, 025	20, 325
Wooden ware	1	30, 000	30			16, 700	18, 300	40, 000
Woolen goods	2	106, 321	28	31	3	14, 721	55, 752	86, 785
TAYLOR:								
Lumber, planed	1	20, 000	8			2, 200	50, 000	70, 000
Lumber, sawed	6	132, 000	85	6	5	28, 400	156, 400	217, 700
TREMPEALEAU:								
Flouring- and grist-mill products	15	151, 100	58			14, 778	321, 136	373, 434
VERNON:								
Flouring- and grist-mill products	13	65, 936	17			5, 980	152, 755	178, 896
Lumber, sawed	14	45, 100	28		1	5, 735	33, 200	56, 575
WALWORTH:								
Agricultural implements	2	225, 000	96		1	37, 461	33, 600	114, 657
Carriages and wagons	7	214, 300	171			80, 200	157, 300	334, 000
Cheese and butter (factory)	15	29, 400	24	1		6, 698	55, 410	84, 052
Clothing, men's	8	9, 950	16	10		8, 050	19, 800	32, 700
Flouring- and grist-mill products	13	190, 100	42			12, 128	404, 793	441, 476
Furniture	5	86, 100	65			25, 646	37, 900	88, 085
Saddlery and harness	11	24, 500	17			6, 292	18, 985	36, 727
Tinware, copperware, and sheet-iron ware	11	10, 900	18			7, 618	12, 900	26, 800
Windmills	1	20, 000	14			4, 000	8, 000	30, 000
Wirework	1	6, 000	14			5, 000	1, 000	20, 000
WASHINGTON:								
Agricultural implements	2	30, 000	19			7, 000	16, 395	33, 260
Brick and tile	8	14, 000	52	1	5	7, 630	5, 520	23, 930
Clothing, men's	4	5, 300	6	1		3, 200	16, 900	24, 300
Flouring- and grist-mill products	11	142, 050	31			9, 295	334, 456	376, 204
Lime	5	4, 700	18	1		3, 840	9, 500	24, 700
Liquors, malt	7	81, 875	13			6, 470	27, 874	49, 721
Lumber, sawed	18	53, 900	40		3	7, 085	42, 033	65, 801
Saddlery and harness	16	20, 800	12			2, 735	13, 650	26, 580
Woolen goods	1	50, 000	10	4	6	6, 000	71, 600	122, 000
WAUKESHA:								
Agricultural implements	4	34, 000	20		2	6, 450	12, 000	30, 942
Boots and shoes	1	15, 000	100		45	48, 000	63, 700	125, 000
Cheese and butter (factory)	15	25, 650	24	1		3, 923	34, 540	50, 880
Flouring- and grist-mill products	23	231, 500	47			11, 055	459, 814	518, 023
Liquors, malt	6	32, 000	9			3, 982	16, 950	30, 214
Woolen goods	2	125, 000	34	37	8	23, 686	89, 372	128, 360
WAUPACA:								
Flouring- and grist-mill products	16	145, 500	46			14, 865	362, 385	415, 544
Liquors, malt	5	45, 000	7			3, 205	14, 143	25, 240
Lumber, sawed	30	190, 241	164	1	12	35, 570	228, 787	336, 147
Tinware, copperware, and sheet-iron ware	8	9, 000	10			3, 740	11, 100	23, 700
WAUSHARA:								
Flouring- and grist-mill products	13	70, 300	23			6, 982	176, 259	203, 394
Lumber, sawed	7	30, 000	17			3, 970	22, 960	40, 355
WINNEBAGO:								
Bread and other bakery products	6	16, 000	4	1		1, 790	18, 500	26, 491
Brick and tile	6	19, 700	72		2	9, 515	6, 925	27, 600
Carriage and wagon materials	1	125, 000	176		4	53, 000	110, 000	180, 000
Carriages and wagons	10	80, 975	169	15	5	71, 268	195, 684	319, 600
Cheese and butter (factory)	15	68, 541	19	2		3, 100	30, 395	43, 842
Clothing, men's	9	90, 000	99	54		48, 708	92, 300	190, 579
Cooperage	12	65, 900	237		50	94, 535	142, 900	288, 465
Corsets	1	5, 000	7	60	13	25, 000	15, 000	50, 000
Flouring- and grist-mill products	17	498, 500	132			55, 339	2, 317, 069	2, 475, 427
Foundery and machine-shop products	12	178, 500	154		1	71, 341	96, 617	243, 018
Furniture	10	49, 300	43	1	2	15, 735	24, 050	64, 640
Leather, curried	3	23, 500	10			4, 125	59, 991	73, 240
Leather, tanned	3	34, 500	17			7, 525	39, 478	55, 861
Lime	4	35, 200	29			10, 050	21, 800	39, 750
Liquors, malt	10	95, 800	18			8, 691	37, 325	66, 702

TABLE V.—SELECTED STATISTICS OF MANUFACTURES, BY COUNTIES, ETC.: 1880.

WISCONSIN—Continued.

Counties and industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
WINNEBAGO—continued.								
Lumber, planed (see also Sash, doors, and blinds)	2	$11, 000	6	....	....	$2, 600	$22, 000	$26, 000
Lumber, sawed	28	1, 172, 500	528	63	40	154, 829	864, 775	1, 224, 214
Marble and stone work	5	11, 900	11	....	....	4, 650	9, 000	20, 300
Matches	1	325, 000	50	320	....	56, 200	454, 800	532, 932
Paper	5	223, 000	123	70	3	72, 840	284, 600	428, 000
Printing and publishing	5	38, 150	31	6	7	15, 740	15, 300	47, 500
Saddlery and harness	9	14, 200	17	....	....	6, 422	17, 200	34, 900
Sash, doors, and blinds (see also Lumber, planed)	10	439, 000	309	....	32	121, 701	549, 732	835, 120
Tinware, copperware, and sheet-iron ware	13	31, 400	28	....	....	12, 588	35, 070	59, 534
Tobacco, cigars and cigarettes	11	11, 350	41	....	....	16, 886	18, 701	48, 305
Trunks and valises	1	35, 000	50	....	....	19, 500	39, 700	70, 000
Woolen goods	2	107, 000	28	23	....	15, 870	64, 100	106, 000
WOOD:								
Carriage and wagon materials	3	21, 000	57	....	3	19, 800	35, 700	71, 000
Flouring- and grist-mill products	2	54, 500	9	....	....	5, 075	138, 850	155, 417
Lumber, planed	1	4, 000	6	....	....	2, 500	20, 000	25, 000
Lumber, sawed	23	788, 923	321	....	28	86, 375	576, 536	805, 195

WYOMING TERRITORY.

Counties and industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
ALBANY:								
Iron and steel	1	$212, 603	174	....	10	$79, 650	$403, 568	$491, 345
Sash, doors, and blinds	1	10, 000	5	....	....	5, 000	30, 000	40, 000
LARAMIE:								
Liquors, malt	2	20, 000	7	....	....	3, 173	11, 977	21, 450
Saddlery and harness	3	13, 500	19	....	....	13, 500	12, 720	36, 000

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY TOTALS: 1880.

NOTE.—The differences between any totals published in this table and the corresponding totals in the preliminary bulletin entitled "The manufactures of 20 principal cities" are due (1) to revision and (2) to the inclusion in this table of the industries noted in that bulletin as having been omitted therefrom.

Cities.	RANK, ACCORDING TO—		No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
	Population.	Value of products.			Males above 16 years.	Females above 15 years.	Children and youths.			
Albany, N. Y	21	30	804	$14, 684, 130	9, 829	1, 528	428	$4, 566, 424	$12, 509, 362	$21, 751, 009
Allegheny, Pa	23	37	424	8, 451, 059	5, 549	614	308	2, 652, 774	8, 818, 153	13, 731, 792
Atlanta, Ga	49	79	196	2, 468, 456	2, 753	533	394	889, 282	3, 159, 267	4, 861, 727
Auburn, N. Y	84	62	154	4, 423, 950	3, 579	752	187	1, 658, 826	4, 052, 746	7, 719, 409
Augusta, Ga	86	92	60	2, 069, 275	867	511	302	448, 825	2, 247, 665	3, 139, 029
Baltimore, Md	7	8	3, 683	38, 586, 773	34, 086	18, 137	4, 115	15, 117, 489	47, 974, 297	78, 417, 304
Bay City, Mich	95	75	80	4, 235, 500	2, 066	21	151	802, 488	3, 851, 553	5, 533, 621
Boston, Mass	5	5	3, 665	47, 348, 384	39, 810	18, 150	1, 253	24, 924, 009	81, 688, 160	130, 531, 993
Bridgeport, Conn	71	47	170	9, 751, 785	5, 476	1, 807	225	3, 342, 935	4, 819, 939	10, 458, 212
Brooklyn, N. Y	3	4	5, 201	61, 646, 749	37, 105	7, 020	3, 462	22, 487, 457	129, 085, 091	177, 223, 142
Buffalo, N. Y	13	15	1, 183	26, 847, 937	15, 033	1, 795	1, 193	7, 442, 109	27, 552, 086	42, 937, 701
Cambridge, Mass	31	24	379	6, 480, 799	6, 205	1, 172	166	3, 416, 470	20, 101, 349	26, 605, 688
Camden, N. J	44	65	321	5, 032, 835	3, 293	826	251	1, 626, 306	4, 348, 710	7, 644, 705
Charleston, S. C	36	93	194	1, 718, 300	1, 788	150	208	639, 030	1, 468, 375	2, 732, 590
Chelsea, Mass	88	89	155	1, 822, 250	1, 122	500	25	677, 737	2, 691, 911	3, 846, 250
Chicago, Ill	4	3	3, 519	68, 836, 885	62, 431	12, 185	4, 798	34, 653, 462	179, 209, 610	249, 022, 948
Cincinnati, Ohio	8	7	3, 276	50, 533, 100	38, 993	10, 483	5, 041	19, 553, 629	62, 376, 710	105, 259, 165
Cleveland, Ohio	11	13	1, 055	19, 430, 989	18, 018	2, 286	1, 420	8, 502, 935	31, 629, 737	48, 604, 050
Columbus, Ohio	33	52	316	5, 379, 401	4, 935	289	266	1, 961, 394	5, 534, 496	9, 646, 679
Covington, Ky	65	71	181	3, 182, 141	2, 251	223	451	1, 033, 463	3, 935, 727	5, 864, 530
Davenport, Iowa	87	81	188	2, 806, 222	1, 473	82	150	685, 469	2, 960, 668	4, 468, 978
Dayton, Ohio	47	43	495	6, 063, 334	5, 071	513	441	2, 293, 630	6, 434, 225	11, 985, 483
Denver, Colo	50	53	259	2, 301, 850	2, 550	264	130	1, 574, 438	5, 715, 215	9, 367, 749
Des Moines, Iowa	80	85	155	1, 463, 250	1, 211	71	96	667, 699	2, 810, 396	4, 220, 709
Detroit, Mich	18	19	919	15, 594, 479	12, 477	2, 430	1, 203	6, 306, 460	18, 150, 995	30, 181, 416
Dubuque, Iowa	81	70	346	3, 446, 866	2, 619	292	92	1, 339, 730	3, 837, 846	6, 328, 889
Elizabeth, N. J	69	68	149	2, 453, 180	3, 151	216	482	1, 740, 456	2, 915, 851	6, 828, 027
Elmira, N. Y	97	78	263	2, 698, 762	2, 283	324	121	1, 024, 161	3, 132, 115	4, 877, 300
Erie, Pa	70	63	167	4, 730, 503	3, 284	207	276	1, 518, 085	4, 879, 319	7, 683, 356
Evansville, Ind	66	61	313	4, 733, 815	2, 945	337	387	1, 365, 006	4, 972, 690	8, 091, 914
Fall River, Mass	37	32	258	25, 076, 518	8, 232	6, 723	2, 130	4, 659, 077	10, 552, 192	18, 913, 584
Fort Wayne, Ind	74	73	114	2, 352, 101	2, 426	164	145	1, 020, 793	4, 007, 955	5, 816, 924
Galveston, Tex	82	94	170	871, 350	633	15	36	499, 785	1, 283, 246	2, 375, 965
Grand Rapids, Mich	58	67	355	4, 864, 298	4, 509	295	368	1, 895, 072	3, 956, 663	7, 405, 007
Harrisburg, Pa	60	64	274	4, 026, 457	3, 243	264	153	1, 236, 522	4, 975, 276	7, 663, 416
Hartford, Conn	43	45	268	9, 679, 126	4, 573	1, 373	354	2, 848, 041	6, 467, 460	11, 437, 200
Hoboken, N. J	59	99	121	486, 320	613	59	51	283, 694	588, 756	1, 051, 136
Holyoke, Mass	85	38	123	8, 913, 903	4, 433	3, 861	717	2, 743, 142	7, 739, 573	13, 667, 327
Indianapolis, Ind	24	21	688	10, 049, 500	8, 671	830	499	3, 917, 114	19, 198, 102	27, 453, 089
Jersey City, N. J	17	12	584	11, 899, 915	7, 962	2, 426	750	4, 622, 655	49, 738, 985	60, 473, 905
Kansas City, Mo	30	69	224	2, 147, 305	2, 127	233	183	1, 420, 713	3, 723, 916	6, 382, 681
Lancaster, Pa	77	76	313	3, 792, 740	2, 741	1, 044	467	1, 177, 249	2, 942, 312	5, 404, 937
Lawrence, Mass	46	28	229	18, 698, 977	7, 819	7, 908	992	5, 544, 513	13, 862, 142	25, 058, 246
Louisville, Ky	16	17	1, 108	21, 767, 013	13, 480	2, 829	1, 139	5, 835, 545	21, 207, 110	35, 423, 203
Lowell, Mass	27	18	283	20, 465, 192	9, 218	9, 503	1, 318	5, 996, 591	16, 315, 062	33, 935, 777
Lynn, Mass	48	23	343	5, 894, 575	8, 894	3, 489	37	5, 833, 849	17, 433, 455	26, 828, 023
Manchester, N. H	56	36	121	15, 149, 153	4, 632	5, 748	458	3, 370, 404	7, 901, 066	14, 136, 305
Memphis, Tenn	54	82	138	2, 313, 975	2, 130	69	69	845, 672	2, 419, 341	4, 413, 422
Milwaukee, Wis	19	14	844	18, 766, 914	16, 015	3, 922	949	6, 946, 105	28, 975, 872	43, 473, 812
Minneapolis, Minn	38	20	401	9, 002, 650	4, 702	457	185	2, 582, 253	24, 274, 623	29, 973, 476
Mobile, Ala	68	97	91	525, 708	622	37	45	261, 643	830, 961	1, 335, 579
Nashville, Tenn	40	57	268	3, 892, 380	3, 815	538	438	1, 312, 765	5, 312, 527	8, 597, 278
Newark, N. J	15	11	1, 319	25, 679, 885	22, 151	5, 246	2, 649	13, 171, 339	44, 604, 335	69, 252, 705
New Bedford, Mass	75	50	330	7, 681, 082	3, 915	1, 538	359	2, 058, 751	5, 907, 874	9, 835, 955
New Haven, Conn	26	29	587	9, 703, 737	9, 998	4, 780	378	5, 761, 374	14, 482, 163	24, 040, 225

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY TOTALS: 1880.

Cities.	RANK, ACCORDING TO—		No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
	Population.	Value of products.			Males above 16 years.	Females above 15 years.	Children and youths.			
New Orleans, La	10	33	915	$8, 565, 303	7, 666	1, 286	552	$3, 717, 557	$10, 771, 892	$18, 808, 096
Newport, Ky	98	88	94	1, 700, 715	1, 608	35	105	711, 019	2, 526, 936	3, 996, 995
New York, N. Y	1	1	11, 339	181, 206, 356	146, 179	71, 795	9, 378	97, 030, 021	288, 441, 691	472, 926, 437
Norfolk, Va	83	96	105	570, 276	668	61	23	317, 528	861, 026	1, 455, 987
Oakland, Cal	51	91	72	1, 371, 457	1, 369	13	5	759, 917	2, 012, 695	3, 181, 066
Omaha, Nebr	63	84	154	1, 835, 800	1, 466	64	158	726, 918	2, 527, 476	4, 280, 866
Oswego, N. Y	92	74	179	2, 611, 238	1, 754	272	106	756, 435	3, 646, 845	5, 619, 944
Paterson, N. J	34	25	346	12, 412, 942	10, 270	6, 576	2, 953	6, 992, 487	14, 623, 833	26, 503, 350
Peoria, Ill	67	35	296	4, 160, 707	3, 619	313	135	1, 507, 666	9, 556, 476	14, 228, 134
Petersburg, Va	89	80	115	1, 755, 415	2, 209	1, 245	742	602, 749	3, 290, 116	4, 643, 015
Philadelphia, Pa	2	2	8, 567	187, 148, 857	113, 075	56, 818	15, 634	64, 265, 966	199, 155, 477	324, 342, 935
Pittsburgh, Pa	12	10	1, 112	52, 645, 010	32, 011	1, 681	3, 238	17, 168, 989	42, 109, 777	75, 915, 033
Portland, Me	53	51	302	4, 243, 225	4, 841	1, 550	738	1, 541, 997	6, 813, 962	9, 832, 931
Poughkeepsie, N. Y	99	83	140	3, 728, 700	1, 766	493	223	761, 711	2, 781, 289	4, 392, 900
Providence, R. I	20	16	1, 205	27, 177, 006	16, 050	5, 125	1, 716	9, 464, 110	22, 794, 227	42, 597, 512
Quincy, Ill	73	60	318	4, 078, 200	2, 866	151	309	1, 271, 995	5, 089, 880	8, 103, 277
Reading, Pa	41	39	330	7, 498, 256	5, 413	724	558	2, 240, 290	8, 396, 910	13, 251, 095
Richmond, Va	25	31	598	6, 884, 386	9, 218	2, 872	1, 957	3, 006, 456	12, 141, 512	20, 790, 106
Rochester, N. Y	22	27	735	13, 161, 870	9, 292	4, 052	1, 263	5, 217, 713	16, 446, 815	26, 478, 266
Sacramento, Cal	90	87	100	1, 672, 400	868	10	46	547, 692	2, 911, 889	4, 093, 934
Saint Joseph, Mo	57	77	238	1, 423, 650	2, 040	94	124	896, 762	3, 210, 080	5, 143, 585
Saint Louis, Mo	6	6	2, 924	50, 832, 885	33, 980	4, 761	3, 084	17, 743, 532	75, 379, 867	114, 333, 375
Saint Paul, Minn	45	48	593	3, 738, 791	3, 930	1, 092	208	2, 254, 340	5, 719, 067	10, 286, 363
Salem, Mass	72	49	241	3, 978, 850	2, 632	1, 309	240	1, 401, 592	7, 264, 447	9, 926, 564
Salt Lake City, Utah	93	95	166	860, 415	696	114	118	425, 537	812, 736	1, 610, 133
San Antonio, Tex	96	100	71	310, 050	300	13	48	137, 781	328, 476	642, 412
San Francisco, Cal	9	9	2, 971	35, 368, 139	23, 662	3, 588	1, 192	14, 928, 534	47, 978, 072	77, 824, 299
Savannah, Ga	62	90	120	1, 102, 970	996	68	66	447, 640	2, 457, 606	3, 396, 297
Scranton, Pa	39	58	216	4, 470, 631	2, 908	456	185	1, 313, 287	6, 671, 479	8, 561, 850
Somerville, Mass	78	72	100	1, 682, 795	1, 191	84	21	564, 508	4, 608, 192	5, 852, 535
Springfield, Ill	100	86	116	1, 709, 775	1, 391	75	232	656, 253	3, 156, 279	4, 123, 883
Springfield, Mass	55	41	434	9, 177, 250	4, 881	2, 138	341	2, 906, 130	7, 726, 119	12, 891, 826
Springfield, Ohio	94	59	170	7, 255, 953	3, 741	47	182	1, 067, 212	4, 550, 569	8, 462, 443
Syracuse, N. Y	32	34	724	8, 186, 818	7, 513	2, 871	582	3, 042, 135	8, 544, 436	14, 695, 674
Taunton, Mass	91	66	148	4, 086, 134	3, 585	898	671	2, 083, 185	4, 272, 451	7, 618, 953
Terre Haute, Ind	76	55	224	2, 566, 750	3, 090	144	142	1, 406, 352	6, 743, 719	9, 185, 246
Toledo, Ohio	35	46	440	5, 534, 285	5, 028	1, 020	690	2, 260, 456	6, 355, 399	10, 600, 074
Trenton, N. J	64	42	404	6, 966, 830	6, 691	1, 084	1, 127	3, 150, 119	7, 421, 399	12, 712, 762
Troy, N. Y	29	26	514	13, 418, 853	10, 337	11, 115	982	6, 745, 874	13, 443, 284	26, 497, 163
Utica, N. Y	52	56	317	5, 905, 635	3, 752	2, 620	338	1, 917, 657	5, 180, 598	8, 873, 306
Washington, D. C	14	44	971	5, 552, 526	5, 496	1, 389	261	3, 924, 612	5, 365, 400	11, 882, 316
Wheeling, W. Va	61	54	227	4, 868, 288	4, 658	196	658	2, 192, 255	5, 203, 931	9, 259, 844
Wilkesbarre, Pa	79	98	89	1, 146, 500	613	17	15	223, 399	660, 649	1, 133, 344
Wilmington, Del	42	40	258	10, 744, 389	6, 871	459	522	3, 171, 821	7, 884, 847	13, 205, 370
Worcester, Mass	23	22	644	11, 378, 604	13, 685	2, 480	394	6, 910, 817	16 582, 750	27, 292, 793

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF ALBANY, N. Y.

[Statistics collected under the direction of F. E. WADHAMS, Chief Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	804	$14, 684, 130	9, 829	1, 528	428	$4, 566, 424	$12, 509, 362	$21, 751, 009
Agricultural implements	3	359, 000	280			70, 788	146, 000	336, 586
Blacksmithing (see also Wheelwrighting)	38	50, 670	83		2	40, 826	36, 365	114, 819
Bookbinding and blank-book making	7	47, 100	52	22	8	35, 589	48, 112	103, 407
Boots and shoes, including custom work and repairing	55	652, 545	1, 178	460	39	549, 700	1, 294, 923	2, 237, 616
Boxes, cigar	5	15, 500	15	14	3	6, 175	24, 183	40, 639
Boxes, fancy and paper	3	18, 000	9	73	3	15, 655	22, 423	46, 405
Brass castings	4	31, 800	40		2	4, 650	11, 925	23, 305
Bread and other bakery products	50	547, 135	324	53	25	209, 880	794, 809	1, 157, 959
Brick and tile	10	167, 000	246		42	71, 805	45, 057	171, 800
Brooms and brushes	3	33, 674	24		6	11, 600	32, 657	88, 768
Carpentering	50	190, 070	479		4	226, 441	308, 545	661, 813
Carriages and wagons (see also Wheelwrighting)	10	153, 708	150		1	54, 701	80, 508	175, 025
Clothing, men's	45	404, 541	681	250	9	260, 426	481, 832	917, 646
Coffee and spices, roasted and ground	5	167, 775	39	1	2	25, 389	467, 800	557, 126
Coffins, burial cases, and undertakers' goods	9	62, 300	22	4		10, 279	22, 668	52, 295
Confectionery	19	61, 500	48	20	15	30, 221	83, 594	160, 921
Cooperage	8	45, 500	40		4	19, 366	54, 650	88, 900
Dentistry, mechanical	10	11, 900	7		4	3, 718	4, 750	17, 250
Dyeing and cleaning	4	22, 500	13	6	1	8, 100	4, 566	21, 405
Electroplating	4	14, 000	25		6	13, 477	5, 300	29, 563
Engraving and die-sinking	3	7, 300	11	1	1	6, 666	8, 600	23, 700
Engraving, wood	5	3, 400	7			5, 248	500	14, 600
Flouring- and grist-mill products	3	222, 000	33			16, 000	300, 000	354, 720
Foundery and machine-shop products	28	3, 070, 959	2, 156		59	974, 145	1, 159, 617	2, 656, 635
Furniture (see also Upholstering)	11	176, 800	131	4	11	53, 051	100, 790	211, 391
Hairwork	6	10, 625		15		3, 014	6, 534	15, 585
Instruments, professional and scientific	4	7, 300	3		1	1, 025	675	6, 642
Jewelry	7	24, 100	23	1	1	13, 650	10, 250	33, 260
Kindling wood	9	17, 900	19		8	6, 987	20, 650	38, 860
Leather, curried	3	43, 000	19			7, 644	69, 336	89, 865
Liquors, malt	17	1, 943, 500	660			291, 896	1, 479, 296	2, 641, 600
Looking-glass and picture frames	3	18, 900	27		3	14, 669	13, 962	35, 907
Lumber, planed (see also Sash, doors, and blinds)	4	100, 000	134		25	52, 597	37, 250	111, 261
Malt	13	1, 322, 688	155			52, 622	1, 111, 656	1, 348, 858
Marble and stone work	9	39, 600	47			19, 777	20, 259	57, 660
Masonry, brick and stone	4	2, 500	20			6, 912	6, 850	19, 600
Mineral and soda waters	5	44, 800	44			15, 221	60, 906	107, 196
Models and patterns	4	2, 300	5			2, 100	550	6, 300
Musical instruments, pianos and materials	7	227, 200	169		1	77, 757	129, 117	248, 000
Painting and paperhanging	36	59, 250	164		2	73, 159	76, 860	199, 838
Patent medicines and compounds	5	47, 000	21	7	7	13, 700	47, 075	85, 126
Photographing	13	86, 025	30	13	4	20, 873	24, 048	87, 022
Plumbing and gasfitting	24	85, 050	103		3	50, 444	101, 856	206, 158
Printing and publishing	17	1, 032, 500	528	148	14	342, 189	340. 717	875, 025
Roofing and roofing materials	3	20, 500	42			21, 900	47, 250	79, 475
Saddlery and harness	19	31, 638	43		1	18, 319	23, 116	66, 839
Sash, doors, and blinds (see also Lumber, planed)	7	54, 000	104		4	40, 100	77, 200	143, 035
Shipbuilding	3	15, 000	71			53, 200	27, 800	90, 000
Shirts	8	41, 800	14	86		25, 325	131, 318	171, 788
Slaughtering and meat-packing, not including retail butchering	10	193, 000	70			18, 182	750, 645	804, 773
Soap and candles	6	65, 800	9			4, 476	38, 011	60, 152
Stationery goods	3	275, 000	67	92		40, 494	278, 459	366, 046
Tinware, copperware, and sheet iron ware	24	83, 200	81		5	30, 000	75, 601	130, 634
Tobacco, cigars and cigarettes	50	220, 450	290	49	30	121, 057	269, 059	545, 246
Upholstering (see also Furniture)	4	15, 450	16	6	1	10, 568	28, 526	47, 302
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	7	7, 500	11			3, 462	4, 400	12, 600
Wirework	6	11, 575	13	1	3	4, 907	52, 700	67, 533
All other industries (*a*)	72	1, 998, 302	736	202	68	384, 802	1, 607, 256	2, 687, 529

[a] Embracing awnings and tents; axle-grease; baking and yeast powders; billiard tables and materials; blacking; bluing; boot and shoe cut stock; boot and shoe findings; boot and shoe uppers; boxes, wooden, packing; carriage and wagon materials; collars and cuffs, paper; coppersmithing; cordage and twine; cork cutting; cutlery and edge tools; drugs and chemicals; enameling; fancy articles; fertilizers; files; food preparations; furs, dressed; gas machines and meters; gold and silver leaf and foil; hats and caps; hosiery and knit goods; housefurnishing goods; ink; iron and steel; iron railing, wrought; lasts, leather, tanned; lock- and gun smithing; mantels, slate, marble, and marbleized; mattresses and spring beds; millinery and lace goods; musical instruments and materials (not specified); oilcloth, enameled; paving materials; plated and britannia ware; pumps; refrigerators; safes, doors, and vaults, fire-proof; saws; silverware, springs, steel, car, and carriage; steam fittings and heating apparatus; stencils and brands; stone- and earthen-ware; tobacco, chewing, smoking, and snuff; umbrellas and canes; varnish; vinegar; wooden ware; and wood, turned and carved.

CITY OF ALLEGHENY, PA.

[Statistics collected under the direction of A. B. MILLS, Chief Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	424	$8, 451, 059	5, 549	614	308	$2, 652, 774	$8, 818, 153	$13, 731, 792
Blacksmithing (see also Wheelwrighting)	16	7, 050	17			8, 910	7, 093	28, 300
Boots and shoes, including custom work and repairing	6	1, 750	4			1, 050	1, 850	5, 900
Bread and other bakery products	18	101, 000	69	9	5	42, 414	142, 613	219, 850
Brick and tile	6	47, 000	144		5	47, 116	16, 560	93, 100
Brooms and brushes	3	6, 000	5	16		4, 300	3, 000	11, 300
Carpentering	32	167, 850	297		2	163, 105	303, 300	624, 770
Carriages and wagons (see also Wheelwrighting)	5	23, 500	60			29, 523	29, 600	74, 925
Clothing, men's	7	39, 300	43	31		16, 798	37, 150	68, 150
Coffins, burial cases, and undertakers' goods	8	215, 500	240	18		105, 132	112, 679	270, 121
Confectionery	5	35, 500	21	11	7	15, 825	42, 300	76, 550

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF ALLEGHENY, PA.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Cooperage	7	$20, 600	32	....	....	$13, 058	$43, 000	$65, 328
Cotton goods	3	596, 935	148	461	161	138, 513	435, 235	734, 250
Dentistry, mechanical	14	12, 500	1	1	....	400	5, 800	26, 600
Drugs and chemicals	4	44, 500	10	1	....	6, 070	32, 570	54, 900
Dyeing and cleaning	5	9, 100	16	4	1	10, 348	4, 450	22, 900
Foundery and machine-shop products	14	978, 700	786	....	20	409, 001	635, 715	1, 167, 137
Furniture (see also Upholstering)	6	51, 800	60	....	1	29, 591	41, 103	89, 500
Hardware	4	87, 000	146	....	....	56, 400	91, 400	216, 400
Iron and steel	7	1, 776, 364	1, 509	....	51	619, 438	1, 418, 292	2, 034, 364
Leather, curried	7	505, 000	103	....	....	51, 741	1, 497, 570	1, 617, 000
Leather, tanned	12	547, 500	221	....	....	105, 839	1, 095, 525	1, 529, 745
Liquors, malt	8	556, 000	150	....	....	76, 947	348, 650	666, 712
Lumber, planed	4	60, 500	51	....	....	30, 470	48, 275	91, 350
Lumber, sawed	4	115, 000	40	....	....	11, 500	118, 000	177, 900
Marble and stone work	7	56, 000	86	....	....	40, 386	29, 342	83, 248
Masonry, brick and stone	7	25, 100	49	....	....	19, 983	12, 909	44, 426
Painting and paperhanging	24	19, 700	56	1	1	30, 450	29, 550	85, 300
Paints	7	925, 000	229	....	4	95, 291	694, 910	1, 005, 788
Photographing	7	10, 200	5	3	....	4, 002	3, 804	12, 962
Plumbing and gasfitting	16	55, 700	54	....	4	27, 908	48, 517	98, 144
Saddlery and harness	7	129, 000	129	....	10	72, 058	122, 549	242, 502
Salt	3	140, 000	53	....	3	24, 680	48, 000	99, 900
Shipbuilding	3	20, 300	9	....	....	5, 000	12, 500	22, 000
Soap and candles	4	159, 900	48	1	....	24, 300	129, 265	286, 115
Tinware, copperware, and sheet-iron ware	17	42, 050	44	....	2	23, 747	36, 200	84, 700
Tobacco, cigars and cigarettes	43	54, 710	118	9	4	53, 114	64, 372	161, 227
Upholstering (see also Furniture)	5	4, 200	5	2	1	3, 400	5, 050	14, 600
Watch and clock repairing	11	8, 350	13	....	3	7, 635	3, 335	24, 000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	25	46, 500	52	....	2	25, 611	24, 825	75, 465
All other industries (*a*)	33	749, 300	426	46	21	201, 720	1, 041, 295	1, 424, 363

a Embracing agricultural implements; baskets, rattan and willow ware; carpets, rag; files; flouring- and grist-mill products; grease and tallow; iron bolts, nuts, washers, and rivets; malt; mineral and soda waters; models and patterns; oil, linseed; printing and publishing; roofing and roofing materials; slaughtering and meat-packing; springs, steel, car, and carriage; tobacco, chewing, smoking, and snuff; vinegar; wirework; and woolen goods.

CITY OF ATLANTA, GA.

[Statistics collected under the direction of MOSES T. SIMMONS, Special Agent.]

All industries	196	$2, 468, 456	2, 753	533	394	$889, 282	$3, 159, 267	$4, 861, 727
Blacksmithing	16	5, 300	29	....	2	7, 650	10, 360	24, 950
Boots and shoes, including custom work and repairing	11	1, 800	23	....	....	8, 438	10, 467	26, 060
Bread and other bakery products	6	36, 900	42	13	9	19, 260	115, 500	161, 100
Brick and tile	14	31, 240	230	....	83	42, 230	33, 915	102, 200
Carpentering	10	85, 500	318	....	5	92, 800	220, 000	382, 200
Carriages and wagons	8	22, 000	86	....	4	32, 800	30, 700	81, 500
Clothing, men's	3	13, 400	12	28	....	8, 465	17, 000	32, 500
Confectionery	4	78, 300	50	23	1	18, 146	215, 000	263, 000
Dyeing and cleaning	3	7, 600	7	4	....	3, 614	2, 624	10, 000
Flouring- and grist-mill products	4	125, 000	34	....	....	15, 000	474, 000	527, 800
Foundery and machine-shop products	7	314, 866	172	....	7	72, 393	114, 784	252, 908
Furniture (see also Mattresses and spring beds)	3	22, 350	85	3	3	17, 558	28, 759	82, 014
Lumber, planed	5	81, 000	235	....	10	56, 789	179, 000	285, 000
Marble and stone work	4	14, 400	25	....	....	8, 950	7, 800	33, 100
Mattresses and spring beds (see also Furniture)	3	1, 400	5	5	1	1, 860	2, 600	6, 200
Painting and paperhanging	6	2, 650	23	....	....	6, 920	6, 400	18, 650
Patent medicines and compounds	9	102, 500	59	15	7	30, 492	52, 700	128, 500
Printing and publishing	10	183, 500	163	10	15	71, 112	96, 549	229, 883
Saddlery and harness	3	12, 200	15	....	....	8, 000	17, 100	32, 000
Slaughtering and meat-packing, not including retail butchering	9	25, 700	35	....	6	9, 473	269, 077	309, 093
Tinware, copperware, and sheet-iron ware	7	44, 300	86	....	6	25, 250	80, 400	127, 900
Watch and clock repairing	4	5, 200	7	....	2	4, 524	4, 000	14, 800
All other industries (*a*)	47	1, 251, 350	1, 012	432	233	327, 558	1, 170, 532	1, 730, 349

a Embracing agricultural implements; bags, paper; baking and yeast powders; bookbinding and blank-book making; boxes, fancy and paper; boxes, wooden, packing; brass castings; coal-tar; coffee and spices, roasted and ground; coffins, burial cases, and undertakers' goods; cooperage; coppersmithing; cotton goods; dyeing and finishing textiles; ice, artificial; instruments, professional and scientific; iron and steel; liquors, distilled; liquors, malt; lithographing; looking-glass and picture frames; masonry, brick and stone; millstones; mineral and soda waters; models and patterns; musical instruments, organs and materials; paints; paving materials; perfumery and cosmetics; plumbing and gasfitting; stencils and brands; straw goods; tobacco, cigars and cigarettes; trunks and valises; and upholstering.

CITY OF AUBURN, N. Y.

[Statistics collected under the direction of MINARD MCDONALD, Special Agent.]

All industries	154	$4, 423, 950	3, 579	752	187	$1, 658, 826	$4, 052, 746	$7, 719, 409
Agricultural implements	7	1, 231, 000	1, 124	....	8	551, 314	894, 800	2, 416, 075
Blacksmithing	8	14, 000	13	....	....	6, 120	7, 600	21, 900
Boots and shoes, including custom work and repairing	9	131, 800	335	....	....	69, 853	469, 805	591, 498
Bread and other bakery products	3	6, 300	19	....	....	9, 590	38, 506	56, 506
Carpentering	6	11, 000	75	....	....	34, 600	120, 000	199, 000
Dentistry, mechanical	4	14, 500	....	....	....	....	3, 261	12, 510
Foundery and machine-shop products	5	152, 000	273	....	....	96, 075	153, 004	299, 177
Furniture	4	75, 300	22	....	....	11, 125	18, 600	37, 849
Liquors, malt	4	132, 000	16	....	6	10, 017	47, 434	87, 362
Marble and stone work	4	10, 500	12	....	....	6, 035	7, 487	19, 048

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF AUBURN, N. Y.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Masonry, brick and stone	6	$6, 700	71	....	....	$35, 000	$30, 000	$72, 700
Painting and paperhanging	4	10, 050	16	....	....	6, 400	13, 800	25, 900
Photographing	8	20, 600	47	15	....	24, 710	24, 450	74, 200
Printing and publishing	3	42, 500	25	24	25	22, 167	34, 490	77, 600
Saddlery and harness	7	34, 500	70	....	....	19, 075	38, 975	70, 700
Tinware, copperware, and sheet-iron ware	5	13, 275	13	....	....	7, 604	17, 750	30, 000
Tobacco, cigars and cigarettes	15	21, 325	29	....	4	15, 378	22, 546	52, 918
Woolen goods	3	940, 000	351	325	26	204, 745	799, 577	1, 292, 901
All other industries (*a*)	49	1, 556, 600	1, 068	388	118	529, 018	1, 310, 661	2, 280, 965

a Embracing bookbinding and blank-book making; boxes, fancy and paper; buttons; carpets, other than rag; carriages and sleds, children's; carriages and wagons; cement; clothing, men's; dyeing and cleaning; files; flouring- and grist-mill products; gloves and mittens; hairwork; hand-knit goods; hardware; hardware, saddlery; iron and steel; iron forgings; leather, curried; leather, tanned; lock- and gun-smithing; mattresses and spring beds; mineral and soda waters; models and patterns; oil, neat's-foot; patent medicines and compounds; pumps; sash, doors and blinds; shirts; soap and candles; starch; tobacco, chewing, smoking, and snuff; tools; washing-machines and clothes-wringers; wheelwrighting; and window blinds and shades.

CITY OF AUGUSTA, GA.

[Statistics collected under the direction of ERNEST E. DOSCHER, Special Agent.]

All industries	60	$2, 069, 275	867	511	302	$448, 825	$2, 247, 665	$3, 139, 029
Blacksmithing	5	2, 075	11	....	....	3, 221	5, 730	12, 539
Carpentering	5	14, 350	81	....	....	30, 585	68, 033	111, 016
Carriages and wagons	4	80, 450	62	....	2	24, 456	52, 750	91, 746
Cotton goods	6	1, 360, 000	222	493	234	223, 633	1, 038, 466	1, 460, 982
Flouring- and grist-mill products	3	144, 000	50	....	6	18, 360	770, 000	869, 950
Foundery and machine-shop products	4	56, 000	107	4	14	37, 620	79, 699	146, 250
Tinware, copperware, and sheet-iron ware	4	4, 100	14	....	1	4, 250	17, 200	27, 700
All other industries (*a*)	29	408, 300	320	14	45	106, 700	215, 787	418, 846

a Embracing bread and other bakery products; brick and tile; coffins, burial cases, and undertakers' goods; confectionery; fertilizers; ice, artificial; looking-glass and picture frames; marble and stone work; mattresses and spring beds; mineral and soda waters; painting and paperhanging; patent medicines and compounds; plumbing and gasfitting; printing and publishing; saddlery and harness; sash, doors, and blinds; stencils and brands; tobacco, chewing, smoking, and snuff; tobacco, cigars and cigarettes; wheelwrighting; and woolen goods.

CITY OF BALTIMORE, MD.

[Statistics collected under the direction of NOBLE H. CREAGER, Chief Special Agent. See note on page 379.]

All industries	3, 683	$38,586,773	34, 086	18, 137	4, 115	$15, 117, 489	$47, 974, 297	$78, 417, 304
Agricultural implements	5	106, 000	118	....	15	49, 250	101, 000	229, 550
Awnings and tents	3	4, 600	11	30	....	7, 900	16, 800	36, 100
Bags, paper	3	78, 500	24	22	4	17, 704	152, 270	236, 700
Baking and yeast powders (see also Drugs and chemicals)	4	70, 600	12	14	....	16, 000	111, 040	167, 808
Baskets, rattan and willow ware	16	5, 110	16	....	2	5, 168	5, 335	18, 826
Blacksmithing (see also Wheelwrighting)	116	127, 520	270	....	6	123, 894	98, 225	348, 835
Bookbinding and blank-book making	17	91, 756	99	83	25	61, 593	59, 304	163, 988
Boot and shoe uppers	11	7, 700	27	18	1	11, 755	17, 375	37, 675
Boots and shoes, including custom work and repairing	623	865, 337	2, 117	507	70	939, 861	1, 632, 492	3, 411, 736
Boxes, cigar	13	19, 325	22	19	9	15, 163	28, 883	58, 822
Boxes, fancy and paper	8	34, 020	28	169	10	32, 617	82, 883	140, 625
Boxes, wooden, packing	13	139, 012	318	....	44	147, 077	300, 573	531, 000
Brass castings	10	19, 500	32	....	1	16, 279	33, 741	71, 101
Bread and other bakery products	316	832, 372	625	73	58	261, 463	1, 449, 459	2, 172, 062
Brick and tile	28	640, 000	1, 460	....	69	322, 839	156, 648	626, 813
Brooms and brushes	28	83, 115	210	22	32	74, 758	156, 978	293, 619
Carpentering	114	1, 107, 800	1, 226	....	9	674, 964	1, 906, 239	3, 216, 028
Carpets, rag	17	23, 525	28	2	4	10, 521	23, 078	48, 506
Carriages and sleds, children's	3	15, 600	31	2	3	10, 740	33, 500	53, 080
Carriages and wagons (see also Wheelwrighting)	37	223, 700	364	....	8	147, 201	155, 573	397, 849
Clothing, men's	188	3, 848, 851	5, 184	5, 915	58	1, 822, 501	6, 013, 863	9, 446, 793
Clothing, women's	27	136, 250	22	482	23	84, 998	265, 192	469, 718
Coffee and spices, roasted and ground	13	124, 750	46	23	....	24, 503	221, 108	299, 874
Coffins, burial cases, and undertakers' goods	52	91, 275	73	....	1	31, 984	73, 103	184, 423
Confectionery	53	339, 765	222	87	13	110, 718	781, 752	1, 108, 038
Cooperage	43	220, 860	364	....	7	146, 382	325, 432	560, 696
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	8	20, 200	21	....	....	11, 900	15, 600	32, 250
Cotton goods (see also Mixed textiles)	3	699, 000	209	225	108	80, 738	182, 283	327, 366
Cutlery and edge tools (see also Hardware)	10	22, 550	23	....	1	9, 200	11, 156	30, 596
Dentistry, mechanical	14	12, 260	11	1	1	6, 323	4, 313	32, 788
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	17	652,300	189	47	....	78, 144	529, 485	873, 125
Dyeing and cleaning	26	40, 785	31	19	....	19, 031	11, 060	58, 662
Electroplating	5	17, 525	29	....	2	10, 166	7, 350	36, 600
Engraving and die-sinking	7	1, 925	6	....	....	3, 300	1, 450	14, 059
Engraving, wood	4	1, 250	4	....	....	1, 800	905	6, 900
Fertilizers	18	3, 241, 370	655	....	6	254, 055	2, 689, 223	4, 287, 398
Files (see also Saws)	4	31, 850	26	....	16	15, 206	9, 850	31, 330
Flavoring extracts	5	8, 200	15	4	....	5, 274	16, 360	31, 100
Flouring- and grist-mill products	8	562, 000	95	....	....	46, 118	1, 173, 988	1, 327, 584
Food preparations (see page 39)	3	4, 650	12	2	1	2, 415	16, 000	26, 000
Foundery and machine-shop products	63	2, 240, 004	2, 643	....	33	1, 333, 841	1, 887, 421	3, 939, 717
Fruits and vegetables, canned and preserved	41	1, 959, 100	2, 324	6, 753	1, 846	815, 013	3, 854, 550	5, 201, 268
Furniture (see also Mattresses and spring beds; Upholstering)	68	721, 552	941	15	22	401, 005	772, 233	1, 512, 634
Furniture, chairs	3	150, 250	64	30	2	47, 200	130, 200	278, 500
Furs, dressed	4	30, 000	6	17	....	8, 125	10, 635	33, 913

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF BALTIMORE, MD.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Gas machines and meters	5	$62,000	82	1	17	$42,748	$118,250	$206,620
Glass	7	406,000	524		88	234,254	239,682	587,000
Gold and silver leaf and foil	3	6,000	16	29	2	10,500	26,000	49,200
Grease and tallow	6	101,500	22			10,254	213,449	258,021
Hairwork	11	12,250	4	29		5,654	16,575	34,298
Hardware (see also Cutlery and edge tools)	5	18,100	31		4	13,844	14,100	37,504
Hats and caps, not including wool hats	6	26,900	22	33		13,415	33,000	63,380
Instruments, professional and scientific	6	49,000	25	2	4	18,244	3,850	31,600
Iron and steel	10	1,632,125	1,343		65	532,579	1,803,209	2,672,940
Iron railing, wrought	6	5,900	19			8,200	13,000	32,800
Jewelry	4	11,300	16	1	3	9,744	12,860	33,100
Kindling wood	11	36,925	42		22	18,256	36,245	72,296
Leather, curried	18	115,017	74		1	29,117	310,527	405,317
Leather, tanned	17	134,768	93	9	4	39,379	206,654	287,980
Liquors, malt	21	1,143,490	203			97,851	488,752	888,644
Lock- and gun-smithing	20	28,100	35		1	15,932	12,143	42,286
Looking-glass and picture frames	31	118,550	271	70	25	98,653	160,492	402,423
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	3	36,000	30			15,500	33,000	60,700
Malt	6	705,000	98			52,060	547,000	752,000
Mantels, slate, marble, and marbleized	3	23,000	19		2	8,388	10,784	80,205
Marble and stone work	40	651,701	815		10	323,480	447,030	954,285
Masonry, brick and stone	47	203,600	655		1	266,889	399,777	767,946
Mattresses and spring beds (see also Furniture)	5	6,825	10	2		4,442	32,443	44,125
Millinery and lace goods	11	79,100	24	133	41	35,896	148,240	229,460
Millstones	3	34,700	24			11,293	14,242	38,319
Mineral and soda waters	17	66,900	84			33,753	108,035	199,607
Mixed textiles (see also Cotton goods; Silk and silk goods)	3	4,900	6	11	5	4,000	7,850	20,240
Models and patterns	3	1,450	5			2,050	1,700	8,100
Musical instruments and materials (not specified)	6	4,900	4			1,395	1,975	7,400
Musical instruments, organs and materials	3	16,250	21		2	8,000	24,810	41,000
Musical instruments, pianos and materials	4	638,382	380		5	200,988	157,699	534,099
Painting and paperhanging	89	99,505	265		8	144,861	168,898	453,943
Paints	10	367,200	93		7	39,941	192,185	338,658
Patent medicines and compounds (see also Drugs and chemicals)	33	222,650	103	109	45	68,467	438,027	646,493
Perfumery and cosmetics	5	23,410	11	27	1	7,902	15,251	42,499
Photographing	25	70,150	51	15	2	25,005	22,426	95,228
Pickles, preserves, and sauces	6	21,850	7	14	6	5,532	48,250	71,300
Plated and britannia ware	3	19,200	43			20,780	18,500	52,000
Plumbing and gasfitting	89	198,185	194		9	82,042	176,186	412,886
Printing and publishing	47	1,954,200	671	21	99	409,251	560,657	1,374,168
Pumps, not including steam pumps	9	8,475	16		1	8,460	14,550	39,050
Refrigerators	3	16,200	24			7,099	13,040	27,990
Roofing and roofing materials	6	89,625	46		1	16,769	30,450	78,917
Saddlery and harness	76	304,625	461	2	81	223,187	388,092	857,810
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	9	354,525	359		34	190,111	334,113	681,755
Saws	3	6,500	8			2,321	2,744	10,281
Scales and balances	3	9,200	7			4,181	2,819	11,077
Sewing machines and attachments	6	20,500	22	1	2	11,620	9,450	35,595
Shipbuilding	62	1,493,275	887			524,873	707,026	1,445,080
Shirts	38	313,930	328	1,284	84	307,867	425,947	949,524
Show-cases	5	14,300	38		1	15,785	27,389	74,320
Silk and silk goods (see also Mixed textiles)	4	20,900	12	56	14	11,000	15,760	35,415
Silversmithing	4	98,703	38			26,979	49,542	112,061
Slaughtering and meat-packing, not including retail butchering	6	705,000	194			85,300	2,559,662	2,742,645
Soap and candles	7	250,432	77		6	43,145	215,238	323,350
Stencils and brands	3	2,800	6		1	3,526	2,200	9,500
Stone- and earthen-ware	6	125,700	194	10	62	115,004	74,923	254,594
Straw goods	3	160,800	107	422	15	57,761	264,507	362,982
Sugar and molasses, refined	3	260,000	106			31,000	756,703	840,986
Surgical appliances	3	5,700	35	5		17,000	15,600	61,500
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	154	1,071,360	1,231	124	298	569,642	2,250,500	3,371,081
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	10	602,600	187	740	128	165,107	1,152,906	1,531,424
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	329	568,282	1,050	115	84	462,099	617,585	1,551,014
Trunks and valises	15	24,150	51		4	19,228	36,810	75,466
Umbrellas and canes	3	8,550	4	6		2,080	8,500	17,400
Upholstering (see also Furniture)	19	22,725	42	7	2	16,820	51,781	98,539
Vinegar	8	47,750	17	1	1	7,012	58,112	87,012
Watch and clock repairing	23	18,500	25		4	14,883	6,454	41,415
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	44	77,445	148		3	54,057	54,013	166,325
Whips	3	21,300	31	6	1	13,936	25,800	52,925
Window blinds and shades	3	5,500	24			3,200	11,500	18,900
Wirework	4	33,500	42		2	24,000	26,000	77,000
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	8	2,660	17		4	8,203	9,020	26,436
All other industries (a)	81	2,790,664	1,564	271	293	766,948	4,945,900	6,655,810

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[a] Embracing artificial limbs; babbitt metal and solder; bags, other than paper; bells; belting and hose, leather; billiard tables and materials; blacking; bluing; bridges; carpets, other than rag; carriage and wagon materials; cars, railroad, street, and repairs; cleansing and polishing preparations; cloth-finishing; cork cutting; cordage and twine; corsets; explosives and fireworks; fancy articles; fire extinguishers, chemical; flags and banners; furnishing goods, men's; glass, cut, stained, and ornamented; hand-knit goods; hosiery and knit goods; iron bolts, nuts, washers, and rivets; iron forgings; iron nails and spikes, cut and wrought; iron work, architectural and ornamental; ivory and bone work; japanning; kaolin and ground earths; lamps and reflectors; lard, refined; lasts; lead, bar, pipe, sheet, and shot; leather, dressed skins; lightning rods; lime; liquors, distilled; lithographing; lumber, sawed; oil, illuminating, not including petroleum refining; oil, lard; oleomargarine; pipes, tobacco; printing materials; regalia and society banners and emblems; rubber and elastic goods; safes, doors, and vaults, fire-proof; shoddy; spectacles and eyeglasses; sporting goods; stationery goods; telegraph and telephone apparatus; toys and games; type founding; upholstering materials; and wooden ware.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF BAY CITY, MICH.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	80	$4, 235, 500	2, 066	21	151	$802, 488	$3, 851, 553	$5, 533, 621
Cooperage	6	10, 200	39		4	19, 220	30, 100	60, 450
Foundery and machine-shop products	9	278, 000	322		5	126, 583	176, 200	340, 695
Lumber, sawed	22	3, 042, 000	1, 079		95	351, 500	2, 831, 608	3, 702, 298
Salt	20	673, 000	405		21	191, 642	296, 297	707, 741
All other industries (*a*)	23	232, 300	221	21	26	113, 543	517, 348	722, 437

a Embracing blacksmithing; boots and shoes; carriages and wagons; clothing, men's; flouring- and grist-mill products; liquors, malt; lumber, planed; mineral and soda waters; models and patterns; needles and pins; sash, doors, and blinds; slaughtering and meat-packing; tinware, copperware, and sheet-iron ware; tobacco, cigars and cigarettes; and wooden ware.

CITY OF BOSTON, MASS.

[Statistics collected under the direction of ROBERT T. SWAN, Chief Special Agent. See note on page 379.]

All industries	3, 665	$47, 348, 384	39, 810	18, 150	1, 253	$24, 924, 009	$81, 688, 160	$130, 531, 993
Artificial feathers and flowers (see also Millinery and lace goods)	4	20, 000	16	162		25, 540	21, 350	124, 900
Awnings and tents	4	16, 200	12	40	1	21, 180	43, 840	77, 150
Baking and yeast powders (see also Drugs and chemicals)	4	254, 000	40	36	8	25, 530	160, 230	305, 230
Belting and hose, leather	3	40, 000	28			16, 383	160, 000	204, 000
Billiard tables and materials	4	47, 200	43			20, 000	42, 700	83, 300
Blacking	6	63, 500	38	44		28, 080	204, 000	324, 400
Blacksmithing (see also Wheelwrighting)	155	218, 275	576		7	278, 741	192, 544	665, 525
Bookbinding and blank-book making	46	410, 328	423	506	31	402, 082	359, 790	986, 416
Boot and shoe cut stock	12	62, 500	57	209	8	61, 075	243, 600	352, 200
Boot and shoe findings	11	117, 700	104	71	15	63, 012	258, 975	389, 883
Boots and shoes, including custom work and repairing	83	348, 775	1, 015	306	29	514, 356	1, 158, 366	1, 928, 740
Boxes, fancy and paper	18	139, 900	80	442	16	115, 432	176, 937	389, 062
Boxes, wooden, packing	5	18, 500	46		1	16, 507	50, 998	80, 900
Brass castings	26	222, 400	244	2	4	121, 532	198, 203	410, 553
Bread and other bakery products	113	292, 950	484	128	18	265, 927	946, 803	1, 471, 582
Bridges	9	53, 000	138			61, 620	206 300	325, 509
Brooms and brushes	16	290, 300	246	167	5	168, 321	491, 392	828, 290
Carpentering	305	818, 605	2, 419		14	1, 163, 648	1, 841, 710	3, 748, 358
Carriage and wagon materials	3	52, 000	23			15, 363	70, 000	110, 770
Carriages and wagons (see also Wheelwrighting)	23	375, 000	419	1		222, 567	259, 891	632, 085
Cars, railroad, street, and repairs	3	100, 000	100			45, 329	61, 399	127, 225
Clothing, men's	222	4, 200, 193	2, 246	6, 844	190	3, 418, 126	9, 844, 108	16, 157, 892
Clothing, women's	24	319, 900	229	1, 740	17	423, 573	1, 028, 135	1, 808, 520
Coffee and spices, roasted and ground	12	289, 000	88	33		70, 089	1, 243, 971	1, 448, 869
Coffins, burial cases, and undertakers' goods	9	27, 300	33			18, 956	18, 625	52, 950
Confectionery	33	251, 475	275	255	5	193, 436	1, 059, 225	1, 606, 214
Cooperage	21	79, 467	119			51, 532	86 374	188, 560
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	8	107, 200	141		5	85, 350	115, 800	249, 100
Cordage and twine	7	706, 550	343	108	19	134, 995	774, 915	1, 124, 400
Cork cutting	4	32, 434	34	16	6	15, 749	62, 467	106, 125
Corsets	5	45, 000	19	242	10	59, 240	105, 000	226, 600
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	4	143, 000	33	81	80	54, 200	161, 000	275, 000
Cutlery and edge tools (see also Hardware)	11	34, 600	41		1	19, 198	17, 670	58, 500
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	11	200, 500	104	10	1	51, 584	321, 132	450, 961
Dyeing and cleaning	20	41, 300	71	141	3	55, 782	27, 360	135, 371
Electrical apparatus and supplies	9	162, 500	86	1	1	48, 308	44, 506	119, 289
Electroplating	19	113, 450	91	4	2	41, 241	53, 990	147, 550
Engraving and die-sinking	22	53, 150	137	33	4	83, 850	68, 302	224, 031
Engraving, steel	5	7, 600	11	3	2	6, 950	3, 040	18, 700
Engraving, wood	11	20, 135	62		2	40, 125	4, 250	84, 975
Fancy articles	6	17, 500	26	18	11	11, 580	23, 100	48, 200
Fertilizers	5	568, 000	254			136, 427	805, 490	1, 231, 170
Files	7	57, 200	64	4		23, 448	11, 700	57, 133
Flavoring extracts	6	65, 500	22	30	2	19, 960	172, 400	266, 500
Flouring- and grist-mill products	8	510, 000	69			40, 792	1, 009, 010	1, 101, 000
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	134	4, 824, 833	3, 813	13	19	2, 068, 609	2, 739, 690	6, 234, 775
Fruits and vegetables, canned and preserved	8	242, 700	97	181	39	83, 997	496, 250	681, 188
Furnishing goods, men's	15	69, 900	25	152	5	47, 300	219, 250	377, 925
Furniture (see also Mattresses and spring beds; Upholstering)	123	1, 388, 875	2, 269	70	26	1, 078, 199	2, 011, 807	3, 867, 917
Furniture, chairs	7	70, 000	102	2		49, 261	170, 279	257, 238
Furs, dressed	13	64, 547	42	73	2	31, 016	179, 177	263, 250
Glass, cut, stained, and ornamented	10	55, 650	77	12	3	48, 511	34, 630	114, 340
Gold and silver leaf and foil	5	19, 300	31	16	5	20, 085	65, 900	96, 175
Grease and tallow	4	392, 000	98		2	54, 880	436, 210	564, 868
Hairwork	13	28, 600	9	65		20, 441	33, 360	73, 400
Hand-stamps	5	9, 500	12			4, 867	8, 750	20, 356
Hardware (see also Cutlery and edge tools)	11	117, 850	46	4	1	22, 575	22, 430	79, 900
Hardware, saddlery	3	26, 000	39	1	2	17, 720	9, 500	36, 700
Hats and caps, not including wool hats	27	106, 200	222	167	13	146, 252	196, 592	441, 276
Housefurnishing goods	5	20, 700	25	10	4	11, 575	22, 750	46, 200
Hosiery and knit goods (see also Cotton goods)	9	156, 800	94	1, 370	53	101, 275	291, 825	484, 183
Instruments, professional and scientific	12	81, 000	93	7	3	53, 446	20, 400	123, 540
Iron and steel	5	1, 624, 408	1, 108		12	444, 095	1, 552, 002	2, 189, 987
Iron bolts, nuts, washers, and rivets	3	30, 000	34	4	1	21, 060	17, 000	54, 000
Iron forgings	3	420, 000	149	95	2	107, 779	250, 947	502, 970
Japanning	6	4, 600	27		2	12, 890	4, 290	25, 060
Jewelry	28	193, 100	277	94	7	133, 382	228, 815	481, 722
Kindling wood	3	19, 000	52		6	19, 085	24, 223	58, 687
Labels and tags	5	288, 000	74	58		52, 210	338, 725	450, 325
Lapidary work	4	39, 000	33	3	3	19, 700	56, 575	102, 200

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF BOSTON, MASS.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Lasts	3	$10,500	14	....	....	$7,820	$3,600	$18,100
Leather, curried	20	420,800	534	....	8	240,250	2,035,382	2,520,792
Leather, dressed skins	8	315,500	200	....	2	82,753	439,840	579,350
Liquors, distilled	3	245,000	75	....	2	35,000	415,500	596,500
Liquors, malt	18	2,874,400	1,014	....	....	486,448	2,461,159	4,426,264
Lithographing (see also Printing and publishing)	9	487,550	576	98	22	336,327	437,360	989,020
Lock- and gun-smithing	20	29,000	50	....	1	21,019	22,865	66,560
Looking-glass and picture frames	45	123,700	267	8	13	147,775	268,895	533,097
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	11	372,500	233	....	5	109,754	261,500	480,810
Marble and stone work	43	696,600	1,033	....	....	387,113	674,141	1,442,861
Masonry, brick and stone	101	284,725	1,178	....	....	515,208	612,351	1,392,231
Mattresses and spring beds (see also Furniture)	19	181,597	169	123	12	124,063	460,722	677,792
Millinery and lace goods (see also Artificial feathers and flowers)	4	38,500	15	109	20	33,300	224,900	317,000
Mineral and soda waters	8	74,600	90	....	1	51,340	137,084	239,644
Mixed textiles (see also Cotton goods; Silk and silk goods)	5	600,000	106	462	26	176,010	581,472	909,000
Models and patterns	22	24,850	84	2	1	39,564	13,640	88,455
Musical instruments and materials (not specified)	6	28,200	39	1	....	19,550	7,307	36,000
Musical instruments, organs and materials	8	445,366	512	8	....	319,804	414,090	904,732
Musical instruments, pianos and materials	23	1,673,000	1,107	11	3	693,867	943,069	2,166,966
Oil, illuminating, not including petroleum refining	3	90,000	11	....	....	6,500	300,000	345,000
Painting and paperhanging	230	256,828	1,091	2	7	490,361	391,689	1,204,861
Paints (see also Varnish)	6	241,500	69	2	2	38,830	281,400	390,900
Patent medicines and compounds (see also Drugs and chemicals)	21	179,650	67	56	2	49,647	345,850	771,631
Perfumery and cosmetics	7	21,500	23	17	....	12,690	69,550	126,000
Photographing	41	103,900	121	59	6	92,581	66,047	231,935
Pickles, preserves, and sauces	4	12,500	9	10	2	6,530	34,500	78,000
Plumbing and gasfitting	117	232,550	568	3	18	291,156	467,607	973,588
Pocket-books	3	2,400	5	1	1	1,650	2,550	7,000
Printing and publishing (see also Lithographing)	145	2,496,535	2,342	436	98	1,783,913	1,955,668	5,469,518
Printing materials	4	15,300	12	1	2	8,460	12,000	28,050
Refrigerators	5	52,350	64	....	....	22,450	44,400	87,700
Roofing and roofing materials	41	173,625	238	....	....	109,142	249,705	465,567
Rubber and elastic goods	10	1,095,000	407	506	10	362,106	1,304,347	2,095,460
Saddlery and harness	69	175,300	390	21	7	164,357	248,052	550,558
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	12	73,800	86	3	4	39,625	124,480	195,045
Scales and balances	3	49,000	39	1	4	23,770	11,440	51,613
Sewing machines and attachments	3	243,000	41	....	....	29,358	36,870	102,700
Shipbuilding	116	1,451,850	841	....	....	536,458	724,422	1,479,148
Shirts	7	69,300	34	159	3	44,626	206,800	329,800
Show-cases	5	10,800	17	....	1	8,900	10,460	29,980
Silk and silk goods (see also Mixed textiles)	9	132,800	81	262	37	106,845	222,815	443,425
Silversmithing	5	4,250	11	2	....	5,811	4,176	16,235
Slaughtering and meat-packing, not including retail butchering	21	918,000	211	....	....	153,263	6,509,139	7,096,777
Soap and candles	11	161,400	59	14	....	33,739	124,600	208,633
Soda-water apparatus	3	95,000	189	5	6	73,335	279,638	487,306
Spectacles and eyeglasses	7	8,200	18	2	1	11,500	4,630	25,730
Sporting goods	3	8,000	8	18	....	5,920	2,950	10,800
Springs, steel, car, and carriage	5	4,450	13	....	....	2,750	9,500	18,509
Stationery goods	10	48,800	73	11	3	41,635	103,870	207,050
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	9	269,500	186	....	17	97,989	228,918	398,780
Stencils and brands	12	28,500	28	3	4	16,660	14,525	53,200
Stereotyping and electrotyping (see also Type founding)	5	38,000	96	2	....	59,021	34,908	115,630
Stone- and earthen-ware	5	58,000	72	6	4	33,450	23,735	97,900
Straw goods	3	41,000	33	125	5	51,227	122,974	220,295
Sugar and molasses, refined	4	1,629,500	395	....	....	202,061	15,544,084	16,518,760
Surgical appliances	5	30,500	30	19	2	28,300	43,000	106,000
Taxidermy	3	1,800	7	2	....	2,900	5,100	14,000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	94	322,280	520	23	16	258,033	531,861	1,055,472
Tobacco, cigars and cigarettes	68	135,556	333	103	15	190,976	253,413	524,283
Trunks and valises	20	104,500	158	6	....	82,665	235,503	400,708
Type founding (see also Stereotyping and electrotyping)	3	72,200	75	56	5	65,500	55,500	162,000
Umbrellas and canes	3	17,600	7	15	....	8,811	28,425	50,046
Upholstering (see also Furniture)	41	122,757	179	45	3	105,103	210,267	390,848
Varnish (see also Paints)	3	65,000	16	....	....	9,600	176,000	235,000
Watch and clock repairing	6	6,700	12	....	....	5,504	1,162	12,000
Watch cases	5	65,000	103	16	3	86,142	274,480	427,371
Whalebone and rattan	4	24,500	31	21	2	19,115	41,044	69,417
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	56	90,225	218	....	....	98,735	73,477	232,965
Window blinds and shades	12	19,250	46	11	....	18,140	40,760	76,345
Wirework	15	69,400	107	16	11	55,106	104,771	214,567
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	44	327,960	441	1	8	208,829	433,855	791,355
Wooden ware	3	6,000	21	....	....	8,950	13,800	33,500
All other industries (*a*)	116	4,142,030	2,265	1,103	100	1,399,393	4,990,581	8,041,397

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a Embracing agricultural implements; artificial limbs; bags, other than paper; bags, paper; baskets, rattan and willow ware; belting and hose, linen; boot and shoe uppers; boxes, cigar; brick and tile; buttons; carpets, other than rag; carpets, rag; carpets, wood; carriages and sleds, children's; cement; cheese and butter (factory); chocolate; cleansing and polishing preparations; clocks; cloth-finishing; collars and cuffs, paper; cordials and sirups; cotton-ties; drain and sewer pipe; dyeing and finishing textiles; dyestuffs and extracts; engravers' materials; explosives and fireworks; fire-arms; food preparations; foundery supplies; gas and lamp fixtures; gas machines and meters; glass; glue; graphite; grindstones; hat and cap materials; hones and whetstones; ink; iron doors and shutters; iron nails and spikes, cut and wrought; iron work, architectural and ornamental; jewelry and instrument cases; lamps and reflectors; lard, refined; lead, bar, pipe, sheet, and shot; leather goods; lime; lumber, sawed; malt; matches; millstones; mirrors; needles and pins; nets and seines; oilcloth, floor; oleomargarine; pens, gold; photographic apparatus; plated and britannia ware; regalias and society banners and emblems; rules, ivory and wood; safes, doors, and vaults, fire-proof; saws; shoddy; silverware; smelting and refining; starch; telegraph and telephone apparatus; terra-cotta ware; tobacco, chewing, smoking, and snuff; toys and games; tools; veneering; vinegar; washing-machines and clothes-wringers; watches; and woolen goods.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF BRIDGEPORT, CONN.

[Statistics collected under the direction of WILLIAM E. DISBROW, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	170	$9, 751, 785	5, 476	1, 807	225	$3, 342, 935	$4, 819, 939	$10, 458, 212
Blacksmithing	6	23, 225	22			11, 400	17, 450	39, 779
Boots and shoes, including custom work and repairing	7	50, 050	59	40		40, 968	84, 659	153, 764
Bread and other bakery products	8	17, 000	40	3		24, 214	67, 754	113, 040
Carpentering	10	18, 200	181		2	71, 926	133, 050	228, 428
Carriages and wagons	6	79, 250	128			58, 494	90, 649	196, 700
Confectionery	4	10, 700	12	2	3	6, 400	17, 785	36, 535
Cutlery and edge tools (see also Hardware)	3	213, 000	434	55	30	226, 200	174, 275	413, 860
Foundery and machine-shop products	11	222, 726	392		27	191, 085	231, 837	486, 185
Furniture	6	171, 000	136	1		52, 385	81, 647	185, 889
Hardware (see also Cutlery and edge tools)	6	261, 850	205	18	9	96, 081	148, 740	324, 876
Liquors, malt	6	121, 000	27			12, 798	72, 560	122, 943
Marble and stone work	6	113, 200	70			37, 371	35, 000	98, 600
Photographing	3	8, 000	5	1		3, 350	2, 900	11, 000
Printing and publishing	7	77, 000	62			35, 744	34, 932	85, 559
Saddlery and harness	5	35, 000	69	6	7	36, 534	72, 430	134, 500
Shirts	7	112, 950	71	531		175, 770	226, 705	443, 490
Springs, steel, car, and carriage	3	65, 250	175			95, 416	219, 838	351, 341
Tobacco, cigars and cigarettes	6	5, 550	14	1	2	6, 425	10, 900	22, 700
Watch and clock repairing	3	20, 200	8			3, 700	1, 700	8, 500
All other industries (*a*)	57	8, 126, 634	3, 366	1, 149	145	2, 157, 674	3, 095, 128	6, 970, 583

a Embracing ammunition; belting and hose, leather; bookbinding and blank-book making; boxes, fancy and paper; brass and copper, rolled; brass castings; buttons; carpets, other than rag; carriage and wagon materials; coffee and spices, roasted and ground; coffins, burial cases, and undertakers' goods; corsets; drugs and chemicals; electroplating; engraving and die-sinking; files; fire-arms; flouring- and grist-mill products; hairwork; iron and steel; looking-glass and picture frames; mantels, slate, marble, and marbleized; millinery and lace goods; mixed textiles; musical instruments, organs and materials; paints; plated and britannia ware; rubber and elastic goods; sash, doors, and blinds; sewing machines and attachments; silk and silk goods; soap and candles; steam fittings and heating apparatus; tinware, copperware, and sheet-iron ware; toys and games; tools; upholstering; upholstering materials; varnish; wheelwrighting; wood, turned and carved; and wool hats.

CITY OF BROOKLYN, N. Y.

[Statistics collected under the direction of JAMES H. FROTHINGHAM, Chief Special Agent. See note on page 379.]

All industries	5, 201	$61, 646, 749	37, 105	7, 020	3, 462	$22, 487, 457	$129, 085, 091	$177, 223, 142
Artificial feathers and flowers (see also Millinery and lace goods)	9	11, 550	2	106	5	16, 170	16, 321	45, 240
Awnings and tents	12	7, 200	15	7		9, 319	14, 559	35, 843
Bags, paper	3	2, 200		5		1, 420	8, 390	12, 765
Baskets, rattan and willow ware	12	10, 025	24	3	12	11, 033	14, 206	35, 238
Blacksmithing	222	194, 573	371		4	232, 262	190, 655	622, 780
Bookbinding and blank-book making	4	4, 500	10	3		7, 008	3, 030	17, 691
Boots and shoes, including custom work and repairing	546	311, 835	944	216	34	502, 834	852, 168	1, 819, 993
Boxes, cigar	3	28, 000	49	6	2	27, 083	42, 100	77, 700
Boxes, fancy and paper	12	49, 050	50	83	8	45, 089	79, 066	158, 826
Boxes, wooden, packing	7	998, 500	540		62	243, 812	1, 286, 630	1, 767, 640
Brass castings	18	151, 350	117		4	59, 540	244, 747	364, 875
Brass ware	7	38, 800	62	25	15	33, 122	57, 843	112, 759
Bread and other bakery products	532	1, 020, 375	1, 017	7	16	596, 660	3, 695, 720	5, 594, 975
Brick and tile	6	113, 000	134		1	72, 774	69, 326	201, 084
Brooms and brushes	33	69, 375	134	47	29	59, 372	96, 074	207, 792
Buttons	5	33, 000	23	120	15	30, 537	16, 363	54, 813
Carpentering	300	1, 229, 678	1, 896		2	1, 325, 540	2, 967, 855	5, 124, 407
Carpets, rag	13	2, 850	14	2		4, 543	11, 333	21, 741
Carriages and wagons	90	484, 350	484		8	289, 155	328, 425	829, 492
Cars, railroad, street, and repairs	7	61, 774	92			65, 329	59, 266	137, 055
Cleansing and polishing preparations	6	112, 000	44	1	4	24, 935	36, 919	114, 750
Clothing, men's	328	952, 445	973	274	13	686, 311	1, 571, 974	2, 937, 262
Clothing, women's	25	157, 425	44	561	10	189, 480	390, 223	711, 249
Coffee and spices, roasted and ground	5	70, 000	42		1	28, 998	183, 342	280, 874
Coffins, burial cases, and undertakers' goods	3	47, 000	41			22, 362	24, 503	63, 269
Confectionery	104	236, 275	165	22	4	79, 477	501, 766	822, 843
Cooperage	42	913, 700	1, 111	5	242	595, 010	1, 583, 987	2, 512, 741
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	10	18, 900	27			11, 365	24, 455	47, 629
Cordage and twine	12	2, 566, 700	665	503	361	380, 223	3, 206, 319	3, 915, 366
Cork cutting	8	102, 800	50	31	16	31, 220	100, 443	161, 853
Cutlery and edge tools (see also Hardware)	5	2, 600	6			3, 626	1, 705	10, 450
Dentistry, mechanical	67	59, 200	39		2	17, 741	28, 521	137, 271
Drugs and chemicals (see also Patent medicines and compounds)	38	3, 449, 650	808	129	24	473, 353	3, 446, 549	4, 900, 338
Dyeing and cleaning	20	23, 250	40	8		22, 349	178, 667	236, 007
Electroplating	6	10, 650	11	4	15	9, 371	3, 630	21, 632
Fancy articles	14	81, 400	63	3	14	34, 827	27, 535	90, 739
Fertilizers	3	545, 000	84	5		51, 000	1, 063, 867	1, 252, 756
Files	12	25, 750	58	3	15	29, 192	21, 978	68, 509
Flouring- and grist-mill products	9	662, 500	139	5		98, 655	2, 615, 270	2, 896, 503
Food preparations (see page 39)	9	155, 250	63	12	4	33, 853	192, 882	268, 823
Foundery and machine-shop products	121	4, 079, 250	3, 750		140	2, 283, 934	3, 146, 992	6, 984, 832
Furniture (see also Mattresses and spring beds; Upholstering)	88	405, 680	608	6	18	315, 439	439, 135	952, 472
Furniture, chairs	11	41, 110	88		2	50, 658	49, 195	121, 703
Furs, dressed	22	416, 265	251	199	23	137, 374	565, 154	830, 804
Glass	12	930, 600	1, 158	36	660	630, 857	489, 593	1, 318, 081
Glass, cut, stained, and ornamented	8	22, 150	14		6	9, 614	15, 698	33, 461
Gold and silver leaf and foil	3	4, 500	1	5		2, 434	28, 174	43, 178
Grease and tallow	3	51, 070	11			6, 860	304, 740	338, 215
Hairwork	22	44, 150	17	82	1	23, 683	44, 043	101, 395
Hardware (see also Cutlery and edge tools)	34	432, 550	391	28	22	103, 186	401, 251	750, 297

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF BROOKLYN, N. Y.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Hats and caps, not including wool hats	32	$533, 915	905	378	109	$626, 504	$999, 218	$1, 978, 145
Ink	3	220, 000	23	....	....	18, 750	124, 000	189, 410
Instruments, professional and scientific	12	116, 200	108	2	10	65, 515	35, 018	144, 611
Iron bolts, nuts, washers, and rivets	12	114, 899	91	....	12	43, 456	103, 552	185, 245
Iron railing, wrought	15	73, 147	79	....	1	53, 468	56, 748	141, 897
Ivory and bone work	8	10, 842	54	....	14	23, 949	22, 571	61, 355
Jute and jute goods	3	390, 000	197	282	....	132, 621	415, 788	650, 560
Kindling wood	28	211, 900	235	2	53	116, 932	276, 907	483, 368
Leather, dressed skins	20	691, 650	511	21	31	248, 932	1, 258, 407	1, 755, 144
Lime and cement	7	77, 000	49	....	....	20, 914	45, 192	98, 608
Liquors, malt	41	3, 838, 500	1, 082	....	....	538, 594	2, 729, 792	4, 871, 772
Lock- and gun-smithing	28	27, 100	26	....	3	10, 793	11, 867	43, 984
Looking-glass and picture frames	17	32, 050	39	....	7	23, 866	56, 725	106, 056
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	12	676, 500	492	....	38	230, 827	1, 271, 317	1, 707, 821
Malt	4	262, 000	37	....	....	24, 375	323, 915	433, 290
Marble and stone work	92	738, 300	730	....	1	521, 858	554, 084	1, 329, 234
Masonry, brick and stone	75	123, 295	551	....	1	374, 569	594, 426	1, 073, 809
Mats and matting	7	193, 650	183	12	70	116, 029	203, 427	385, 340
Mattresses and spring beds (see also Furniture)	7	31, 100	24	....	....	13, 268	67, 640	137, 670
Millinery and lace goods (see also Artificial feathers and flowers)	13	140, 700	33	84	10	48, 710	339, 634	476, 262
Mineral and soda waters	21	107, 800	63	....	5	29, 475	63, 196	155, 177
Mixed textiles (see also Silk and silk goods)	11	338, 300	98	122	39	99, 430	263, 097	423, 239
Models and patterns	9	11, 250	25	....	....	18, 530	5, 643	37, 530
Musical instruments and materials (not specified)	9	13, 500	39	1	6	20, 543	56, 483	102, 724
Musical instruments, organs and materials	4	7, 700	8	....	....	6, 139	4, 237	18, 076
Musical instruments, pianos and materials	11	195, 775	115	1	8	68, 984	122, 810	252, 983
Oil, lubricating	3	22, 000	7	....	....	3, 941	31, 221	43, 645
Oil, resin	3	82, 523	23	....	....	14, 590	189, 622	238, 471
Painting and paperhanging	271	335, 425	938	14	22	553, 040	496, 527	1, 389, 719
Paints (see also Varnish)	26	2, 602, 800	856	80	5	478, 376	4, 023, 500	5, 284, 201
Paperhangings	3	285, 000	230	50	92	175, 733	783, 753	1, 382, 862
Paper patterns	4	105, 100	13	84	....	40, 538	44, 000	512, 550
Patent medicines and compounds (see also Drugs and chemicals)	6	550, 000	57	59	1	56, 411	274, 474	730, 046
Photographing	35	88, 950	64	18	2	37, 455	26, 685	141, 947
Pickles, preserves, and sauces	7	34, 400	17	1	....	5, 908	38, 830	69, 500
Plumbing and gasfitting	216	352, 890	668	....	23	377, 195	701, 530	1, 399, 092
Printing and publishing	64	889, 284	693	257	72	522, 075	452, 610	1, 549, 743
Pumps, not including steam pumps	6	10, 150	17	....	....	9, 708	8, 156	24, 190
Roofing and roofing materials	29	82, 975	196	....	3	98, 443	160, 974	447, 259
Rubber and elastic goods	6	298, 837	185	60	28	120, 885	664, 335	922, 857
Saddlery and harness	88	105, 877	128	42	15	73, 437	151, 848	300, 425
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	24	368, 350	393	....	40	190, 509	398, 679	738, 722
Sewing machines and attachments	15	10, 725	24	10	5	16, 780	6, 244	34, 158
Shipbuilding	58	768, 050	957	....	....	746, 856	1, 044, 724	1, 999, 788
Shirts	25	97, 300	57	240	7	105, 723	260, 511	439, 060
Silk and silk goods (see also Mixed textiles)	15	559, 325	147	453	107	231, 135	443, 135	853, 480
Slaughtering and meat-packing, not including retail butchering	28	1, 125, 000	260	....	....	194, 568	7, 340, 450	8, 010, 492
Soap and candles	8	338, 000	101	4	13	55, 642	587, 036	799, 053
Spectacles and eyeglasses	3	39, 300	75	15	20	36, 556	5, 300	68, 000
Sporting goods	11	65, 750	77	24	24	45, 112	32, 487	103, 826
Stamped ware (see also Tinware, copperware, and sheet-iron ware)	6	870, 000	858	112	40	394, 779	936, 084	1, 556, 829
Stationery goods	7	325, 800	63	91	28	65, 390	226, 237	386, 097
Stone- and earthen-ware	4	198, 600	175	113	10	102, 053	56, 960	194, 284
Sugar and molasses, refined	11	10, 946, 000	2, 054	....	13	954, 929	56, 423, 868	59, 711, 168
Surgical appliances	6	10, 650	4	2	....	5, 294	7, 686	17, 968
Tinware, copperware, and sheet-iron ware (see also Coppersmithing; Stamped ware).	119	156, 350	268	2	14	150, 331	346, 867	619, 134
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	10	1, 059, 890	129	466	1	198, 770	931, 250	2, 302, 703
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, snuff).	341	376, 590	519	17	56	228, 141	381, 589	977, 480
Toys and games	10	255, 775	146	199	43	109, 958	142, 769	332, 146
Trunks and valises	7	89, 800	59	18	16	32, 138	88, 249	146, 344
Umbrellas and canes	9	18, 600	4	8	....	4, 066	14, 305	28, 773
Upholstering (see also Furniture)	72	584, 535	197	135	35	145, 950	483, 514	784, 112
Varnish (see also Paints)	8	716, 800	70	....	3	47, 186	353, 205	874, 655
Vinegar	7	63, 712	16	....	....	6, 974	54, 630	77, 019
Watch and clock repairing	109	82, 668	133	8	11	76, 171	53, 319	221, 723
Watch cases	4	156, 565	261	22	12	249, 816	717, 177	1, 109, 046
Window blinds and shades	12	294, 450	129	8	3	82, 171	224, 722	475, 805
Wirework	10	240, 778	128	23	21	83, 690	97, 641	228, 204
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	19	95, 300	78	....	6	39, 866	52, 411	139, 255
Wooden ware	3	9, 250	20	....	1	9, 477	21, 150	36, 264
Zinc	3	26, 500	14	....	....	11, 502	10, 520	38, 385
All other industries (*a*)	78	5, 231, 247	3, 060	923	438	1, 691, 160	8, 546, 026	12, 065, 141

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a Embracing agricultural implements; babbitt metal and solder; baking and yeast powders; belting and hose, leather; billiard tables and materials; bone-, ivory-, and lamp-black; boot and shoe findings; brass and copper, rolled; carpets, wood; carriages and sleds, children's; clocks; corsets; cotton goods; dyeing and finishing textiles; dyestuffs and extracts; engraving, wood; envelopes; explosives and fireworks; felt goods; gas and lamp fixtures; gloves and mittens; glue; gold and silver, reduced and refined; hat and cap materials; housefurnishing goods; iron and steel; iron forgings; japanning; jewelry; jewelry and instrument cases; lamps and reflectors; lead, bar, pipe, sheet, and shot; leather, tanned; liquors, distilled; lithographing; oil, essential; oil, linseed; oilcloth, floor; oleomargerine; paper; paving materials; pencils, lead; pens, gold; photographic apparatus; plated and britannia ware; pocket-books; printing materials; racking hose; refrigerators; regalia and society banners and emblems; sand and emery paper and cloth; saws; straw goods; taxidermy; upholstering materials; watch and clock materials; whalebone and rattan; wheelbarrows; wire; wood preserving; and wool hats.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF BUFFALO, N. Y.

[Statistics collected under the direction of SILAS J. DOUGLAS, Chief Special Agent. See note on page 379.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	1,183	$26,847,937	15,033	1,795	1,193	$7,442,109	$27,552,086	$42,937,701
Agricultural implements	4	341,500	255			86,773	129,800	423,500
Baking and yeast powders (see also Drugs and chemicals)	7	38,200	13	1	1	6,950	61,800	79,400
Belting and hose, leather	3	120,000	39		21	18,500	285,000	322,000
Billiard tables and materials	3	13,500	5		1	3,500	7,100	16,060
Blacksmithing (see also Wheelwrighting)	59	66,175	65		4	33,227	41,108	121,945
Bookbinding and blank-book making	6	73,800	37	44	3	30,600	53,900	104,100
Boots and shoes, including custom work and repairing	131	490,146	549	84	47	268,309	579,157	1,068,296
Boxes, fancy and paper	4	10,500	10	72	12	15,100	44,190	72,225
Boxes, wooden, packing	6	27,590	43			14,053	34,550	61,812
Brass castings	7	40,600	37		4	18,990	36,378	71,400
Bread and other bakery products	59	352,550	238	43	27	125,805	605,993	924,420
Brick and tile	9	161,495	226		70	106,750	45,270	201,040
Brooms and brushes	8	13,700	16	7	4	8,796	23,379	43,892
Carpentering	15	45,600	120			56,780	127,275	224,100
Carriages and sleds, children's	3	47,800	29	4		14,000	37,500	75,400
Carriages and wagons (see also Wheelwrighting)	23	295,900	281		7	143,221	184,081	410,631
Clothing, men's	52	1,090,900	649	853	11	576,425	1,798,067	2,747,475
Coffee and spices, roasted and ground	5	120,300	22	4	3	11,706	187,000	230,500
Confectionery	10	173,700	121	75	17	77,770	262,680	433,800
Cooperage	17	251,857	315		26	130,340	232,245	432,162
Cutlery and edge tools (see also Hardware)	6	98,400	83		14	46,039	50,900	115,100
Dentistry, mechanical	7	5,875	6		2	3,635	6,800	22,500
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	5	314,600	54	14	1	25,000	137,635	204,900
Dyeing and cleaning	4	31,350	12	14	1	4,090	3,230	12,500
Engraving, steel	4	4,100	4			2,850	1,100	7,500
Engraving, wood	5	6,600	10			16,100	1,825	30,550
Files	5	12,400	32		1	13,625	6,000	29,500
Flouring- and grist-mill products	7	940,000	120			58,984	2,081,532	2,251,848
Foundery and machine-shop products	41	3,080,918	2,011		152	936,543	1,935,038	3,577,029
Furniture (see also Mattresses and spring beds; Upholstering)	33	578,200	371	15	52	218,549	370,005	773,091
Furs, dressed	5	85,000	19	37	3	14,378	86,509	136,750
Glucose	3	1,750,000	775	5	17	485,000	2,000,000	3,075,000
Hardware (see also Cutlery and edge tools)	9	230,000	223	3	41	106,025	174,844	382,003
Hats and caps, not including wool hats	6	17,950	12	11	2	6,150	17,050	30,200
Iron and steel	4	1,790,000	688		25	212,278	635,353	887,012
Iron forgings	3	255,000	180		5	69,000	225,000	400,000
Leather, curried	3	93,000	64		2	26,233	439,250	510,500
Leather, tanned	7	1,077,000	375		2	140,442	1,446,800	1,757,600
Liquors, malt	28	1,859,975	360			179,962	916,171	1,636,020
Lithographing (see also Printing and publishing)	4	190,000	128	6	9	99,400	185,910	381,800
Lock- and gun-smithing	4	4,500	7			4,050	10,859	20,500
Looking-glass and picture frames	8	39,700	40	3	8	13,205	45,780	86,700
Lumber, planed (see also Wood, turned and carved)	17	1,183,000	561		59	243,820	784,541	1,219,406
Malt	34	1,342,000	275			91,840	1,512,752	2,002,893
Marble and stone work	21	274,050	477	7	2	189,649	182,829	433,023
Masonry, brick and stone	16	27,250	123		6	47,700	50,250	144,350
Mattresses and spring beds (see also Furniture)	7	19,098	10	3	3	6,074	31,945	64,032
Musical instruments, pianos and materials	3	46,000	44			22,450	13,114	42,679
Painting and paperhanging	29	40,157	175		6	98,070	110,185	258,488
Patent medicines and compounds (see also Drugs and chemicals)	12	1,098,100	78	47	2	60,471	261,345	654,027
Photographing	21	46,500	28	4	7	15,388	13,275	64,800
Plumbing and gasfitting	17	99,300	152		16	77,890	151,500	288,200
Printing and publishing (see also Lithographing)	31	819,000	424	80	97	261,803	372,318	975,022
Pumps, not including steam pumps	4	13,000	19			9,875	7,850	25,200
Refrigerators	4	125,000	212	13	25	88,700	113,500	264,500
Roofing and roofing materials	5	19,321	38			13,951	36,791	62,728
Saddlery and harness	31	87,844	93		2	41,483	80,498	165,844
Shipbuilding	17	576,500	709			328,390	455,252	859,756
Shirts	7	20,800	10	61	2	21,760	24,300	66,500
Slaughtering and meat-packing, not including retail butchering	6	872,500	289			170,433	3,023,924	3,441,280
Soap and candles	7	579,000	153	4	48	81,095	881,114	1,176,840
Starch	3	245,000	184	40	15	77,691	378,176	625,390
Stereotyping and electrotyping	3	39,000	30		1	26,400	9,600	58,000
Stone- and earthen-ware	3	8,500	10			4,675	2,275	17,800
Tinware, copperware, and sheet-iron ware	53	203,050	213		21	115,417	269,470	492,317
Tobacco, cigars and cigarettes	40	196,929	250	11	41	114,470	241,758	464,943
Trunks and valises	6	38,600	43		1	16,596	43,500	79,800
Upholstering (see also Furniture)	6	4,450	5		1	1,960	8,200	15,600
Vinegar	6	52,100	18			9,842	53,406	84,200
Watch and clock repairing	16	18,000	25		3	14,538	10,493	42,099
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	35	83,325	72		4	31,795	38,854	107,603
Wirework	5	119,800	93	10	42	55,305	114,614	203,500
Wood, turned and carved (see also Lumber, planed)	5	46,000	86	6	19	35,910	56,630	115,526
All other industries (a)	81	2,264,382	1,490	214	175	643,535	2,663,781	4,028,591

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[a] Embracing artificial limbs; awnings and tents; baskets, rattan and willow ware; bluing; boot and shoe findings; boot and shoe uppers; boxes, cigar; bridges; carriage and wagon materials; cars, railroad, street, and repairs; coffins, burial cases, and undertakers' goods; cordage and twine; dentists' materials; drain and sewer pipe; electrical apparatus and supplies; electroplating; envelopes; fertilizers; flavoring extracts; fruits and vegetables, canned and preserved; furniture, chairs; glass, cut, stained, and ornamented; gloves and mittens; glue; gold and silver leaf and foil; gold and silver, reduced and refined; grease and tallow; hairwork; housefurnishing goods; ink; iron bolts, nuts, washers, and rivets; iron pipe, wrought; iron railing, wrought; iron work, architectural and ornamental; jewelry; lasts; lead, bar, pipe, sheet, and shot; liquors, distilled; lumber, sawed; mantles, slate, marble, and marbleized; millinery and lace goods; models and patterns; musical instruments, organs and materials; oil, linseed; oil, lubricating; paints; paperhangings; paving materials; perfumery and cosmetics; scales and balances; show-cases; silversmithing; springs, steel, car, and carriage; stamped ware; stencils and brands; toys and games; type founding; umbrellas and canes; whips; and window blinds and shades.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF CAMBRIDGE, MASS.

[Statistics collected under the direction of SIMEON SNOW, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	379	$6, 480, 799	6, 205	1, 172	166	$3, 416, 470	$20, 101, 349	$26, 605, 688
Blacksmithing (see also Wheelwrighting)	26	29, 450	54	....	....	27, 760	26, 900	81, 790
Bookbinding and blank-book making	4	144, 000	81	109	1	78, 703	100, 730	202, 485
Boots and shoes, including custom work and repairing	6	31, 250	29	5	4	11, 684	25, 232	47, 109
Bread and other bakery products	19	121, 600	170	80	47	113, 881	346, 732	579, 856
Brick and tile	7	457, 000	363	....	13	73, 239	120, 700	217, 930
Brooms and brushes	4	34, 500	47	33	....	19, 730	75, 203	124, 281
Carpentering	37	100, 350	243	....	....	134, 896	298, 420	491, 551
Carriages and wagons (see also Wheelwrighting)	13	148, 600	104	....	....	62, 443	75, 121	161, 586
Confectionery	4	76, 000	49	42	....	29, 200	153, 000	203, 800
Cooperage	4	42, 500	116	....	10	64, 800	77, 500	155, 500
Drugs and chemicals	3	235, 000	31	13	2	21, 400	194, 000	300, 000
Furniture (see also Mattresses and spring beds)	12	275, 000	562	11	5	264, 765	233, 058	615, 191
Foundery and machine-shop products	9	137, 734	231	....	....	128, 029	344, 890	509, 326
Leather, curried	5	104, 000	140	....	5	70, 915	601, 860	753, 000
Marble and stone work	14	98, 050	110	1	....	54, 865	30, 326	113, 798
Masonry, brick and stone	29	100, 275	216	....	....	104, 852	233, 870	388, 030
Mattresses and spring beds (see also Furniture)	3	29, 000	32	1	4	11, 270	24, 500	53, 000
Musical instruments, organs and materials	5	593, 000	481	15	15	326, 090	292, 556	783, 222
Musical instruments, pianos and materials	7	54, 200	145	9	6	79, 870	67, 990	161, 900
Painting and paperhanging	25	27, 100	86	2	....	38, 285	30, 300	95, 510
Photographing	3	3, 300	4	4	....	1, 950	2, 050	8, 000
Plumbing and gasfitting	6	11, 700	23	....	....	12, 049	27, 806	56, 325
Printing and publishing	15	313, 200	485	341	5	404, 789	109, 993	785, 443
Roofing and roofing materials	5	4, 000	14	....	....	6, 300	14, 100	26, 400
Saddlery and harness	7	5, 300	13	....	....	6, 750	8, 450	21, 500
Slaughtering and meat-packing, not including retail butchering	5	560, 500	483	....	....	228, 800	6, 434, 700	7, 179, 625
Soap and candles	13	375, 500	222	....	28	101, 096	1, 602, 696	1, 983, 604
Tinware, copperware, and sheet-iron ware	14	50, 100	50	....	....	25, 772	33, 200	70, 410
Tobacco, cigars and cigarettes	11	14, 100	35	6	....	20, 546	22, 415	52, 350
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	8	8, 850	17	....	....	11, 540	11, 100	30, 700
Wood, turned and carved	6	18, 800	79	7	4	44, 800	54, 200	126, 750
All other industries (*a*)	50	2, 276, 840	1, 490	493	17	835, 401	8, 427, 751	10, 225, 716

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a Embracing boxes, wooden, packing; bridges; cars, railroad, street, and repairs; cheese and butter (factory); clothing, men's; coffins, burial cases, and undertakers' goods; collars and cuffs, paper; cordage and twine; cutlery and edge tools; flavoring extracts; food preparations; flouring- and grist-mill products; hardware; instruments, professional and scientific; iron bolts, nuts, washers, and rivets; iron pipe, wrought; iron and steel; lard, refined; leather, tanned; lime and cement; liquors, distilled; looking-glass and picture frames; mats and matting; mineral and soda waters; models and patterns; musical instruments and materials (not specified); pumps; rubber and elastic goods; safes, doors, and vaults, fire-proof; sash, doors, and blinds; shipbuilding; sporting goods; springs, steel, car, and carriage; stamped ware; steam fittings and heating apparatus; stone- and earthen-ware; sugar and molasses, refined; trunks and valises; upholstering; vinegar; and window blinds and shades.

CITY OF CAMDEN, N. J.

[Statistics collected under the direction of JOSEPH B. FOX, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	321	$5, 032, 835	3, 293	826	251	$1, 626, 306	$4, 348, 710	$7, 644, 705
Blacksmithing (see also Wheelwrighting)	14	8, 000	20	....	....	8, 296	11, 396	31, 098
Boots and shoes, including custom work and repairing	35	29, 475	140	57	4	66, 532	125, 827	246, 975
Bread and other bakery products	29	64, 900	37	1	....	13, 291	74, 672	122, 284
Carpentering	18	55, 000	87	....	....	43, 801	66, 176	143, 382
Carpets, rag	7	5, 600	10	....	....	2, 940	7, 600	17, 420
Carriages and wagons (see also Wheelwrighting)	7	183, 000	192	2	7	61, 528	58, 600	180, 700
Coffins, burial cases, and undertakers' goods	4	15, 700	8	....	....	4, 559	3, 300	11, 320
Confectionery	9	9, 400	20	6	2	9, 166	33, 200	52, 970
Drugs and chemicals (see also Patent medicines and compounds)	3	800, 000	180	....	1	93, 752	504, 333	751, 618
Foundery and machine-shop products	6	815, 000	869	....	42	366, 091	734, 226	1, 293, 050
Furniture	6	11, 550	21	....	....	7, 138	7, 400	22, 280
Hats and caps, not including wool hats	3	3, 200	6	3	....	2, 785	2, 950	8, 791
Lumber, sawed	3	445, 000	50	....	3	20, 500	208, 900	307, 000
Marble and stone work	4	5, 700	8	1	1	2, 600	4, 975	14, 306
Masonry, brick and stone	19	37, 700	98	....	....	49, 156	51, 005	134, 850
Painting and paperhanging	17	21, 800	63	....	....	28, 918	33, 778	87, 788
Patent medicines and compounds (see also Drugs and chemicals)	3	3, 300	3	....	1	1, 396	5, 100	11, 675
Plumbing and gasfitting	8	16, 000	30	....	....	14, 329	18, 340	55, 050
Printing and publishing	9	96, 225	70	....	11	26, 350	25, 914	75, 250
Roofing and roofing materials	8	20, 560	19	....	....	9, 610	26, 341	53, 350
Saddlery and harness	4	25, 350	15	....	....	7, 024	15, 946	28, 700
Sash, doors, and blinds	5	202, 000	152	....	....	56, 624	124, 464	219, 200
Shipbuilding	13	484, 400	266	....	....	161, 355	209, 649	438, 576
Tinware, copperware, and sheet-iron ware	6	38, 950	74	1	6	46, 893	81, 100	156, 421
Tobacco, cigars and cigarettes	17	24, 575	40	....	2	16, 478	17, 937	56, 448
Watch and clock repairing	4	7, 000	5	....	....	2, 300	1, 800	8, 030
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	6	10, 850	13	....	....	5, 900	7, 410	17, 400
Woolen goods	3	570, 000	235	91	43	116, 909	401, 084	754, 500
All other industries (*a*)	51	1, 022, 600	562	664	128	380, 085	1, 485, 287	2, 344, 278

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a Embracing baskets, rattan and willow ware; boxes, cigar; brass castings; brick and tile; brooms and brushes; cigar molds; clothing, men's; coffee and spices, roasted and ground; cooperage; cotton goods; dentistry, mechanical; dyestuffs and extracts; flouring- and grist-mill products; fruits and vegetables, canned and preserved; furnishing goods, men's; glass; gold and silver leaf and foil; grease and tallow; hairwork; hosiery and knit goods; ink; iron work, architectural and ornamental; kindling wood; leather, curried; lime; lock- and gun-smithing; looking-glass and picture frames; mixed textiles; oilcloth, floor; paints; paper; pens, steel; photographing; pumps; shirts; silk and silk goods; soap and candles; straw goods; slaughtering and meat-packing; vinegar; and worsted goods.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF CHARLESTON, S. C.

[Statistics collected under the direction of B. R. STUART, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	194	$1,718,300	1,788	150	208	$639,030	$1,468,375	$2,732,590
Blacksmithing (see also Wheelwrighting)	6	10,050	10		5	6,058	3,855	13,727
Boots and shoes, including custom work and repairing	9	1,120	11		2	4,256	4,100	13,191
Bread and other bakery products	10	59,850	65		16	28,695	120,860	172,185
Carpentering	14	31,050	448		15	97,738	130,998	268,565
Clothing, men's	6	40,100	35	4	4	11,500	25,700	47,300
Confectionery	4	2,500	4		3	1,630	6,750	11,240
Cotton compressing	4	530,000	230			62,900	65,000	198,000
Dentistry, mechanical	7	2,800					3,785	9,800
Flouring- and grist-mill products	5	61,000	27			12,070	141,300	167,750
Foundery and machine-shop products	5	111,700	177		28	59,150	96,100	174,900
Lock- and gun-smithing	7	2,330	5		3	2,708	2,100	11,418
Lumber, planed	6	82,000	167		34	35,450	121,950	189,000
Lumber, sawed	4	115,000	37		12	21,420	139,509	254,550
Marble and stone work	5	14,700	16		4	10,900	17,000	34,000
Mineral and soda water	3	4,500	13			4,059	7,800	20,250
Painting and paperhanging	7	5,550	44			9,629	10,228	25,450
Photographing	3	4,800	4			1,800	1,500	8,100
Plumbing and gasfitting	6	3,900	10		8	9,086	19,050	33,176
Printing and publishing	10	116,700	144	33	9	88,772	80,150	249,320
Saddlery and harness	6	5,150	19		4	9,030	27,001	43,650
Shipbuilding	11	44,350	85			52,810	53,350	138,650
Tinware, copperware, and sheet-iron ware	10	7,300	35		3	9,296	16,576	36,176
Tobacco, cigars and cigarettes	8	8,600	33		1	13,411	9,240	30,520
Upholstering	4	13,400	11	4		6,000	30,420	49,600
Watch and clock repairing	8	4,700	11		3	9,996	2,030	16,900
Wheelwrighting (see also Blacksmithing)	8	18,050	26		22	14,388	7,685	31,066
All other industries (*a*)	18	417,100	121	109	32	56,278	324,338	484,106

a Embracing axle-grease; bagging, flax, hemp, and jute; bags, other than paper; baskets, rattan and willow ware; carriages and wagons; cars, railroad, street, and repairs; coppersmithing; cotton-ties; fertilizers; furnishing goods, men's; furniture; liquors, malt; soap and candles; and stencils and brands.

CITY OF CHELSEA, MASS.

[Statistics collected under the direction of JOHN SALE, Special Agent. See note on page 379.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	155	$1,822,250	1,122	500	25	$677,737	$2,691,911	$3,846,250
Blacksmithing	8	9,950	13			6,599	9,251	18,988
Boots and shoes, including custom work and repairing	4	6,200	10	1	2	4,470	5,600	13,400
Bread and other bakery products	9	96,600	44	11	2	21,449	153,675	226,312
Brick and tile	3	31,000	47		4	14,750	25,000	42,250
Carpentering	15	17,850	27		1	13,799	31,547	55,119
Carriages and wagons	3	12,000	9			6,320	3,490	13,900
Clothing, men's	4	3,700	6	9		3,950	7,000	16,300
Confectionery	3	5,500	6	6		1,400	11,200	18,800
Cotton goods	3	405,000	69	303		89,350	373,703	511,340
Foundery and machine-shop products	4	516,000	284			178,837	190,000	464,000
Furniture	4	38,200	32	4		15,138	35,676	64,814
Leather, curried	5	53,300	79		1	37,140	717,601	793,263
Marble and stone work	3	3,800	10			5,600	3,650	13,650
Masonry, brick and stone	4	8,200	30		1	7,670	15,500	25,166
Painting and paperhanging	11	8,350	30			12,197	9,590	31,501
Plumbing and gasfitting	6	9,150	20			6,611	13,156	24,340
Roofing and roofing materials	3	13,000	18			10,700	54,500	72,000
Saddlery and harness	3	4,300	6			3,350	3,300	9,900
Soap and candles	4	12,800	9			4,912	14,060	22,750
Tobacco, cigars and cigarettes	12	34,950	36	48	2	25,598	74,640	110,284
All other industries (*a*)	44	532,400	337	118	12	207,897	939,772	1,298,173

a Embracing baking and yeast powders; bluing; bone-, ivory-, and lamp-black; bookbinding and blank-book making; boxes, fancy and paper; brass castings; brooms and brushes; cars, railroad, street, and repairs; cleansing and polishing preparations; drugs and chemicals; dyeing and cleaning; fertilizers; flavoring extracts; furniture, chairs; hairwork; hardware; hosiery and knit goods; leather, tanned; looking-glass and picture frames; mattresses and spring beds; oil, lubricating; oil, neat's-foot; paperhangings; photographing; printing and publishing; rubber and elastic goods; shipbuilding; stone- and earthen-ware; tinware, copperware, and sheet-iron ware; tools; type founding; upholstering; varnish; watch and clock repairing; wheelwrighting; and window blinds and shades.

CITY OF CHICAGO, ILL.

[Statistics collected under the direction of CHARLES RANDOLPH, Chief Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	3,519	$68,836,885	62,431	12,185	4,798	$34,653,462	$179,209,610	$249,022,948
Agricultural implements	3	3,110,000	981		40	559,532	1,642,748	2,699,480
Awnings and tents	8	10,350	20	24	1	13,540	46,872	72,031
Baking and yeast powders (see also Drugs and chemicals)	3	135,000	75	37	1	44,134	485,000	635,000
Baskets, rattan and willow ware	11	107,750	119		14	48,750	54,225	120,400
Billiard tables and materials	4	263,200	300			137,225	283,900	665,400
Blacksmithing (see also Wheelwrighting)	146	110,375	335		11	199,689	123,609	482,029
Bookbinding and blank-book making	26	176,100	208	163	39	165,102	203,725	481,131
Boots and shoes, including custom work and repairing	133	997,475	1,387	358	66	770,191	1,355,208	2,479,805
Boxes, cigar	6	54,800	40	43	22	36,268	114,090	179,411
Boxes, fancy and paper	12	66,200	68	178	32	81,550	116,400	254,792

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF CHICAGO, ILL.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Boxes, wooden, packing	14	$525, 000	892	....	95	$414, 953	$1, 271, 682	$1, 883, 073
Brass castings	11	442, 500	517	....	....	232, 125	361, 700	737, 500
Bread and other bakery products	118	553, 200	680	159	37	398, 081	1, 817, 078	2, 613, 186
Brick and tile (see also Terra-cotta ware)	35	348, 800	1, 176	13	61	454, 557	128, 573	800, 400
Bridges	3	348, 000	642	....	....	311, 763	1, 473, 000	1, 974, 000
Brooms and brushes	41	243, 200	255	106	46	132, 830	271, 337	517, 324
Carpentering	171	442, 050	1, 733	1	58	893, 642	1, 337, 890	2, 598, 508
Carpets, rag	5	1, 275	3	1	....	1, 700	2, 843	6, 450
Carriages and wagons (see also Wheelwrighting)	40	1, 361, 080	1, 152	35	123	590, 166	702, 532	1, 809, 759
Cars, railroad, street, and repairs	5	421, 500	562	....	20	286, 742	675, 291	1, 043, 682
Clothing, men's	102	6, 439, 650	4, 101	4, 001	374	3, 530, 169	11, 631, 764	17, 342, 207
Clothing, women's	19	353, 500	72	1, 488	23	334, 885	1, 017, 720	1, 585, 990
Coffee and spices, roasted and ground	10	477, 900	185	40	45	137, 496	2, 342, 021	2, 808, 879
Coffins, burial cases, and undertakers' goods	5	179, 650	107	12	2	67, 020	164, 500	290, 000
Confectionery	24	413, 200	310	163	132	211, 604	1, 424, 830	1, 953, 558
Cooperage	65	325, 560	686	....	20	313, 977	644, 380	1, 137, 694
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	3	3, 100	10	....	....	4, 460	4, 820	14, 200
Cork cutting	3	45, 800	24	15	17	22, 103	125, 038	217, 220
Cutlery and edge tools (see also Hardware; Tools)	12	113, 700	135	8	27	69, 581	49, 670	177, 000
Dentistry, mechanical	48	37, 000	28	2	2	14, 000	25, 000	144, 000
Dentists' materials	3	11, 000	18	5	....	11, 300	12, 000	46, 000
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	14	408, 500	165	45	11	93, 440	617, 800	959, 850
Dyeing and cleaning	16	78, 350	74	13	7	47, 023	46, 815	140, 461
Dyeing and finishing textiles	11	69, 850	72	13	7	46, 519	45, 565	135, 521
Electrical apparatus and supplies	3	271, 200	127	25	....	100, 603	143, 587	543, 000
Electroplating	9	24, 800	31	2	6	18, 645	9, 820	59, 000
Engraving and die-sinking	5	18, 000	22	3	....	17, 397	13, 550	49, 000
Engraving, wood	16	35, 825	66	3	8	51, 785	12, 970	116, 775
Flavoring extracts	4	71, 200	65	40	5	36, 780	334, 500	461, 500
Flouring- and grist-mill products	12	652, 100	176	....	....	103, 542	1, 939, 709	2, 217, 564
Food preparations (see page 39)	5	89, 600	27	12	8	15, 940	58, 500	119, 000
Foundery and machine-shop products (see also Iron work, architectural and ornamental; Steam fittings and heating apparatus).	133	4, 455, 417	4, 736	6	145	2, 371, 361	5, 088, 619	8, 934, 629
Fruits and vegetables, canned and preserved	5	90, 000	113	40	27	58, 700	417, 415	587, 223
Furnishing goods, men's	13	586, 100	144	1, 119	47	392, 700	1, 143, 275	1, 835, 597
Furniture (see also Mattresses and spring beds; Upholstering)	149	2, 443, 175	4, 160	57	347	2, 028, 371	2, 996, 088	6, 177, 114
Furniture, chairs	6	216, 500	278	....	57	121, 200	139, 440	334, 072
Furs, dressed	10	160, 500	49	88	2	51, 058	227, 000	370, 000
Gas and lamp fixtures	3	17, 100	46	1	2	18, 600	41, 225	96, 000
Gas machines and meters	3	45, 500	42	....	....	19, 723	28, 884	64, 800
Glass, cut, stained, and ornamented	6	39, 600	76	1	3	47, 545	38, 564	113, 612
Gloves and mittens (see also Hosiery and knit goods)	7	50, 200	36	109	5	40, 075	110, 150	170, 800
Gold and silver leaf and foil	3	22, 000	34	45	2	25, 750	41, 000	85, 000
Grease and tallow	6	117, 000	111	....	....	64, 044	1, 123, 025	1, 327, 000
Hairwork	15	48, 650	8	110	....	26, 782	65, 300	135, 915
Hand-knit goods	7	14, 900	4	106	9	14, 065	43, 470	64, 072
Handles, wooden	3	2, 850	4	....	2	1, 950	4, 485	9, 000
Hand-stamps	4	5, 500	11	1	1	7, 140	11, 600	26, 050
Hardware (see also Cutlery and edge tools; Tools)	13	134, 870	136	....	31	70, 293	89, 395	244, 018
Hardware, saddlery	3	30, 100	32	1	20	18, 200	48, 200	87, 000
Hats and caps, not including wool hats	11	18, 950	34	27	7	28, 226	36, 500	88, 200
Hosiery and knit goods (see also Gloves and mittens)	7	57, 800	121	341	63	66, 966	184, 831	300, 577
Ink	3	33, 750	18	2	12	11, 450	15, 000	61, 000
Iron and steel	11	3, 875, 000	2, 871	....	125	1, 477, 563	8, 006, 970	10, 441, 891
Iron doors and shutters	3	7, 500	18	....	....	11, 720	19, 800	40, 560
Iron forgings	4	135, 800	115	....	....	56, 130	349, 337	485, 581
Iron railings, wrought	5	10, 000	27	....	....	15, 590	17, 400	42, 882
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	11	64, 000	133	....	12	68, 294	170, 900	303, 900
Japanning	3	9, 100	26	....	1	6, 300	5, 000	17, 100
Jewelry	11	48, 600	67	....	5	45, 396	73, 380	192, 004
Lamps and reflectors	4	453, 500	345	25	55	159, 250	648, 408	1, 051, 346
Lasts	3	16, 500	34	....	2	19, 988	34, 075	61, 700
Leather, curried	9	481, 002	225	....	....	129, 196	1, 762, 756	2, 146, 500
Leather, tanned	19	1, 932, 998	981	99	29	541, 184	3, 790, 522	4, 914, 550
Liquors, distilled	7	1, 175, 000	750	....	....	330, 000	2, 961, 281	4, 387, 545
Liquors, malt	18	3, 395, 500	892	....	....	445, 891	1, 886, 165	3, 429, 375
Lithographing (see also Printing and publishing)	13	494, 150	307	12	11	220, 955	263, 549	698, 387
Lock- and gun-smithing	14	10, 400	20	....	1	10, 481	7, 155	34, 094
Looking-glass and picture frames	52	338, 675	787	31	156	357, 625	600, 540	1, 268, 855
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	15	471, 008	686	....	56	297, 730	3, 441, 100	4, 080, 900
Malt	16	870, 200	230	....	1	108, 709	1, 583, 019	1, 960, 780
Marble and stone work	43	491, 150	891	....	14	456, 014	583, 915	1, 275, 355
Masonry, brick and stone	59	241, 250	1, 613	....	10	759, 843	1, 616, 845	2, 623, 137
Mattresses and spring beds (see also Furniture)	24	216, 950	281	63	48	131, 286	333, 900	739, 908
Millinery and lace goods	12	108, 100	48	289	65	85, 280	244, 060	430, 900
Mineral and soda waters	13	120, 150	196	....	6	84, 380	182, 810	406, 900
Models and patterns	16	11, 400	57	....	1	31, 380	8, 251	64, 272
Musical instruments, organs and materials	9	81, 500	177	....	22	105, 307	195, 028	376, 650
Musical instruments, pianos and materials	5	20, 300	27	....	....	16, 902	11, 800	37, 675
Oil, lard	3	190, 000	82	....	3	42, 600	928, 000	1, 107, 000
Oil, linseed	5	655, 000	143	4	9	85, 005	1, 590, 500	1, 967, 093

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF CHICAGO—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Oleomargarine	3	$208, 800	63	....	7	$21, 310	$328, 500	$437, 800
Painting and paperhanging	134	280, 207	963	1	33	519, 973	549, 015	1, 403, 026
Paints (see also Varnish)	12	785, 500	251	18	7	153, 128	2, 110, 845	2, 796, 000
Patent medicines and compounds (see also Drugs and chemicals)	12	176, 050	94	32	2	45, 878	516, 500	674, 280
Paving materials	3	58, 500	81	....	....	36, 787	244, 500	307, 000
Photographing	47	181, 625	115	57	7	100, 738	81, 885	325, 978
Pickles, preserves, and sauces	6	27, 000	49	5	2	25, 400	216, 470	288, 200
Pipes, tobacco	5	6, 700	4	....	1	3, 050	3, 025	14, 200
Plumbing and gasfitting	86	108, 201	302	2	54	190, 114	253, 938	563, 012
Pocket-books	3	22, 300	61	28	....	31, 890	95, 840	150, 590
Printing and publishing (see also Lithographing)	135	2, 886, 400	2, 750	453	316	1, 930, 881	2, 451, 360	5, 959, 295
Printing materials	4	20, 200	24	....	7	17, 452	26, 300	61, 000
Roofing and roofing materials	15	192, 521	221	....	....	82, 331	422, 827	593, 431
Rubber and elastic goods	3	10, 500	8	10	....	4, 540	25, 750	35, 600
Saddlery and harness	82	219, 250	329	100	62	179, 574	403, 625	746, 247
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	27	1, 213, 538	1, 793	16	190	805, 233	1, 649, 555	2, 961, 508
Saws	6	40, 300	26	....	....	18, 283	12, 300	43, 500
Scales and balances	4	51, 450	74	....	....	40, 500	111, 250	217, 600
Sewing-machine cases	6	70, 800	339	....	26	106, 706	79, 685	262, 355
Sewing machines and attachments	11	91, 300	147	4	6	59, 906	130, 800	259, 513
Shirts	28	156, 450	111	417	7	132, 020	420, 677	721, 167
Shipbuilding	21	355, 000	347	....	....	181, 675	358, 820	659, 133
Show-cases	11	55, 100	107	....	8	59, 976	111, 500	227, 000
Silk and silk goods	5	82, 000	67	135	57	72, 195	125, 895	244, 150
Slaughtering and meat-packing, not including retail butchering	70	8, 455, 200	7, 180	....	298	3, 392, 748	74, 546, 319	85, 324, 371
Soap and candles	16	1, 230, 800	402	33	79	199, 292	3, 135, 047	3, 627, 310
Springs, steel, car, and carriage	5	45, 500	64	....	1	36, 740	151, 000	222, 500
Stationery goods	3	5, 600	6	4	3	4, 100	17, 050	25, 500
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	11	99, 700	220	....	5	115, 590	411, 780	580, 530
Stereotyping and electrotyping (see also Type founding)	3	25, 000	45	....	12	23, 672	18, 300	65, 554
Straw goods	8	144, 000	85	335	19	119, 514	297, 744	484, 609
Surgical appliances	4	20, 500	16	12	....	10, 700	17, 200	48, 800
Terra-cotta ware (see also Brick and tile)	3	28, 000	81	....	13	26, 500	22, 576	68, 000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	106	657, 875	919	108	154	513, 329	1, 157, 831	2, 164, 496
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	4	287, 500	142	97	15	77, 060	1, 206, 187	1, 387, 598
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	287	538, 350	1, 489	134	101	701, 573	1, 058, 916	2, 315, 174
Tools (see also Cutlery and edge tools; Hardware)	5	15, 300	15	....	....	6, 200	4, 850	19, 224
Trunks and valises	12	155, 000	212	....	10	102, 170	295, 700	508, 300
Type founding (see also Stereotyping and electrotyping)	4	290, 000	127	95	96	109, 300	86, 000	314, 000
Umbrellas and canes	6	2, 775	8	....	2	2, 516	2, 100	7, 600
Upholstering (see also Furniture)	19	43, 900	110	21	9	51, 383	121, 691	226, 195
Varnish (see also Paints)	4	207, 000	32	....	1	24, 646	302, 600	389, 000
Vinegar	13	196, 300	63	....	4	36, 189	179, 900	328, 338
Watch and clock repairing	28	26, 950	49	1	1	31, 174	8, 537	63, 194
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	118	184, 205	426	....	21	213, 500	165, 049	532, 734
Whips	4	2, 300	8	3	1	3, 325	3, 950	11, 369
Window blinds and shades	4	11, 500	12	8	9	6, 550	32, 600	51, 250
Wirework	24	311, 122	213	....	39	108, 294	753, 786	1, 065, 860
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	14	86, 010	106	10	21	54, 767	79, 587	181, 840
All other industries (*a*)	74	4, 114, 271	2, 207	461	318	1, 258, 133	8, 060, 254	10, 787, 109

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a Embracing axle-grease; bags, other than paper; bags, paper; belting and hose, leather; cleansing and polishing preparations; cordage and twine; corsets; cotton goods; envelopes; explosives and fireworks; fancy articles; files; fire extinguishers, chemical; glass; glue; gold and silver, reduced and refined; iron bolts, nuts, washers, and rivets; iron nails and spikes, cut and wrought; iron pipe, wrought; ivory and bone work; jewelry and instrument cases; labels and tags; lapidary work; lard, refined; lead, bar, pipe, sheet, and shot; lightning rods; lime; mantels, slate, marble, and marbleized; matches; mixed textiles; musical instruments and materials (not specified); oil, essential; perfumery and cosmetics; photographic apparatus; pumps; refrigerators; regalia and society banners and emblems; safes, doors, and vaults, fire-proof; screws; shoddy; soda-water apparatus; stencils and brands; stone- and earthen-ware; stamped ware; telegraph and telephone apparatus and supplies; toys and games; vault lights; washing-machines and clothes-wringers; watch cases; and wooden ware.

CITY OF CINCINNATI, OHIO.

[Statistics collected under the direction of HENRY COLE, Chief Special Agent. See note on page 379.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	3, 276	$50, 533, 100	38, 993	10, 483	5, 041	$19, 553, 629	$62, 376, 710	$105, 259, 165
Artificial limbs (see also Surgical appliances)	3	3, 350	11	....	1	4, 904	3, 155	12, 225
Awnings and tents	9	7, 450	19	30	....	11, 492	34, 095	64, 750
Bags, paper	3	85, 000	42	41	2	26, 377	376, 072	472, 808
Baking and yeast powders (see also Drugs and chemicals)	6	28, 000	19	....	4	8, 560	54, 347	119, 700
Baskets, rattan and willow ware	9	9, 000	13	....	2	4, 175	10, 595	24, 060
Belting and hose, leather	3	57, 000	26	....	....	15, 429	73, 107	104, 554
Blacksmithing (see also Wheelwrighting)	128	115, 745	328	....	5	161, 816	123, 530	437, 019
Bookbinding and blank-book making	18	157, 910	122	118	22	116, 534	116, 377	387, 640
Boot and shoe findings	5	28, 000	9	2	....	4, 366	63, 200	91, 000
Boot and shoe uppers	3	5, 400	13	9	3	9, 000	14, 900	29, 900
Boots and shoes, including custom work and repairing	333	1, 066, 656	2, 352	579	283	1, 088, 248	2, 305, 219	4, 132, 637
Boxes, cigar	8	23, 750	47	44	23	32, 090	60, 185	118, 740
Boxes, fancy and paper	7	38, 550	27	35	7	26, 726	32, 012	72, 809
Boxes, wooden, packing	5	43, 100	75	8	11	30, 469	71, 900	125, 612
Brass castings	14	220, 777	226	....	33	109, 249	306, 962	551, 696

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF CINCINNATI, OHIO—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Bread and other bakery products	232	$391, 860	551	66	82	$246, 344	$1, 159, 917	$1, 827, 216
Brick and tile	35	90, 660	249		41	79, 155	59, 950	215, 035
Brooms and brushes	18	101, 237	108	13	13	41, 438	64, 835	148, 050
Carpentering	119	290, 305	875		13	386, 095	745, 720	1, 515, 097
Carpets, rag	21	4, 775	32	3	6	11, 425	15, 899	41, 822
Carriage and wagon materials	5	368, 440	178	2	20	92, 318	160, 089	430, 636
Carriages and wagons (see also Wheelwrighting)	50	1, 252, 131	2, 694	81	522	1, 207, 319	3, 061, 264	5, 287, 113
Clothing, men's	237	6, 279, 783	3, 731	4, 898	646	2, 670, 130	8, 628, 133	13, 878, 903
Clothing, women's	19	194, 802	31	898	8	222, 380	608, 002	1, 036, 454
Coffee and spices, roasted and ground	10	86, 400	65	4	3	32, 542	258, 170	410, 100
Coffins, burial cases, and undertakers' goods	8	636, 500	464	98	96	258, 446	462, 675	1, 002, 866
Coke	3	14, 000	13			4, 012	17, 206	42, 887
Confectionery	20	177, 075	148	60	23	83, 595	467, 820	660, 260
Cooperage	58	359, 950	531		11	205, 559	258, 428	587, 083
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	5	34, 000	50		2	25, 054	57, 740	102, 536
Corsets	3	2, 900		5	1	1, 395	3, 800	10, 000
Cotton goods (see also Hosiery and knit goods)	3	715, 000	97	275	26	99, 147	298, 465	684, 158
Cutlery and edge tools (see also Hardware; Tools)	12	40, 100	31		4	16, 452	13, 500	48, 900
Dentistry, mechanical	24	18, 550	14	1	1	6, 763	12, 179	72, 495
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	8	102, 200	49			16, 844	159, 225	225, 025
Dyeing and cleaning	12	47, 050	24	16	3	18, 731	10, 080	52, 475
Dyeing and finishing textiles	7	58, 300	27	13	3	20, 401	78, 400	144, 295
Electrical apparatus and supplies	5	83, 500	31	8	6	15, 260	80, 700	173, 580
Electroplating	7	33, 160	88	2	5	30, 637	23, 065	83, 440
Engraving and die-sinking	12	11, 050	26	8	10	16, 838	6, 894	38, 021
Engraving, steel	3	1, 300	3			1, 600	1, 100	5, 600
Engraving, wood	3	2, 100	8			4, 150	825	9, 500
Fancy articles	3	4, 500	5	8	5	2, 502	4, 048	9, 600
Flavoring extracts	4	10, 800	10	1	2	3, 980	9, 300	17, 800
Flouring- and grist-mill products	14	210, 500	101			36, 913	544, 226	634, 964
Food preparations (see page 39)	3	6, 300	6	4		2, 000	5, 860	13, 910
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	90	4, 088, 475	3, 503	6	126	1, 749, 584	2, 592, 096	5, 723, 508
Fruits and vegetables, canned and preserved	4	221, 380	179	577	150	79, 173	565, 234	743, 928
Furniture (see also Mattresses and spring beds; Upholstering)	119	2, 642, 711	2, 853	138	470	1, 335, 213	1, 641, 141	4, 372, 339
Furniture, chairs	16	71, 850	167	17	14	73, 775	50, 222	208, 635
Gas machines and meters	6	121, 000	76		1	41, 998	77, 100	139, 670
Glass, cut, stained, and ornamented	3	5, 650	14			8, 700	3, 525	23, 600
Gloves and mittens (see also Hosiery and knit goods)	3	1, 100	4	1		1, 400	3, 500	7, 000
Glue	3	189, 000	46		26	21, 180	34, 700	143, 000
Grease and tallow	7	44, 550	34		1	18, 486	187, 200	229, 600
Hairwork	14	32, 050	11	31		9, 988	16, 090	42, 680
Hardware (see also Cutlery and edge tools; Tools)	18	959, 309	671	3	48	249, 533	507, 852	1, 051, 193
Hats and caps, not including wool hats	9	9, 350	25	19	3	14, 205	37, 870	66, 770
Hosiery and knit goods (see also Cotton goods; Gloves and mittens)	9	76, 400	32	213	76	55, 425	147, 300	235, 825
Ink	3	41, 200	13		2	7, 360	45, 200	78, 800
Instruments, professional and scientific	8	33, 200	37	1	2	17, 557	11, 998	47, 549
Iron and steel	4	610, 689	305		8	163, 590	338, 479	506, 160
Iron railing, wrought	5	18, 150	58		4	22, 183	32, 969	69, 386
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	8	50, 250	84			39, 025	152, 124	255, 847
Jewelry	9	152, 600	179	25	49	131, 886	142, 385	418, 900
Leather, curried	21	379, 000	184			86, 175	1, 425, 505	1, 700, 426
Leather, tanned	29	918, 600	341		5	168, 393	1, 594, 137	2, 090, 672
Lightning rods	3	40, 000	13			6, 950	96, 000	144, 500
Liquors, distilled	10	3, 143, 500	750			312, 500	3, 604, 120	5, 293, 466
Liquors, malt	19	4, 139, 968	1, 373			595, 363	2, 566, 000	4, 580, 579
Lithographing (see also Printing and publishing)	9	322, 400	286	20	39	185, 063	283, 517	633, 744
Lock- and gun-smithing	13	6, 095	9		4	4, 328	3, 035	14, 410
Looking-glass and picture frames	9	404, 350	462		44	187, 120	249, 500	524, 000
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	11	247, 676	341	1	1	168, 000	400, 959	656, 824
Lumber, sawed	9	502, 000	295		20	110, 979	974, 097	1, 247, 191
Malt	14	839, 000	107			57, 316	736, 613	884, 310
Mantels, slate, marble, and marbleized	5	235, 000	199		17	93, 362	136, 540	304, 330
Marble and stone work	44	468, 650	628	5	33	262, 647	287, 562	856, 863
Masonry, brick and stone	18	23, 050	138		5	58, 591	85, 628	183, 509
Mattresses and spring beds (see also Furniture)	13	37, 940	48	14	15	22, 239	74, 150	135, 350
Millinery and lace goods	22	81, 450	25	259	11	77, 486	162, 852	320, 091
Mineral and soda waters	11	34, 600	50		5	18, 192	29, 991	82, 742
Models and patterns	13	8, 350	26	8	4	10, 243	6, 140	29, 346
Musical instruments and materials (not specified)	7	12, 300	17			6, 875	4, 925	19, 625
Oil, lard	5	220, 000	35			14, 272	357, 916	395, 145
Oil, lubricating	4	104, 775	29		1	18, 404	169, 100	238, 000
Painting and paperhanging	87	95, 711	368		5	133, 939	148, 174	414, 469
Patent medicines and compounds (see also Drugs and chemicals)	41	505, 750	102	11	11	56, 360	361, 163	540, 120
Photographing	30	34, 700	66	13	3	37, 434	33, 780	122, 747
Pickles, preserves, and sauces	3	35, 000	56	12		16, 800	95, 000	130, 000
Plumbing and gasfitting	59	200, 488	235		22	95, 767	237, 101	423, 113
Printing and publishing (see also Lithographing)	89	2, 527, 791	1, 910	349	830	1, 168, 592	1, 897, 880	4, 006, 450
Refrigerators	4	44, 100	41		2	11, 303	13, 425	42, 040
Regalia and society banners and emblems	5	46, 200	17	76	7	18, 550	45, 800	80, 500
Roofing and roofing materials	25	230, 520	234	1	3	91, 764	409, 244	612, 491

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF CINCINNATI, OHIO—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Saddlery and harness	51	$413, 955	543	14	35	$236, 473	$511, 749	$1, 155, 564
Safes, doors, and vaults, fire-proof	4	784, 000	865	....	10	502, 428	425, 000	1, 335, 000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	9	410, 600	391	....	12	187, 949	355, 400	735, 200
Saws	5	112, 750	96	....	....	37, 518	66, 410	145, 550
Sewing machines and attachments	6	14, 700	13	1	2	8, 035	152, 104	168, 800
Shipbuilding	8	131, 000	231	....	....	134, 995	395, 100	566, 700
Shirts	21	188, 400	69	418	2	107, 271	253, 325	416, 627
Show-cases	4	26, 200	92	....	3	41, 616	53, 019	116, 637
Silk and silk goods	5	21, 700	19	68	39	10, 700	18, 355	46, 140
Slaughtering and meat-packing, not including retail butchering	49	4, 074, 682	1, 107	....	36	338, 302	10, 454, 991	11, 614, 810
Spectacles and eyeglasses	3	1, 125	2	....	....	460	500	2, 500
Stencils and brands	4	9, 450	19	....	7	12, 924	3, 450	22, 620
Stereotyping and electrotyping	3	10, 600	20	....	2	13, 495	7, 600	28, 348
Stone- and earthen-ware	12	287, 100	275	41	75	139, 508	93, 730	356, 900
Surgical appliances (see also Artificial limbs)	4	16, 300	8	2	....	6, 452	8, 060	26, 000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	107	344, 333	390	3	19	168, 933	406, 303	790, 333
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	13	490, 645	431	85	60	101, 980	1, 138, 489	1, 508, 486
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	250	746, 935	2, 009	372	384	901, 628	1, 043, 066	2, 767, 401
Tools (see also Cutlery and edge tools; Hardware)	3	17, 800	28	....	1	19, 100	14, 700	45, 800
Trunks and valises	11	93, 700	199	20	14	61, 200	100, 935	226, 706
Umbrellas and canes	7	20, 250	12	11	3	9, 800	31, 525	55, 600
Upholstering (see also Furniture)	11	152, 850	113	16	45	48, 883	168, 495	265, 825
Varnish	4	94, 500	23	....	....	14, 355	131, 958	186, 090
Vinegar	8	92, 750	49	....	....	16, 848	79, 600	167, 728
Watch and clock repairing	36	84, 520	68	4	8	33, 686	15, 040	106, 151
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	45	122, 012	206	....	4	84, 345	55, 945	218, 304
Window blinds and shades	6	17, 100	17	4	1	9, 484	61, 000	100, 424
Wirework	6	82, 600	170	....	36	36, 157	97, 200	198, 600
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	17	27, 070	60	4	2	26, 979	23, 965	104, 160
Wooden ware	3	83, 064	70	....	42	50, 850	77, 291	173, 684
All other industries (*a*)	74	2, 783, 615	1, 144	260	184	547, 141	2, 632, 395	4, 310, 063

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a Embracing agricultural implements; axle-grease; bags, other than paper; billiard tables and materials; blacking; calcium lights; carriages and sleds, children's; cars, railroad, street, and repairs; cement; cigar molds; cleansing and polishing preparations; cloth finishing; combs; cordage and twine; drain and sewer pipe; enameled goods; envelopes; explosives and fireworks; fertilizers; files; flags and banners; foundery supplies; furnishing goods, men's; furs, dressed; gas and lamp fixtures; gold and silver leaf and foil; hand-knit goods; hand-stamps; housefurnishing goods; lamps and reflectors; lapidary work; lasts; lead, bar, pipe, sheet, and shot; lime; millstones; mirrors; mixed textiles; oleomargarine; oil, cottonseed and cake; oil, illuminating; oil, linseed; paints; pens, gold; pocket-books; printing materials; scales and balances; smelting and refining; soap and candles; springs, steel, car, and carriage; starch; steam fittings and heating apparatus; taxidermy; type founding; veneering; washing-machines and clothes-wringers; and woolen goods.

CITY OF CLEVELAND, OHIO.

[Statistics collected under the direction of M. M. HOBART, Chief Special Agent. See note on page 379.]

All industries	1, 055	$19, 430, 989	18, 018	2, 286	1, 420	$8, 502, 935	$31, 629, 737	$48, 604, 050
Agricultural implements	3	101, 200	39	....	8	16, 006	53, 930	85, 420
Blacksmithing (see also Wheelwrighting)	28	31, 650	72	....	4	31, 249	29, 030	84, 770
Bookbinding and blank-book making	12	116, 000	115	71	10	66, 705	114, 112	210, 200
Boot and shoe uppers	3	19, 000	16	15	1	8, 488	27, 450	42, 920
Boots and shoes, including custom work and repairing	103	227, 045	320	44	1	121, 238	242, 879	455, 536
Boxes, cigar	3	6, 900	11	12	8	8, 500	24, 000	44, 000
Brass castings	6	37, 500	81	....	2	35, 200	60, 000	118, 140
Bread and other bakery products	45	110, 303	131	16	7	63, 163	290, 515	452, 823
Brick and tile	21	89, 100	256	....	22	74, 914	37, 169	159, 450
Bridges	4	347, 000	573	....	4	180, 122	504, 348	925, 063
Brooms and brushes	6	22, 000	210	64	101	54, 675	57, 725	141, 666
Carpentering	13	36, 550	120	....	2	56, 240	104, 000	185, 150
Carpets, rag	9	760	5	....	....	1, 050	2, 372	9, 815
Carriages and wagons (see also Wheelwrighting)	25	165, 400	283	....	2	126, 388	122, 480	335, 084
Cars, railroad, street, and repairs	4	144, 500	216	....	....	103, 925	461, 000	661, 000
Clothing, men's	73	1, 086, 600	824	1, 172	61	634, 319	1, 488, 780	2, 687, 409
Coffee and spices, roasted and ground	4	138, 000	62	1	6	43, 440	199, 000	300, 000
Coffins, burial cases, and undertakers' goods	3	198, 000	144	39	10	70, 612	103, 780	265, 150
Confectionery	5	61, 500	47	25	9	23, 300	111, 500	161, 550
Cooperage	11	42, 575	194	....	....	88, 625	334, 315	474, 050
Cutlery and edge tools (see also Hardware)	3	97, 000	116	....	....	47, 531	54, 326	123, 000
Dentistry, mechanical	3	9, 000	7	1	....	4, 918	6, 050	19, 450
Drugs and chemicals (see also Patent medicines and compounds)	6	563, 000	202	4	1	63, 400	323, 875	557, 500
Engraving, wood	3	1, 200	7	....	1	3, 000	800	10, 000
Flouring- and grist-mill products	6	120, 000	71	....	....	34, 200	988, 659	1, 105, 768
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	53	1, 961, 038	2, 426	3	108	946, 877	1, 786, 420	3, 820, 687
Furniture (see also Upholstering)	28	326, 600	392	12	23	167, 251	183, 199	470, 835
Hairwork	10	14, 740	5	19	....	4, 335	10, 230	21, 140
Hardware (see also Cutlery and edge tools)	8	49, 000	69	....	11	28, 550	59, 875	142, 500
Hats and caps, not including wool hats	3	2, 000	12	5	1	6, 200	4, 100	17, 800
Hosiery and knit goods	5	27, 000	4	192	2	21, 960	42, 100	97, 550
Iron and steel	10	2, 839, 042	2, 788	....	211	1, 960, 237	6, 491, 506	9, 435, 432
Iron bolts, nuts, washers, and rivets	5	307, 500	364	....	....	153, 923	482, 926	860, 711
Iron forgings	3	305, 000	206	....	....	86, 500	323, 000	523, 000
Iron railing, wrought	4	28, 200	25	....	8	8, 885	23, 800	45, 500

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF CLEVELAND, OHIO—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	3	$11, 500	37	....	....	$18, 844	$47, 274	$84, 354
Jewelry	4	5, 900	26	....	....	10, 500	11, 600	30, 000
Leather, curried	4	47, 000	19	....	....	8, 200	159, 608	178, 500
Leather, tanned	4	68, 000	32	....	....	14, 850	143, 700	181, 800
Lime	4	44, 600	45	....	4	19, 100	35, 750	63, 500
Liquors, malt	23	1, 286, 200	328	1	1	162, 345	699, 666	1, 249, 502
Lithographing (see also Printing and publishing)	4	100, 700	136	16	5	70, 600	124, 100	223, 000
Looking-glass and picture frames	8	41, 650	24	1	3	11, 200	40, 050	61, 850
Malt	4	260, 000	40	....	2	20, 603	259, 673	333, 452
Marble and stone work	11	168, 600	161	....	36	100, 290	219, 364	412, 850
Masonry, brick and stone	5	20, 700	168	....	2	63, 000	93, 750	187, 000
Mineral and soda waters	4	21, 500	25	....	4	9, 230	12, 950	43, 000
Models and patterns	4	2, 800	11	....	....	6, 800	1, 500	12, 200
Oil, lubricating	5	655, 850	122	....	6	56, 123	850, 102	1, 163, 714
Painting and paperhanging	24	47, 420	139	....	....	58, 267	59, 590	160, 366
Paints (see also Varnish)	10	423, 500	207	12	15	113, 214	801, 334	1, 202, 480
Patent medicines and compounds (see also Drugs and chemicals)	3	6, 700	5	....	1	2, 400	9, 006	14, 311
Photographing	14	31, 450	33	7	6	18, 471	18, 411	68, 400
Plumbing and gasfitting	17	22, 850	85	....	2	34, 061	60, 600	142, 411
Printing and publishing (see also Lithographing)	11	693, 300	392	18	16	258, 590	236, 947	666, 509
Pumps, not including steam pumps	3	9, 500	10	....	....	4, 300	7, 900	15, 200
Roofing and roofing materials	4	61, 000	41	....	....	19, 292	113, 000	109, 000
Saddlery and harness	35	36, 031	77	....	2	28, 951	60, 900	118, 300
Sash, doors, and blinds (see also Wood, turned and carved)	15	406, 314	489	....	11	202, 703	533, 035	857, 687
Sewing-machine cases	5	36, 000	275	....	22	108, 600	126, 000	255, 600
Shipbuilding	12	167, 100	282	....	....	144, 200	301, 250	510, 550
Shirts	7	20, 300	7	48	....	14, 589	51, 812	87, 295
Slaughtering and meat-packing, not including retail butchering	12	447, 000	388	....	28	192, 892	4, 886, 771	5, 427, 938
Soap and candles	5	55, 000	20	....	2	8, 420	47, 715	68, 700
Stencils and brands	3	1, 200	6	....	....	2, 825	2, 100	9, 300
Stereotyping and electrotyping	3	4, 150	6	....	1	3, 400	1, 900	8, 500
Tinware, copperware, and sheet-iron ware	60	141, 650	215	1	25	100, 080	227, 019	447, 811
Tobacco, cigars and cigarettes	68	106, 950	299	36	11	119, 315	166, 320	366, 412
Trunks and valises	6	28, 700	35	3	5	12, 200	29, 100	49, 600
Umbrellas and canes	3	3, 300	2	1	2	550	3, 045	7, 500
Upholstering (see also Furniture)	8	4, 300	16	6	2	5, 820	21, 500	33, 350
Varnish (see also Paints)	4	432, 500	53	....	....	32, 695	562, 939	691, 245
Watch and clock repairing	3	12, 800	10	1	2	3, 450	5, 600	12, 500
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	19	10, 900	39	....	....	16, 235	15, 800	48, 600
Wirework	4	118, 500	78	2	25	3, 175	200, 500	287, 000
Wood, turned and carved (see also Sash, doors, and blinds)	3	17, 250	30	....	9	17, 000	20, 695	53, 489
Wooden ware	3	108, 500	140	10	58	52, 550	158, 000	232, 500
All other industries (*a*)	73	3, 609, 921	3, 052	428	488	1, 007, 679	5, 052, 410	7, 316, 707

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a Embracing artificial limbs; awnings and tents; bags, other than paper; baking and yeast powders; baskets, rattan and willow ware; belting and hose, leather; belting and hose, rubber; billiard tables and materials; boxes, fancy and paper; carriage and wagon materials; clothing, women's; cordage and twine; dyeing and cleaning; electric lights; electroplating; fancy articles; fertilizers; files; foundery supplies; fruits and vegetables, canned and preserved; furs, dressed; gas and lamp fixtures; hand-stamps; ink; instruments, professional and scientific; iron nails and spikes, cut and wrought; iron pipe, wrought; lamps and reflectors; lead, bar, pipe, sheet, and shot; leather, dressed skins; liquors, distilled; lumber, planed; lumber, sawed; mantels, slate, marble, and marbleized; mattresses and spring beds; millstones; musical instruments, organs and materials; oil, lard; oil, linseed; paper; rubber and elastic goods; rules, ivory and wood; saws; screws; sewing machines and attachments; shoddy; show-cases; silk and silk goods; springs, steel, car, and carriage; surgical appliances; taxidermy; telegraph and telephone apparatus; tobacco, chewing, smoking, and snuff; tools; vinegar; wheelbarrows; wire; and woolen goods.

CITY OF COLUMBUS, OHIO.

[Statistics collected under the direction of ISAAC W. TUCKER, Special Agent.]

All industries	316	$5, 379, 401	4, 935	289	266	$1, 961, 394	$5, 534, 496	$9, 646, 679
Blacksmithing (see also Wheelwrighting)	20	5, 855	20	....	....	6, 515	8, 455	26, 675
Bookbinding and blank-book making	3	41, 200	26	20	8	27, 800	66, 200	153, 600
Boots and shoes, including custom work and repairing	25	61, 250	102	17	....	51, 383	77, 105	159, 637
Brass castings	3	13, 200	31	....	....	13, 420	54, 250	115, 000
Bread and other bakery products	10	49, 653	51	5	....	25, 241	142, 193	198, 395
Brick and tile	7	187, 036	174	....	4	53, 113	96, 941	232, 630
Brooms and brushes	8	31, 500	45	4	6	20, 714	60, 004	99, 572
Carpentering	12	25, 650	83	....	....	36, 784	98, 676	191, 747
Carriage and wagon materials	5	221, 000	158	....	....	49, 481	81, 625	222, 999
Carriages and wagons (see also Wheelwrighting)	10	393, 000	555	2	40	248, 722	598, 376	1, 008, 179
Clothing, men's	3	23, 000	80	20	....	11, 560	56, 053	86, 458
Confectionery	4	6, 400	4	3	3	4, 430	20, 447	33, 800
Dentistry, mechanical	5	4, 350	2	....	....	600	3, 450	16, 000
Flouring- and grist-mill products	3	15, 000	2	....	....	804	27, 429	31, 161
Foundery and machine-shop products	16	376, 500	376	....	6	142, 965	233, 231	446, 350
Furniture	3	197, 000	187	8	12	79, 883	62, 000	208, 500
Iron and steel	3	800, 000	504	....	26	177, 008	734, 794	1, 149, 525
Liquors, malt	4	510, 000	149	....	....	67, 459	290, 895	519, 529
Lumber, planed	9	213, 100	119	....	15	56, 940	317, 245	445, 500
Marble and stone work	11	34, 750	59	....	....	19, 954	28, 500	70, 925
Painting and paperhanging	14	4, 625	39	....	1	19, 000	16, 043	55, 848
Photographing	6	16, 100	12	2	....	7, 391	8, 100	27, 900
Printing and publishing	10	167, 100	199	8	11	129, 271	110, 900	272, 358
Pumps, not including steam pumps	4	3, 800	8	....	....	3, 050	2, 750	10, 786
Saddlery and harness	9	24, 900	24	....	....	10, 783	18, 300	57, 218

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF COLUMBUS, OHIO—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Shirts	3	$7,400	....	18	....	$4,400	$13,900	$25,500
Tinware, copperware, and sheet-iron ware	22	89,300	103	....	....	40,012	75,875	161,975
Tobacco, cigars and cigarettes	19	46,645	131	6	18	43,831	79,766	188,039
Vinegar	3	4,300	3	....	....	2,750	7,888	18,100
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	6	7,250	8	....	....	2,801	2,050	8,499
All other industries (*a*)	56	1,798,537	1,681	176	116	603,329	2,140,965	3,404,249

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a Embracing agricultural implements; baskets, rattan and willow ware; boxes, fancy and paper; carriages and sleds, children's; cars, railroad, street, and repairs; coffee and spices, roasted and ground; cooperage; cordage and twine; cutlery and edge tools; enameled goods; engraving and die-sinking; files; furniture, chairs; glass; hairwork; handles, wooden; hardware, saddlery; hosiery and knit goods; iron bolts, nuts, washers, and rivets; iron railing, wrought; iron work, architectural and ornamental; jewelry; leather, curried; leather, tanned; lime; lock- and gun-smithing; looking-glass and picture frames; masonry, brick and stone; mattresses and spring beds; mineral and soda waters; oil, lard; paper; paving materials; regalia and society banners and emblems; sash, doors, and blinds; saws; soap and candles; trunks and valises; watch and clock repairing; watches; window blinds and shades; wire; and wirework.

CITY OF COVINGTON, KY.

[Statistics collected under the direction of J. M. BLACKBURN, Special Agent.]

All industries	181	$3,182,141	2,251	223	451	$1,033,463	$3,935,727	$5,864,530
Blacksmithing	8	14,700	27	....	....	10,878	6,500	24,200
Boots and shoes, including custom work and repairing	11	19,650	28	4	....	8,120	8,450	23,100
Boxes, wooden, packing	4	2,350	9	....	2	3,372	7,172	14,350
Bread and other bakery products	20	39,050	24	7	3	9,176	52,458	88,840
Brick and tile	9	6,200	73	....	21	14,650	15,100	40,795
Carpentering	8	12,750	29	....	....	14,486	66,400	93,600
Carriages and wagons	4	40,700	39	....	....	18,156	22,200	51,500
Cooperage	6	2,660	35	....	....	10,265	18,340	34,070
Flouring- and grist-mill products	5	73,000	33	....	....	12,433	223,224	246,312
Furniture, chairs	4	1,850	6	....	1	2,500	3,450	7,600
Iron and steel	3	730,000	533	....	32	281,925	663,705	1,012,004
Iron railing, wrought	3	7,500	26	....	....	8,200	10,560	25,480
Leather, tanned	3	37,000	39	....	....	15,900	301,106	330,150
Liquors, distilled	3	255,000	91	....	1	38,775	425,500	635,000
Liquors, malt	4	319,129	94	....	....	43,912	188,395	313,659
Marble and stone work	7	12,500	33	....	....	15,417	28,600	67,330
Saddlery and harness	4	13,500	20	....	1	7,600	14,700	27,421
Slaughtering and meat-packing, not including retail butchering	3	30,500	10	....	....	5,384	98,900	111,000
Tinware, copperware, and sheet-iron ware	5	16,700	15	1	....	5,223	8,921	17,558
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	13	581,500	279	88	161	150,202	1,057,339	1,395,533
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	15	40,627	57	1	21	22,453	56,659	100,422
All other industries (*a*)	39	925,275	751	122	208	334,436	658,048	1,204,606

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a Embracing agricultural implements; brooms and brushes; carpets, rag; clothing, men's; coffee and spices, roasted and ground; cordage and twine; foundery and machine-shop products; furniture; glass; grease and tallow; hardware; iron nails and spikes, cut and wrought; iron work, architectural and ornamental; leather, curried; lumber, planed; lumber, sawed; mineral and soda waters; painting and paperhanging; patent medicines and compounds; pickles, preserves, and sauces; pumps; shipbuilding; sporting goods; stationery goods; upholstering; vinegar; wirework; wood, turned and carved; and wool engoods.

CITY OF DAVENPORT, IOWA.

[Statistics collected under the direction of JAMES R. GRAHAM, Special Agent.]

All industries	188	$2,806,222	1,473	82	150	$685,469	$2,960,668	$4,468,978
Agricultural implements	3	325,000	187	....	....	68,558	167,615	344,900
Blacksmithing (see also Wheelwrighting)	16	16,952	16	....	1	8,447	9,650	30,555
Boots and shoes, including custom work and repairing	14	41,440	33	1	3	15,894	18,580	52,230
Bread and other bakery products	7	97,700	39	2	1	17,105	95,610	132,015
Brick and tile	6	30,500	53	....	9	12,804	6,350	25,750
Carpentering	10	50,400	51	....	9	29,805	92,755	147,600
Carriages and wagons (see also Wheelwrighting)	4	35,870	35	....	1	23,400	26,383	65,500
Clothing, men's	13	110,900	82	30	1	62,068	109,759	209,378
Confectionery	3	19,650	7	5	1	4,320	55,800	78,000
Cooperage	4	16,700	33	....	....	12,060	29,590	47,642
Flouring- and grist-mill products	5	123,000	36	....	....	19,458	569,585	644,699
Foundery and machine-shop products	3	76,500	51	....	3	26,950	50,300	99,250
Furniture	5	110,500	91	1	2	40,212	61,732	124,650
Liquors, malt	4	205,000	62	....	....	24,135	103,590	178,370
Lumber, sawed	5	655,000	240	....	64	101,800	576,350	828,080
Marble and stone work	4	20,500	19	....	1	9,865	13,816	31,931
Printing and publishing	4	79,500	45	9	3	29,213	53,986	108,123
Saddlery and harness	9	16,200	21	....	2	8,645	19,317	38,585
Sash, doors, and blinds	3	135,000	83	....	25	40,240	252,182	333,475
Slaughtering and meat-packing, not including retail butchering	3	285,000	49	....	....	7,310	266,559	273,634
Tinware, copperware, and sheet-iron ware	14	49,100	36	....	....	15,907	29,365	64,202
Tobacco, cigars and cigarettes	15	70,380	73	22	7	45,178	82,162	184,609
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	4	4,780	6	....	1	2,192	3,810	8,438
All other industries (*a*)	30	230,650	125	12	16	59,903	265,822	417,362

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a Embracing bookbinding and blank-book making; boxes, wooden, packing; brass castings; brooms and brushes; coffee and spices, roasted and ground; coffins, burial cases, and undertakers' goods; cordage and twine; engraving, wood; hairwork; leather, curried; leather, tanned; lock- and gun-smithing; looking-glass and picture frames; malt; mineral and soda waters; models and patterns; painting and paperhanging; paints; paving materials; photographing; roofing and roofing materials; shirts; soap and candles; trunks and valises; vinegar; and window blinds and shades.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF DAYTON, OHIO.

[Statistics collected under the direction of J. H. THOMAS, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	495	$6,063,334	5,071	513	441	$2,293,630	$6,434,225	$11,985,483
Agricultural implements	12	914,000	577	....	20	212,613	468,536	1,187,204
Blacksmithing (see also Wheelwrighting)	15	12,100	36	....	....	15,780	9,400	47,330
Bookbinding and blank-book making	3	22,000	11	11	3	10,700	21,500	54,000
Boots and shoes, including custom work and repairing	52	11,975	72	5	2	35,108	30,663	95,208
Bread and other bakery products	20	101,025	64	2	6	26,975	163,349	229,110
Carpentering	37	139,050	240	....	4	120,701	300,222	642,591
Carpets, rag	4	925	4	....	....	1,250	1,650	3,750
Carriages and wagons (see also Wheelwrighting)	12	78,000	146	....	7	56,930	81,750	212,000
Clothing, men's	19	115,700	226	119	2	122,155	202,900	426,900
Coffee and spices, roasted and ground	4	18,700	18	4	....	10,495	86,300	112,675
Confectionery	10	17,100	29	22	....	10,343	78,190	114,500
Cooperage	9	26,450	51	....	1	17,670	46,447	81,151
Flouring- and grist-mill products	8	314,000	64	....	....	29,705	1,134,529	1,341,558
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	16	785,000	697	....	36	299,739	484,852	1,062,887
Furniture (see also Upholstering)	14	151,850	136	3	12	55,490	89,150	217,554
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	3	33,000	61	....	....	11,800	57,200	104,600
Iron railing, wrought	3	23,400	13	....	1	5,060	14,400	30,000
Leather, curried	4	31,000	13	....	....	6,340	75,030	96,275
Leather, tanned	4	19,500	8	....	....	3,740	49,434	63,925
Liquors, malt	8	133,428	49	....	....	25,139	108,690	194,021
Lock- and gun-smithing	3	1,300	6	....	....	2,500	1,750	5,600
Looking-glass and picture frames	4	34,200	5	1	....	2,676	13,800	26,000
Marble and stone work	6	21,800	32	....	....	13,280	17,100	45,100
Masonry, brick and stone	33	35,125	287	....	7	121,070	162,225	379,900
Oil, linseed	3	102,500	30	....	....	11,500	255,000	315,000
Painting and paperhanging	12	4,250	46	....	....	16,785	10,525	41,570
Paper	4	676,000	199	35	20	89,975	143,769	476,104
Patent medicines and compounds	4	3,700	3	1	2	1,145	7,700	23,750
Plumbing and gasfitting	6	38,300	47	....	....	23,118	61,211	105,612
Printing and publishing	10	244,600	133	55	22	97,885	126,018	332,624
Pumps, not including steam pumps	4	1,200	5	....	1	1,850	2,200	8,000
Saddlery and harness	11	41,350	72	....	5	31,500	63,050	133,460
Slaughtering and meat-packing, not including retail butchering	5	50,500	27	....	2	20,980	178,136	236,318
Tinware, copperware, and sheet-iron ware	18	27,600	70	....	2	31,525	37,350	93,625
Tobacco, cigars and cigarettes	28	71,900	144	57	25	74,387	91,060	296,976
Upholstering (see also Furniture)	4	17,300	[illegible]	....	2	4,460	15,700	29,300
Watch and clock repairing	8	5,525	16	....	1	9,330	5,235	22,370
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	6	5,900	17	....	....	5,780	5 950	19,610
Window blinds and shades	4	3,900	5	2	....	2,800	7,200	12,950
All other industries (*a*)	65	1,728,181	1,404	196	258	653,351	1,725,054	3,064,375

a Embracing awnings and tents; bagging, flax, hemp, and jute; bags, paper; baskets, rattan and willow ware; boxes, cigar; boxes, fancy and paper; brass castings; bridges; brooms and brushes; cars, railroad, street, and repairs; carriage and wago nmaterials; clothing, women's; cotton goods; cutlery and edge tools; drain and sewer pipe; dyeing and cleanings; electroplating; fancy articles; files; flax, dressed; hairwork; hardware; hats and caps; hosiery and knit goods; ink; kaolin and ground earths; lasts; liquors, distilled; lumber, sawed; malt; mineral and soda waters; models and patterns; musical instruments, organs and materials; oil, lard; paints; refrigerators; roofing and roofing materials; sash, doors, and blinds; saws; shirts; soap and candles; stationery goods; steam fittings and heating apparatus; stencils and brands; stone- and earthen-ware; tobacco, chewing, smoking, and snuff; toys and games; trunks and valises; umbrellas and canes; varnish; and woolen goods.

CITY OF DENVER, COLO.

[Statistics collected under the direction of WILLIAM ODENHEIMER, Special Agent.]

All industries	259	$2,301,850	2,550	264	130	$1,574,438	$5,715,215	$9,367,749
Blacksmithing	14	31,400	66	....	5	37,400	31,600	98,900
Boots and shoes, including custom work and repairing	13	8,700	45	....	2	22,178	23,200	66,725
Bread and other bakery products	16	97,200	100	6	11	82,800	355,900	574,552
Brick and tile	24	104,800	441	....	24	118,710	92,808	286,028
Carpentering	26	80,800	227	....	1	210,220	546,600	964,600
Carriages and wagons	9	261,000	123	....	2	102,000	194,000	435,000
Clothing, men's	6	3,350	5	16	....	13,225	27,350	52,350
Clothing, women's	3	18,300	....	130	5	60,200	92,150	176,500
Confectionery	6	7,900	23	1	4	17,250	20,700	49,550
Flouring- and grist-mill products	7	162,000	85	....	....	44,486	926,112	1,124,442
Foundery and machine-shop products	10	176,500	249	....	10	157,420	426,130	771,522
Furniture	7	68,400	42	3	2	33,300	43,000	138,850
Hairwork	3	3,300	....	10	....	4,125	6,600	15,200
Leather, curried	3	16,700	13	1	....	8,500	53,250	90,550
Leather, tanned	3	16,700	13	1	....	9,000	38,300	55,800
Liquors, malt	6	281,500	70	....	....	32,065	119,470	217,710
Lock- and gun-smithing	8	2,600	11	....	....	3,700	2,200	10,500
Marble and stone work	5	19,500	62	....	....	23,600	21,750	61,500
Mineral and soda waters	3	6,100	9	....	....	6,500	14,750	32,675
Printing and publishing	4	181,000	156	12	19	135,050	95,300	305,500
Saddlery and harness	9	91,250	61	2	12	47,050	94,600	207,350
Slaughtering and meat-packing, not including retail butchering	4	49,000	35	....	5	15,990	536,920	590,945
Tinware, copperware, and sheet-iron ware	12	25,250	47	....	10	26,650	60,900	128,100
Tobacco, cigars and cigarettes	9	14,150	23	3	....	16,578	33,500	77,025
Vinegar	3	13,000	10	....	3	4,300	13,000	24,500
Watch and clock repairing	10	25,550	13	....	1	11,130	18,800	50,880
All other industries (*a*)	41	535,900	621	79	14	331,011	1,826,325	2,760,495

a Embracing awnings and tents; baking and yeast powders; brass castings; brooms and brushes; coffee and spices, roasted and ground; cutlery and edge tools; drugs and chemicals; dyeing and cleaning; flavoring extracts; fruits and vegetables, canned and preserved; furs, dressed; gloves and mittens; iron and steel; iron work, architectural and ornamental; jewelry and instrument cases; leather, dressed skins; lithographing; looking-glass and picture frames; lumber, planed; masonry, brick and stone; mattresses and spring beds; patent medicines and compounds; pickles, preserves, and sauces; plumbing and gasfitting; roofing and roofing materials; sash, doors, and blinds; soap and candles; stencils and brands; stereotyping and electrotyping; trunks and valises; upholstering; wheelwrighting; and whips.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF DES MOINES, IOWA.

[Statistics collected under the direction of J. P. BUSHNELL, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	155	$1, 463, 250	1, 211	71	96	$667, 699	$2, 810, 396	$4, 220, 709
Agricultural implements	3	55, 000	18			8, 000	14, 200	46, 200
Blacksmithing (see also Wheelwrighting)	5	3, 300	8	1		4, 700	5, 100	14, 500
Boots and shoes, including custom work and repairing	5	7, 500	16			7, 350	8, 240	22, 195
Bread and other bakery products	6	14, 050	31	1		13, 995	41, 000	64, 362
Brick and tile	3	12, 700	80		12	21, 000	12, 375	42, 000
Carpentering	5	17, 000	52			28, 900	94, 500	142, 750
Carriages and wagons (see also Wheelwrighting)	4	22, 500	27			13, 750	27, 000	53, 000
Clothing, men's	13	60, 700	43	13		39, 050	70, 300	134, 600
Cooperage	3	3, 000	17			9, 100	21, 100	32, 300
Flouring- and grist-mill products	7	142, 500	40			13, 105	204, 380	239, 235
Foundery and machine-shop products	8	94, 000	75		4	46, 702	50, 823	151, 848
Furniture	4	47, 500	29		8	17, 600	45, 500	80, 000
Liquors, malt	5	84, 000	25			10, 605	35, 610	81, 295
Marble and stone work	5	43, 000	36	1		20, 100	21, 600	68, 700
Painting and paperhanging	3	4, 800	14			8, 580	21, 000	36, 700
Paving materials	3	4, 100	14			5, 900	6, 300	16, 000
Printing and publishing	13	320, 500	148	21	14	136, 102	174, 850	399, 438
Saddlery and harness	4	5, 100	16		1	6, 200	24, 000	39, 000
Tinware, copperware, and sheet-iron ware	8	32, 000	35			18, 442	47, 200	109, 400
Tobacco, cigars and cigarettes	5	17, 700	32	4	4	20, 700	36, 050	74, 500
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	6	8, 500	11			5, 300	5, 150	14, 074
All other industries (*a*)	37	463, 800	444	30	53	212, 518	1, 844, 118	2, 358, 612

a Embracing bookbinding and blank-book making; boxes, cigar; brass castings; brooms and brushes; coffee and spices, roasted and ground; confectionery; corsets; engraving and die-sinking; files; glucose; hairwork; hardware; liquors, distilled; lithographing; looking-glass and picture frames; lumber, planed; lumber, sawed; oil, linseed; pumps; roofing and roofing materials; scales and balances; shirts; slaughtering and meat-packing; soap and candles; steam fittings and heating apparatus; stereotyping and electrotyping; stone- and earthen-ware; vinegar; wirework; and woolen goods.

CITY OF DETROIT, MICH.

[Statistics collected under the direction of JAMES E. TRYON, Chief Special Agent. See note on page 379.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	919	$15, 594, 479	12, 477	2, 430	1, 203	$6, 306, 460	$18, 150, 995	$30, 181, 416
Baking and yeast powders	6	38, 000	33	10	3	17, 596	84, 800	141, 600
Baskets, rattan and willow ware	6	11, 100	18	9	7	12, 570	9, 325	29, 900
Blacksmithing (see also Wheelwrighting)	39	43, 575	80		3	37, 064	33, 300	109, 350
Boot and shoe uppers	3	7, 300	22	12	2	12, 150	20, 500	42, 200
Boots and shoes, including custom work and repairing	69	331, 700	529	54	29	317, 100	605, 450	1, 066, 025
Boxes, cigar	4	41, 000	30	25	29	23, 450	58, 000	103, 000
Boxes, fancy and paper	3	5, 900	6	30	1	10, 160	34, 500	58, 000
Boxes, wooden, packing	6	32, 600	149		17	54, 600	145, 500	226, 800
Bread and other bakery products	47	225, 400	229	12	35	146, 580	656, 389	930, 157
Brooms and brushes	10	39, 400	55	19	44	32, 409	72, 069	127, 538
Carpentering	30	272, 000	669		3	254, 236	580, 495	955, 195
Carriages and wagons (see also Wheelwrighting)	23	209, 000	285	2	8	127, 945	174, 000	400, 220
Clothing, men's	31	963, 500	273	767		389, 926	1, 364, 016	2, 056, 182
Clothing, women's	3	12, 800		44		9, 280	8, 300	24, 100
Coffee and spices, roasted and ground	3	55, 000	27	6	1	16, 950	100, 000	145, 000
Confectionery	8	207, 200	93	72	5	63, 800	467, 400	584, 200
Cooperage	20	118, 300	183		13	69, 500	146, 650	266, 400
Corsets	4	46, 800	20	115	16	41, 450	111, 100	208, 500
Cutlery and edge tools (see also Hardware)	4	9, 000	14		2	7, 920	5, 270	20, 500
Dentistry, mechanical	5	9, 000	7	2	1	4, 700	11, 000	27, 500
Dyeing and cleaning	6	16, 200	10	14		9, 228	5, 700	22, 100
Flouring- and grist-mill products	14	497, 000	123			62, 795	1, 438, 752	1, 649, 627
Foundery and machine-shop products	24	1, 262, 050	960		64	431, 065	915, 955	1, 808, 355
Furniture (see also Upholstering)	32	243, 800	264	18	78	119, 620	229, 002	438, 801
Hairwork	4	6, 200		19		5, 120	5, 000	15, 800
Hardware (see also Cutlery and edge tools)	3	27, 000	55		7	18, 142	20, 300	49, 000
Hats and caps, not including wool hats	6	298, 000	100	133	1	73, 069	129, 400	293, 500
Instruments, professional and scientific	3	12, 500	10			4, 880	4, 470	14, 540
Iron and steel	7	1, 547, 386	1, 088		7	436, 986	1, 872, 407	2, 498, 634
Jewelry	9	89, 302	56		4	40, 499	58, 251	135, 600
Leather, curried	7	104, 336	34			16, 088	233, 975	284, 118
Leather, tanned	10	498, 664	139	2		56, 493	465, 526	629, 696
Lime	4	95, 500	30			10, 440	18, 753	37, 555
Liquors, malt	28	1, 205, 120	299	4	1	149, 677	640, 768	1, 143, 601
Lock- and gun-smithing	6	4, 500	10			4, 200	1, 850	13, 300
Looking-glass and picture frames	13	252, 650	266	74	60	126, 472	217, 797	462, 669
Marble and stone work	16	110, 100	173		9	109, 446	160, 300	348, 200
Models and patterns	3	3, 800	4		1	2, 130	1, 475	6, 400
Painting and paperhanging	23	88, 900	315		10	130, 235	194, 229	384, 930
Patent medicines and compounds	5	48, 000	23	36	6	16, 920	25, 000	87, 000
Perfumery and cosmetics	4	25, 500	20	9	5	12, 900	42, 000	94, 000
Photographing	16	40, 550	35	11	3	19, 892	24, 860	74, 600
Plumbing and gasfitting	16	136, 200	183		3	93, 881	173, 897	359, 754
Printing and publishing	29	866, 050	677	78	57	373, 262	301, 350	980, 098
Roofing and roofing materials	5	30, 000	65		4	25, 700	60, 500	108, 200
Saddlery and harness	28	39, 100	70	1	6	33, 415	51, 100	120, 700
Sash, doors, and blinds (see also Wood, turned and carved)	15	261, 000	338		65	148, 525	278, 850	553, 000
Shipbuilding	16	187, 200	756			310, 605	504, 262	738, 975
Shirts	5	4, 700	18	30	1	12, 860	15, 800	36, 420
Slaughtering and meat-packing, not including retail butchering	7	485, 000	137		10	79, 067	1, 413, 426	1, 721, 232

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF DETROIT, MICH.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Spectacles and eyeglasses	3	$45, 000	53	5	19	$23, 400	$24, 500	$71, 000
Stencils and brands	6	9, 200	18	....	....	10, 750	10, 500	34, 100
Tinware, copperware, and sheet-iron ware	47	108, 650	142	....	24	68, 781	100, 725	232, 700
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	5	495, 000	138	125	80	100, 725	719, 554	1, 212, 146
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	58	453, 700	723	102	74	310, 828	572, 080	1, 196, 870
Trunks and valises	3	35, 500	78	....	12	44, 142	82, 758	145, 900
Upholstering (see also Furniture)	5	52, 200	67	5	9	28, 115	112, 400	172, 400
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	15	12, 300	32	....	3	13, 670	10, 150	36, 300
Wirework	4	87, 000	135	10	22	69, 900	97, 500	192, 500
Wood, turned and carved (see also Sash, doors, and blinds)	11	15, 550	31	....	3	14, 306	13, 850	49, 849
Wooden ware	5	273, 000	243	25	6	67, 680	131, 500	226, 950
All other industries (*a*)	59	2, 842, 496	1, 837	550	327	971, 185	2, 222, 470	3, 971, 730

a Embracing artificial limbs; billiard tables and materials; boot and shoe findings; brass castings; brick and tile; bridges; carpets, rag; carriages and sleds, children's; cars, railroad, street, and repairs; combs; drugs and chemicals; files; fruits and vegetables, canned and preserved; furniture, chairs; furs, dressed; gas machines and meters; gloves and mittens; hosiery and knit goods; ink; lasts; lumber, sawed; masonry, brick and stone; matches; musical instruments, organs and materials; musical instruments, pianos and materials; needles and pins; oil, lubricating; pens, gold; pickles, preserves, and sauces; pipes, tobacco; refrigerators; regalia and society banners and emblems; safes, doors, and vaults, fire-proof; saws; scales and balances; show-cases; stone- and earthen-ware; telegraph and telephone apparatus; umbrellas and canes; varnish; whips; and window blinds and shades.

CITY OF DUBUQUE, IOWA.

[Statistics collected under the direction of ABRAM S. BUNTING, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	346	$3, 446, 866	2, 619	292	92	$1, 339, 730	$3, 837, 846	$6, 328, 889
Blacksmithing (see also Wheelwrighting)	8	6, 750	24	....	....	12, 250	4, 525	23, 880
Bookbinding and blank-book making	4	17, 750	15	3	6	9, 100	8, 600	24, 300
Boots and shoes, including custom work and repairing	34	41, 475	80	4	1	38, 900	64, 825	128, 100
Bread and other bakery products	15	55, 135	51	9	3	26, 558	92, 107	149, 664
Brick and tile	8	12, 600	84	....	....	16, 900	9, 562	35, 300
Carpentering	26	28, 200	339	....	....	161, 277	149, 100	355, 550
Carpets, rag	7	480	8	1	....	3, 700	4, 450	14, 000
Carriages and wagons (see also Wheelwrighting)	9	532, 900	283	....	....	150, 050	324, 250	627, 000
Clothing, men's	18	241, 150	71	188	1	66, 500	254, 875	403, 000
Cooperage	10	58, 150	109	....	3	55, 750	70, 630	168, 656
Dentistry, mechanical	6	5, 900	10	....	....	9, 300	2, 675	16, 430
Flouring- and grist-mill products	4	30, 000	14	....	....	5, 030	69, 740	83, 257
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	4	157, 500	109	....	....	57, 500	86, 960	181, 320
Furniture	6	87, 500	159	....	1	70, 250	100, 600	219, 000
Hairwork	3	3, 700	2	9	2	3, 100	6, 750	12, 300
Liquors, malt	6	265, 000	63	....	....	26, 975	110, 132	211, 125
Lock- and gun-smithing	6	2, 500	5	....	....	2, 900	650	6, 204
Looking-glass and picture frames	4	4, 000	10	....	....	4, 750	7, 000	17, 500
Lumber, sawed	4	295, 000	160	....	23	53, 000	212, 200	345, 000
Marble and stone work	7	7, 650	28	....	....	15, 450	13, 200	37, 058
Masonry, brick and stone	19	3, 396	107	....	....	43, 210	52, 775	121,450
Painting and paperhanging	11	6, 950	47	....	2	24, 250	15, 150	50, 900
Photographing	7	5, 500	12	7	1	9, 490	2, 045	17, 100
Printing and publishing	8	111, 800	74	8	9	56, 252	38, 300	137, 475
Saddlery and harness	7	63, 300	36	....	....	18, 124	42, 500	78, 227
Sash, doors, and blinds	3	114, 000	71	....	15	50, 000	191, 000	284, 000
Slaughtering and meat-packing, not including retail butchering	5	183, 000	133	....	1	86, 500	1, 237, 400	1, 379, 000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	3	50, 400	61	....	....	37, 000	36, 000	90, 800
Tinware, copperware, and sheet-iron ware	16	21, 850	44	....	....	22, 250	28, 250	74, 100
Tobacco, cigars and cigarettes	10	9, 600	34	....	1	14, 822	18, 275	45, 750
Vinegar	3	53, 000	24	....	....	12, 350	35, 535	89, 650
Watch and clock repairing	10	6, 050	18	....	....	11, 900	2, 770	24, 300
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	10	5, 600	29	....	....	12, 500	9, 450	34, 100
All other industries (*a*)	45	959, 080	305	63	23	151, 842	535, 565	843, 393

a Embracing agricultural implements; awnings and tents; bags, paper; baskets, rattan and willow ware; bellows; boxes, paper; brass ware; bridges; brooms and brushes; carriage and wagon materials; clothing, women's; coffee and spices, roasted and ground; coffins, burial cases, and undertakers' goods; confectionery; dyeing and cleaning; files; furs, dressed; hats and caps; iron work, architectural and ornamental; lead, bar, pipe, sheet, and shot; lightning rods; lime; liquors, vinous; mattresses and spring beds; mineral and soda waters; models and patterns; roofing and roofing materials; shipbuilding; shirts; show-cases; soap and candles; tobacco, chewing, smoking, and snuff; trunks and valises; upholstering; wirework; and wooden ware.

CITY OF ELIZABETH, N. J.

[Statistics collected under the direction of J. F. WILEY, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	149	$2, 453, 180	3, 151	216	482	$1, 740, 456	$2, 915, 851	$6, 828, 027
Blacksmithing (see also Wheelwrighting)	10	12, 200	25	....	....	10, 820	14, 000	33, 600
Boots and shoes, including custom work and repairing	3	26, 000	23	7	....	17, 420	36, 660	63, 800
Bread and other bakery products	19	31, 050	50	1	....	20, 528	99, 095	150, 900
Brick and tile	3	75, 000	98	....	1	44, 000	70, 500	138, 000
Carpentering	5	11, 800	48	....	....	20, 425	56, 500	97, 000
Carriages and wagons (see also Wheelwrighting)	3	2, 500	10	....	....	3, 940	6, 800	16, 000
Clothing, men's	6	16, 300	23	13	2	13, 100	24, 700	51, 000
Coke	....	....	....	....	....	....	....	....
Confectionery	3	26, 300	9	5	1	5, 450	57, 000	87, 600
Dyeing and cleaning	3	3, 800	7	3	....	2, 400	1, 950	6, 750

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF ELIZABETH, N. J.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Valne of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Foundery and machine-shop products	3	$105,000	152	....	10	$90,000	$110,000	$248,000
Kindling wood	4	4,450	5	....	1	1,660	3,410	9,000
Painting and paperhanging	7	12,700	32	2	....	15,450	28,100	81,500
Photographing	3	5,900	4	....	....	2,630	2,900	9,500
Plumbing and gasfitting	6	24,400	39	....	....	16,000	28,500	55,300
Printing and publishing	5	41,600	53	....	11	29,580	34,700	73,600
Tobacco, cigars and cigarettes	13	15,350	19	....	3	8,100	22,830	43,850
Upholstering	4	8,000	9	....	....	4,850	12,200	21,800
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	3	800	3	....	....	800	1,200	3,500
All other industries (a)	46	2,030,030	2,542	185	453	1,433,303	2,304,806	5,637,327

a Embracing clothing, women's; combs; cordage and twine; cutlery and edge tools; drugs and chemicals; fancy articles; fertilizers; flouring- and grist-mill products; hardware, saddlery; instruments, professional and scientific; iron and steel; lamps and reflectors; leather, curried; leather, tanned; liquors, malt; lumber, sawed; marble and stone work; masonry, brick and stone; mineral and soda waters; musical instruments and materials (not specified); oilcloth, floor; patent medicines and compounds; paving materials; roofing and roofing materials; rubber and elastic goods; saddlery and harness; sash, doors, and blinds; saws; sewing machines and attachments; shipbuilding; spectacles and eyeglasses; stone- and earthen-ware; straw goods; tinware, copperware, and sheet-iron ware; umbrella and canes; and wood, turned and carved.

CITY OF ELMIRA, N. Y.

[Statistics collected under the direction of E. B. PICKERING, Special Agent.]

All industries	263	$2,698,762	2,283	324	121	$1,024,161	$3,132,115	$4,877,300
Blacksmithing (see also Wheelwrighting)	14	20,400	19	....	....	7,470	6,317	24,895
Boots and shoes, including custom work and repairing	25	364,625	396	75	16	205,857	469,191	760,425
Bread and other bakery products	6	5,200	6	2	1	3,525	12,700	20,060
Carpentering	30	20,050	92	....	2	41,561	70,606	135,047
Carriages and wagons (see also Wheelwrighting)	6	162,300	59	....	....	29,060	40,800	86,200
Clothing, men's	8	135,000	82	127	3	63,670	170,212	260,250
Cooperage	5	5,800	11	....	....	4,197	4,925	11,900
Flouring- and grist-mill products	5	52,000	19	....	....	8,414	105,790	124,710
Foundery and machine-shop products	3	46,500	31	....	1	12,391	27,245	52,365
Furniture	4	98,000	68	2	3	37,140	63,200	167,000
Leather, tanned	4	205,000	69	....	....	25,900	450,852	540,600
Liquors, malt	3	139,922	18	....	....	7,664	38,959	69,506
Lumber, planed	6	170,000	39	....	....	13,312	170,000	207,900
Marble and stone work	9	81,150	52	2	....	21,393	52,613	95,998
Masonry, brick and stone	10	8,500	86	....	....	42,700	49,218	113,169
Painting and paperhanging	22	16,375	76	....	2	25,692	27,840	73,750
Photographing	6	17,800	3	2	2	2,318	3,903	13,739
Plumbing and gasfitting	4	32,000	23	....	....	13,155	42,000	75,000
Printing and publishing	6	140,000	120	5	41	69,100	38,662	138,908
Pumps, not including steam pumps	3	11,000	8	....	1	2,375	8,200	13,000
Saddlery and harness	7	21,600	31	....	....	15,201	21,078	44,320
Tinware, copperware, and sheet-iron ware	12	40,600	110	56	4	45,839	67,768	131,900
Tobacco, cigars and cigarettes	22	69,850	117	10	14	43,817	112,822	211,000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	6	4,150	7	....	1	3,006	2,600	9,940
All other industries (a)	37	830,940	741	43	30	279,404	1,074,614	1,495,718

a Embracing agricultural implements; boxes, cigar; brick and tile, brooms and brushes; carpets, wood; confectionery; cutlery and edge tools; dentistry, mechanical; drain and sewer pipe; files; iron and steel; leather, curried; lime; looking-glass and picture frames; lumber, sawed; mattresses and spring beds; mineral and soda waters; mixed textiles; musical instruments, organs and materials; musical instruments, pianos and materials; roofing and roofing materials; sash, doors, and blinds; saws; show-cases; soap and candles; upholstering; vinegar; wirework; and woolen goods.

CITY OF ERIE, PA.

[Statistics collected under the direction of JOSEPH R. STERRETT, Special Agent.]

All industries	167	$4,730,503	3,284	207	276	$1,518,085	$4,879,319	$7,683,356
Blacksmithing	8	6,800	14	....	....	7,471	6,700	21,440
Boots and shoes, including custom work and repairing	6	77,700	86	16	8	54,397	91,817	161,867
Bread and other bakery products	4	33,000	14	....	2	9,300	29,870	60,026
Carpentering	14	51,900	124	....	2	56,485	137,725	227,794
Clothing, men's	6	113,000	91	126	....	57,120	136,000	225,740
Flouring- and grist-mill products	4	201,000	42	....	....	25,050	688,050	809,800
Foundery and machine-shop products	14	1,258,453	1,182	....	60	515,682	1,410,872	2,291,529
Furniture	4	60,500	43	....	1	17,800	27,300	72,900
Liquors, malt	5	187,000	43	....	....	20,950	107,500	195,500
Lumber, planed (see also Sash, doors, and blinds)	3	300,000	66	....	4	25,659	117,200	185,000
Malt	3	158,000	47	....	....	14,829	199,631	255,588
Painting and paperhanging	5	3,400	32	....	....	10,916	10,800	27,265
Plumbing and gasfitting	4	10,800	20	....	....	8,373	13,335	25,966
Printing and publishing	10	156,800	94	17	51	59,520	76,700	178,550
Pumps, not including steam pumps	4	37,500	18	....	....	7,240	15,289	29,501
Saddlery and harness	4	30,000	14	....	....	6,860	23,500	57,500
Sash, doors, and blinds (see also Lumber, planed)	5	88,000	50	....	1	23,360	39,578	73,760
Tinware, copperware, and sheet-iron ware	7	26,000	28	....	....	16,361	18,900	46,300
Tobacco, cigars and cigarettes	10	28,100	24	2	6	10,874	14,476	44,895
All other industries (a)	47	1,902,550	1,252	46	141	569,888	1,714,076	2,712,635

a Embracing brass castings; brick and tile; carriage and wagon materials; carriages and sleds, children's; carriages and wagons; cars, railroad, street, and repairs; clothing, women's; coffee and spices, roasted and ground; confectionery; cooperage; electroplating; glue; iron and steel; iron forgings; leather, curried; leather, tanned; lime; lumber, sawed; marble and stone work; matches; mattresses and spring beds; musical instruments and materials (not specified); photographing; roofing and roofing materials; scales and balances; shipbuilding; show-cases; soap and candles; springs, steel, car, and carriage; stone- and earthen-ware; washing-machines and clothes-wringers; wheelwrighting; wirework; wooden ware; and wood, turned and carved.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF EVANSVILLE, IND.

[Statistics collected under the direction of CHARLES H. MCCARER, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	313	$4, 733, 815	2, 945	337	387	$1, 365, 006	$4, 972, 690	$8, 091, 914
Agricultural implements	5	266, 414	111	....	7	53, 516	103, 481	233, 929
Blacksmithing (see also Wheelwrighting)	18	17, 250	27	....	....	8, 501	9, 960	32, 130
Boots and shoes, including custom work and repairing	35	26, 050	72	11	2	37, 314	61, 331	137, 260
Bread and other bakery products	16	30 300	26	1	6	10, 107	58, 056	86, 731
Brick and tile	4	43, 000	45	....	8	14, 250	8, 100	30, 100
Brooms and brushes	3	7, 000	21	2	5	7, 670	18, 900	37, 000
Carpentering	5	6, 850	20	....	....	8, 803	10, 382	25, 438
Carriages and wagons (see also Wheelwrighting)	6	67, 500	46	....	1	20, 900	35, 550	79, 300
Confectionery	4	6, 150	5	3	5	4, 052	25, 850	33, 680
Cooperage	12	102, 500	167	....	7	69, 421	76, 150	198, 310
Flouring- and grist-mill products	12	337, 800	91	....	....	48, 342	1, 167, 400	1, 348, 215
Foundery and machine-shop products	12	823, 253	330	....	8	166, 440	349, 418	734, 458
Furniture (see also Mattresses and spring beds)	5	303, 000	292	1	99	151, 714	223, 609	467, 000
Furniture, chairs	4	119, 200	117	24	42	46, 120	38, 952	113, 496
Leather, curried	4	82, 001	33	....	....	13, 344	170, 455	214, 950
Leather, tanned	4	63, 999	28	....	....	11, 965	137, 622	168, 000
Lumber, planed	5	104, 521	127	....	3	60, 774	190, 520	338, 178
Lumber, sawed	10	580, 350	376	....	25	134, 048	633, 050	958, 405
Marble and stone work	7	35, 827	55	....	4	27, 317	35, 803	82, 573
Mattresses and spring beds (see also Furniture)	3	13, 000	8	5	....	3, 000	5, 550	14, 300
Painting and paperhanging	11	6, 300	34	....	....	13, 443	14, 450	46, 400
Patent medicines and compounds	3	11, 500	3	1	1	1, 700	11, 500	25, 000
Printing and publishing	6	125, 500	127	5	21	75, 290	32, 901	146, 735
Saddlery and harness	17	134, 400	122	....	16	55, 028	178, 400	287, 260
Shipbuilding	8	16, 650	28	....	....	15, 770	40, 070	60, 955
Slaughtering and meat-packing, not including retail butchering	4	199, 000	75	....	....	11, 600	324, 623	346, 278
Stone- and earthen-ware	3	13, 300	14	....	1	5, 800	2, 850	14, 000
Tinware, copperware, and sheet-iron ware	16	120, 550	128	....	12	62, 224	105, 766	254, 131
Tobacco, cigars and cigarettes	16	26, 400	60	....	9	24, 253	29, 462	79, 043
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	11	15, 150	14	....	2	4, 948	5, 450	17, 700
All other industries (*a*)	44	1, 029, 100	343	284	103	197, 352	867, 079	1, 480, 959

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a Embracing bags, other than paper; baking and yeast powders; bookbinding and blank-book making; boxes, cigar; brass castings; clothing, men's; coffins, burial cases, and undertakers' goods; cotton goods; drain and sewer pipe; files; hats and caps; iron and steel; liquors, malt; liquors, vinous; lock- and gun-smithing; malt; mantles, slate, marble, and marbleized; mineral and soda waters; mixed textiles; models and patterns; musical instruments, organs and materials; paper; plumbing and gasfitting; pumps; safes, doors, and vaults, fire-proof; shirts; stencils and brands; tobacco, chewing, smoking, and snuff; trunks and valises; umbrellas and canes; vinegar; watch and clock repairing; wooden ware; and woolen goods.

CITY OF FALL RIVER, MASS.

[Statistics collected under the direction of WILLIAM J. BURT, Special Agent.]

All industries	258	$25, 076, 518	8, 232	6, 723	2, 130	$4, 659, 077	$10, 552, 192	$18, 913, 584
Blacksmithing	29	30, 970	70	....	4	29, 552	23, 550	80, 000
Boots and shoes, including custom work and repairing	20	3, 950	23	....	....	8, 733	6, 730	20, 928
Bread and other bakery products	10	10, 500	24	4	....	11, 874	13, 500	33, 000
Carpentering	15	15, 050	188	....	....	54, 861	178, 250	254, 750
Carriages and wagons	6	18, 400	35	....	....	8, 900	17, 700	40, 700
Clothing, men's	10	30, 500	17	28	....	16, 300	27, 700	65, 500
Coffins, burial cases, and undertakers' goods	5	20, 000	10	....	....	6, 000	30, 000	50, 000
Cotton goods	33	22, 707, 043	5, 677	6, 462	1, 988	3, 705, 420	8, 110, 736	14, 510, 007
Dentistry, mechanical	5	8, 500	9	....	....	4, 500	9, 000	24, 000
Foundery and machine-shop products	17	284, 255	334	38	3	132, 403	166, 897	363, 707
Liquors, malt	3	121, 000	58	....	....	27, 670	139, 850	234, 184
Lumber, planed	3	10, 100	17	....	....	5, 160	2, 200	11, 500
Masonry, brick and stone	5	5, 400	148	....	....	29, 400	24, 650	62, 530
Painting and paperhanging	14	28, 750	107	....	1	22, 710	33, 850	86, 905
Photographing	6	7, 000	....	9	....	2, 700	4, 000	12, 000
Plumbing and gasfitting	4	13, 300	54	....	2	16, 580	67, 300	118, 100
Printing and publishing	7	66, 400	57	7	2	28, 457	39, 000	90, 800
Saddlery and harness	5	8, 200	18	....	....	6, 950	13, 000	25, 752
Slaughtering and meat-packing, not including retail butchering	4	100, 000	53	....	....	21, 500	360, 650	425, 135
Tinware, copperware, and sheet-iron ware	12	10, 400	36	....	....	12, 634	30, 499	58, 078
Watch and clock repairing	7	21, 000	10	....	....	7, 500	10, 000	30, 000
All other industries (*a*)	38	1, 555, 800	1, 287	175	130	499, 253	1, 243, 130	2, 316, 008

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a Embracing belting and hose, leather; bookbinding and blank-book making; boxes, fancy and paper; brooms and brushes; cooperage; cordage and twine; cotton-ties; drugs and chemicals; dyeing and finishing textiles; electroplating; files; flouring- and grist-mill products; furniture; hosiery and knit goods; iron and steel; lithographing; lumber, sawed; marble and stone work; sash, doors, and blinds; shipbuilding; soap and candles; steam fittings and heating apparatus; tobacco, cigars and cigarettes; upholstering; wood, turned and carved; and woolen goods.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF FORT WAYNE, IND.

[Statistics collected under the direction of MARTIN A. NOLLE, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	114	$2, 352, 101	2, 426	164	145	$1, 020, 793	$4, 007, 955	$5, 816, 924
Blacksmithing (see also Wheelwrighting)	6	8, 750	10	....	....	5, 540	3, 850	15, 800
Boots and shoes, including custom work and repairing)	11	5, 400	29	....	1	12, 812	13, 625	37, 000
Bread and other bakery products	4	34, 000	27	2	....	11, 232	83, 906	109, 385
Carpentering	3	13, 500	72	....	....	24, 600	43, 250	83, 000
Carriages and wagons (see also Wheelwrighting)	4	25, 000	46	....	1	18, 000	27, 000	56, 600
Cooperage	3	10, 900	12	....	4	4, 980	5, 950	17, 000
Flouring- and grist-mill products	5	105, 000	33	....	....	17, 440	473, 150	532, 265
Foundery and machine-shop products	5	785, 000	900	....	45	387, 000	1, 941, 400	2, 529, 000
Furniture	5	71, 000	35	....	1	17, 515	33, 100	70, 300
Liquors, malt	3	95, 000	23	....	....	10, 710	46, 240	85, 438
Lumber, sawed	5	295, 000	282	....	30	93, 100	285, 300	458, 300
Marble and stone work	3	15, 000	17	....	....	10, 550	9, 500	29, 500
Printing and publishing	5	68, 500	88	1	43	45, 780	70, 700	157, 000
Saddlery and harness	11	29, 200	38	....	....	16, 725	53, 400	90, 500
Tinware, copperware, and sheet-iron ware	4	9, 800	15	....	....	7, 750	14, 200	27, 500
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	9	16, 650	35	....	1	17, 700	14, 750	44, 700
All other industries (*a*)	28	764, 401	764	161	19	319, 359	888, 634	1, 473, 636

a Embracing agricultural implements; bookbinding and blank-book making; brooms and brushes; carriage and wagon materials; clothing, men's; coffee and spices, roasted and ground; confectionery; files; handles, wooden; iron work, architectural and ornamental; leather, curried; leather, tanned; lumber, planed; masonry, brick and stone; oil, linseed; painting and paperhanging; patent medicines and compounds; plumbing and gasfitting; pumps; sash, doors, and blinds; shirts; trunks and valises; upholstering; and woolen goods.

CITY OF GALVESTON, TEX.

[Statistics collected under the direction of EDWARD J. BYRNE, Special Agent.]

All industries	170	$871, 350	633	15	36	$499, 785	$1, 283, 246	$2, 375, 965
Blacksmithing	14	32, 700	20	....	2	14, 975	18, 880	52, 525
Boots and shoes, including custom work and repairing	21	6, 800	19	....	....	14, 050	34, 875	78, 050
Bread and other bakery products	8	15, 200	19	....	....	13, 511	59, 300	96, 300
Carpentering	8	14, 800	38	....	....	28, 500	48, 750	101, 600
Confectionery	3	61, 500	18	....	3	15, 300	86, 000	146, 600
Cooperage	8	18, 300	42	....	....	35, 850	81, 000	147, 000
Flouring- and grist-mill products	4	97, 000	22	....	....	15, 290	257, 168	313, 340
Foundery and machine-shop products	4	76, 000	57	....	....	32, 336	51, 500	103, 000
Furniture	11	7, 450	8	....	3	5, 425	4, 225	23, 600
Painting and paperhanging	10	24, 450	33	....	....	29, 050	30, 300	81, 500
Patent medicines and compounds	3	9, 000	6	....	....	5, 250	16, 500	35, 500
Photographing	4	7, 300	4	3	....	5, 100	2, 950	20, 200
Plumbing and gasfitting	3	21, 500	18	....	2	17, 050	24, 400	52, 900
Printing and publishing	5	287, 000	107	6	21	112, 593	52, 738	230, 500
Saddlery and harness	5	19, 900	13	....	....	9, 525	24, 600	42, 850
Shipbuilding	4	1, 300	1	....	....	1, 430	4, 060	6, 000
Tinware, copperware, and sheet-iron ware	9	51, 000	32	....	....	29, 000	84, 500	150, 000
Tobacco, cigars and cigarettes	18	15, 700	56	....	....	43, 950	53, 200	178, 850
All other industries (*a*)	28	104, 450	120	6	5	71, 600	348, 300	515, 650

a Embracing bags, other than paper; boxes, fancy and paper; carriages and wagons; coffins, burial cases, and undertakers' goods; clothing, men's; drain and sewer pipe; hand-stamps; hats and caps, not including wool hats; looking-glass and picture frames; marble and stone work; mattresses and spring beds; mineral and soda waters; musical instruments, pianos and materials; perfumery and cosmetics; pickles, preserves, and sauces; safes, doors, and vaults, fire-proof; sash, doors, and blinds; shirts; show-cases; stencils and brands; and umbrellas and canes.

CITY OF GRAND RAPIDS, MICH.

[Statistics collected under the direction of GEORGE W. GAGE, Special Agent.]

All industries	355	$4, 864, 298	4, 509	295	368	$1, 895, 072	$3, 956, 663	$7, 405, 007
Agricultural implements	7	259, 525	197	3	15	72, 978	163, 166	303, 029
Blacksmithing (see also Wheelwrighting)	18	9, 425	19	....	....	10, 200	11, 520	32, 974
Boots and shoes, including custom work and repairing	18	28, 310	45	3	....	27, 270	53, 130	101, 292
Bread and other bakery products	14	80, 750	57	4	3	31, 420	195, 050	253, 500
Carpentering	14	21, 100	98	5	....	46, 385	89, 863	162, 492
Carriages and wagons (see also Wheelwrighting)	9	88, 500	92	....	1	41, 790	75, 930	138, 822
Clothing, men's	9	118, 920	106	89	....	62, 150	165, 329	323, 742
Coffins, burial cases, and undertakers' goods	3	71, 300	86	....	1	37, 048	33, 929	119, 308
Confectionery	4	53, 075	72	18	5	28, 774	124, 650	165, 000
Cooperage	9	27, 650	49	....	....	17, 503	48, 451	75, 058
Drugs and chemicals (see also Patent medicines and compounds)	3	65, 500	35	1	1	11, 590	34, 536	78, 427
Files	3	3, 200	18	....	....	8, 900	10, 700	22, 000
Flouring- and grist-mill products	5	129, 500	33	....	....	17, 550	356, 775	398, 988
Foundery and machine-shop products	13	267, 971	276	....	....	133, 499	188, 451	384, 611
Furniture	11	1, 313, 156	1, 702	6	99	647, 537	823, 086	1, 831, 172
Liquors, malt	7	278, 000	65	....	....	29, 883	128, 553	229, 526
Looking-glass and picture frames	4	10, 600	9	5	....	5, 950	14, 650	30, 518
Lumber, sawed	8	1, 014, 685	252	....	....	79, 099	457, 259	755, 476
Marble and stone work	4	8, 500	11	....	....	4, 644	9, 300	20, 800
Masonry, brick and stone	8	17, 300	89	....	....	26, 538	49, 055	83, 320
Painting and paperhanging	11	8, 500	41	....	....	18, 270	24, 940	54, 475
Patent medicines and compounds (see also Drugs and chemicals)	4	3, 100	3	....	....	1, 490	3, 600	9, 132
Photographing	10	13, 850	11	6	....	7, 974	6, 180	26, 423
Plumbing and gasfitting	4	16, 350	16	....	....	9, 194	27, 322	46, 630
Printing and publishing	20	93, 450	151	3	57	79, 250	46, 662	168, 324

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF GRAND RAPIDS, MICH.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Saddlery and harness	10	$15, 150	40	....	1	$16, 628	$36, 100	$62, 156
Sash, doors, and blinds	6	66, 500	96	....	1	38, 489	93, 396	160, 043
Tinware, copperware, and sheet-iron ware	10	26, 600	53	....	....	28, 274	48, 775	93, 740
Tobacco, cigars and cigarettes	18	39, 800	63	5	8	26, 445	74, 655	124, 463
Upholstering materials	3	13, 500	7	....	4	4, 200	7, 806	18, 425
Watch and clock repairing	12	4, 650	15	....	....	9, 776	5, 375	23, 972
Wirework	3	1, 100	1	....	....	700	1, 900	4, 124
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	13	8, 400	26	....	4	11, 700	13, 250	35, 448
All other industries (*a*)	60	686, 381	675	147	168	301, 974	533, 319	1, 067, 597

a Embracing awnings and tents; baking and yeast powders; baskets, rattan and willow ware; belting and hose, leather; bookbinding and blank-book making; boxes, cigar; boxes, wooden, packing; brick and tile; brooms and brushes; carriages and sleds, children's; carriage and wagon materials; corsets; cutlery and edge tools; electroplating; engraving and die-sinking; fertilizers; flavoring extracts; furs, dressed; gloves and mittens; hats and caps; housefurnishing goods; instruments, professional and scientific; iron work, architectural and ornamental; lime; lock- and gun-smithing; lumber, planed; mattresses and spring beds; mineral and soda waters; musical instruments, organs and materials; pumps; roofing and roofing materials; saws; sewing machines and attachments; shirts; soap and candles; sporting goods; steam fittings and heating apparatus; stencils and brands; stone- and earthen-ware; surgical appliances; toys and games; upholstering; wood, turned and carved; wooden ware; and woolen goods.

CITY OF HARRISBURG, PA.

[Statistics collected under the direction of JOHN T. BOYLE, Special Agent.]

All industries	274	$4, 026, 457	3, 243	264	153	$1, 236, 522	$4, 975, 276	$7, 663, 416
Blacksmithing (see also Wheelwrighting)	15	8, 850	17	....	....	5, 375	5, 150	19, 700
Boots and shoes, including custom work and repairing	30	50, 775	62	21	....	26, 390	51, 534	107, 456
Bread and other bakery products	31	37, 750	45	2	2	13, 198	81, 895	125, 322
Brick and tile	8	136, 000	125	....	42	36, 785	48, 850	113, 700
Brooms and brushes	3	4, 000	9	....	3	4, 422	15, 700	30, 000
Carpentering	21	13, 075	53	....	....	19, 898	47, 238	89, 225
Carpets, rag	3	2, 500	4	....	1	1, 514	2, 300	5, 550
Carriages and wagons (see also Wheelwrighting)	5	34, 150	39	....	....	15, 154	10, 304	33, 960
Confectionery	6	11, 600	12	2	1	6, 363	22, 400	35, 700
Foundery and machine-shop products	3	145, 000	128	5	....	49, 100	87, 880	174, 000
Furniture (see also Upholstering)	4	900	2	....	....	300	800	4, 000
Iron and steel	8	2, 021, 692	1, 076	....	51	445, 507	1, 896, 916	2, 839, 500
Liquors, malt	3	80, 000	18	....	....	8, 370	47, 050	85, 500
Looking-glass and picture frames	3	2, 700	1	....	....	150	1, 600	3, 300
Lumber, planed	5	205, 000	59	....	2	26, 187	59, 797	110, 019
Marble and stone work	4	6, 200	11	....	....	4, 260	6, 900	16, 800
Painting and paperhanging	17	18, 800	56	1	4	21, 103	26, 950	71, 100
Photographing	3	14, 500	14	3	....	7, 556	4, 600	20, 132
Plumbing and gasfitting	12	16, 650	36	....	....	11, 967	17, 000	53, 993
Printing and publishing	9	172, 550	192	43	5	103, 125	294, 150	465, 920
Saddlery and harness	5	5, 050	6	....	....	2, 800	8, 150	14, 700
Tinware, copperware, and sheet-iron ware	13	16, 900	29	....	....	10, 540	21, 980	46, 000
Tobacco, cigars and cigarettes	24	28, 650	66	11	5	22, 021	34, 473	79, 730
Upholstering (see also Furniture)	5	3, 250	7	1	....	1, 230	2, 600	6, 600
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	5	3, 250	9	....	....	2, 861	1, 650	7, 000
All other industries (*a*)	29	986, 665	1, 167	175	37	390, 346	2, 177, 409	3, 104, 509

a Embracing agricultural implements; bookbinding and blank-book making; boxes, cigar; cars, railroad, street, and repairs; cotton goods; engraving and die-sinking; flouring- and grist-mill products; furnishing goods, men's; glue; hats and caps; iron forgings; iron railing, wrought; leather, curried; leather, dressed skins; leather, tanned; lock- and gun-smithing; lumber, sawed; millstones; models and patterns; patent medicines and compounds; shipbuilding; soap and candles; stencils and brands; varnish; and wood, turned and carved.

CITY OF HARTFORD, CONN.

[Statistics collected under the direction of GEORGE D. BATES, Special Agent.]

All industries	268	$9, 679, 126	4, 573	1, 373	354	$2, 848, 041	$6, 467, 460	$11, 437, 200
Blacksmithing	11	7, 515	22	....	....	13, 127	9, 610	37, 000
Boots and shoes, including custom work and repairing	4	142, 300	91	30	5	29, 345	270, 770	369, 100
Bread and other bakery products	12	34, 500	53	3	8	31, 911	147, 294	214, 012
Brick and tile	3	11, 050	20	....	3	10, 200	10, 230	27, 480
Brooms and brushes	3	14, 500	12	6	....	7, 000	15, 450	36, 985
Carpentering	12	51, 450	227	....	....	87, 500	186, 500	311, 800
Carriages and wagons	7	54, 050	81	....	....	34, 428	40, 288	97, 531
Clothing, men's	49	112, 686	300	100	40	157, 205	330, 834	657, 212
Coffee and spices, roasted and ground	3	65, 000	14	8	....	11, 000	153, 000	195, 000
Coffins, burial cases, and undertakers' goods	4	89, 200	44	....	....	25, 900	25, 100	93, 000
Dentistry, mechanical	5	9, 500	7	....	1	4, 500	8, 300	24, 250
Flouring- and grist-mill products	3	122, 000	45	....	....	25, 168	401, 448	465, 296
Foundery and machine-shop products	12	1, 007, 000	671	....	....	367, 433	288, 387	821, 705
Furniture	4	41, 200	49	1	....	26, 772	39, 000	78, 900
Furs, dressed	5	33, 000	12	63	....	13, 386	37, 474	66, 782
Liquors, malt	4	170, 000	32	....	....	15, 436	87, 117	146, 344
Looking-glass and picture frames	4	26, 500	16	1	....	9, 925	24, 000	38, 500
Marble and stone work	7	266, 100	55	....	1	30, 500	24, 787	85, 942
Masonry, brick and stone	4	7, 500	59	....	2	24, 200	34, 300	67, 700
Painting and paperhanging	7	10, 300	52	....	....	29, 860	30, 200	77, 000
Photographing	4	21, 000	14	5	....	7, 290	8, 800	27, 458
Plated and britannia ware	3	63, 500	93	10	2	33, 591	150, 500	237, 175
Printing and publishing	12	929, 700	269	78	16	196, 294	173, 422	513, 600
Roofing and roofing materials	3	11, 100	40	....	....	19, 292	88, 521	112, 500
Saddlery and harness	7	47, 575	117	35	8	70, 456	202, 980	306, 589

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF HARTFORD, CONN.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Shirts	3	$7, 250	4	50		$11, 050	$16, 854	$37, 520
Tinware, copperware, and sheet-iron ware	6	21, 000	32			17, 041	32, 055	60, 930
Tobacco, cigars and cigarettes	9	13, 800	47	7	1	26, 845	29, 193	73, 632
All other industries (*a*)	58	6, 288, 850	2, 095	976	267	1, 502, 386	3, 606, 046	6, 156, 257

a Embracing agricultural implements; awnings and tents; belting and hose, leather; bookbinding and blank-book making; boot and shoe uppers; boxes, cigar; boxes, fancy and paper; boxes, wooden, packing; carriages and sleds, children's; confectionery; corsets; dyeing and cleaning; dyestuffs and extracts; electroplating; engraving, steel; envelopes; files; fire-arms; gold and silver leaf and foil; hairwork; hardware; hardware, saddlery; iron forgings; lamps and reflectors; lithographing; liquors, distilled; lumber, planed; mattresses and spring beds; models and patterns; patent medicines and compounds; plumbing and gasfitting; pumps; sash, doors, and blinds; screws; sewing machines and attachments; soap and candles; steam fittings and heating apparatus; stereotyping and electrotyping; stone- and earthen-ware; silk and silk goods; trunks and valises; wirework; and wood, turned and carved.

CITY OF HOBOKEN, N. J.

[Statistics collected under the direction of DANIEL VAN WINKLE, jr., Chief Special Agent.]

All industries	121	$486, 320	613	59	51	$283, 694	$588, 756	$1, 051, 136
Blacksmithing (see also Wheelwrighting)	6	6, 750	9			5, 300	6, 600	17, 650
Boots and shoes, including custom work and repairing	11	4, 830	6			2, 875	7, 875	16, 450
Bread and other bakery products	17	46, 300	33	7	5	18, 525	88, 710	128, 050
Carpentering	8	6, 290	27			13, 176	24, 976	49, 151
Clothing, men's	8	8, 000	23	6	1	8, 673	13, 200	30, 100
Foundery and machine-shop products	3	123, 000	129		4	49, 255	88, 807	141, 056
Painting and paperhanging	5	19, 800	40			22, 098	22, 300	57, 782
Plumbing and gasfitting	3	6, 500	21			8, 822	12, 900	25, 300
Sash, doors, and blinds	3	8, 200	29			21, 100	31, 500	61, 000
Silk and silk goods	4	74, 300	124	33	33	43, 530	49, 970	101, 000
Tobacco, cigars and cigarettes	19	22, 950	26	1	5	13, 801	33, 708	66, 670
Wheelwrighting (see also Blacksmithing)	4	8, 500	21			9, 900	10, 550	27, 000
All other industries (*a*)	30	150, 900	125	12	3	66, 639	197, 660	329, 927

a Embracing boxes, wooden, packing; confectionery; cooperage; drugs and chemicals; dyeing and cleaning; dyeing and finishing textiles; furniture; iron railings, wrought; kindling wood; liquors, malt; looking-glass and picture frames; lumber, planed; marble and stone work; mineral and soda waters; mixed textiles; printing and publishing; saddlery and harness; shirts; soap and candles; tinware, copperware, and sheet-iron ware; varnish; vinegar; and wood, turned and carved.

CITY OF HOLYOKE, MASS.

[Statistics collected under the direction of ALLEN HIGGINBOTTOM, Special Agent.]

All industries	123	$8, 913, 903	4, 433	3, 861	717	$2, 743, 142	$7, 739, 573	$13, 667, 327
Blacksmithing	4	5, 900	19			7, 633	4, 700	17, 500
Boots and shoes, including custom work and repairing	5	4, 900	8		1	4, 141	1, 900	9, 096
Brick and tile	3	26, 000	104			22, 600	22, 375	49, 294
Carpentering	8	7, 755	93			28, 501	75, 433	115, 510
Carriages and wagons	3	17, 000	34			18, 475	16, 000	43, 000
Clothing, men's	5	4, 300	10	10		5, 428	8, 400	18, 150
Cotton goods	5	2, 810, 000	852	1, 481	429	717, 752	1, 419, 149	3, 088, 851
Foundery and machine-shop products	11	282, 500	499		2	206, 124	218, 820	521, 592
Painting and paperhanging	8	12, 975	41		5	14, 887	15, 500	37, 400
Paper	17	3, 476, 979	988	1, 500	13	793, 934	2, 709, 075	4, 610, 947
Printing and publishing	5	20, 300	34	6	1	14, 170	7, 181	30, 628
Tinware, copperware, and sheet-iron ware	6	22, 500	45			18, 280	53, 000	79, 822
Woolen goods	4	895, 794	448	199	127	220, 382	423, 958	809, 851
All other industries (*a*)	39	1, 327, 000	1, 258	665	139	670, 835	2, 764, 082	4, 235, 686

a Embracing bags, paper; belting and hose, leather; brass castings; cutlery and edge tools; dyeing and finishing textiles; fertilizers; files; flouring- and grist-mill products; glue; lithographing; lumber, planed; lumber, sawed; marble and stone work; mattresses and spring beds; mixed textiles; patent medicines and compounds; plumbing and gasfitting; postal cards; rubber and elastic goods; saddlery and harness; sash, doors, and blinds; screws; shoddy; silk and silk goods; slaughtering and meat-packing; soap and candles; steam fittings and heating apparatus; tobacco, cigars and cigarettes; watch and clock repairing; wire; wirework; wood pulp; wood, turned and carved; and worsted goods.

CITY OF INDIANAPOLIS, IND.

[Statistics collected under the direction of J. M. RIDENOUR, Chief Special Agent.]

All industries	688	$10, 049, 500	8, 671	830	499	$3, 917, 114	$19, 198, 102	$27, 453, 089
Agricultural implements	3	41, 000	55			11, 400	31, 200	55, 500
Baking and yeast powders (see also Drugs and chemicals)	3	5, 500	16	2		6, 620	35, 000	56, 500
Baskets, rattan and willow ware	3	850	5			790	1, 150	4, 720
Blacksmithing (see also Wheelwrighting)	22	14, 600	44		1	19, 633	24, 994	70, 112
Boots and shoes, including custom work and repairing	79	24, 495	114	4	1	47, 398	65, 804	176, 973
Boxes, wooden, packing	3	37, 300	52			20, 020	43, 200	118, 200
Bread and other bakery products	25	95, 900	142	27	6	75, 821	234, 110	423, 071
Brick and tile	8	86, 300	117		10	38, 950	34, 118	101, 000
Brooms and brushes	5	13, 900	38	8	17	10, 892	27, 604	55, 350
Carpentering	22	60, 575	235		29	89, 225	221, 484	384, 460
Carpets, rag	7	6, 550	5	7	2	4, 347	12, 350	21, 850
Carriages and wagons (see also Wheelwrighting)	14	248, 500	260		3	78, 400	115, 600	250, 400
Clothing, men's	27	172, 410	219	127	1	165, 235	375, 410	658, 960
Coffee and spices, roasted and ground	4	63, 000	24	4		10, 150	197, 450	290, 100
Coffins, burial cases, and undertakers' goods	5	67, 000	61			28, 464	43, 800	99, 140

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF INDIANAPOLIS, IND.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Confectionery	12	$90, 750	54	24	6	$29, 568	$181, 835	$273, 200
Cooperage	13	277, 700	520		75	153, 100	812, 475	1, 107, 582
Dentistry, mechanical	16	10, 780	9	6	1	5, 212	8, 670	38, 921
Drugs and chemicals (see also Baking and yeast powders)	6	62, 700	35	26		22, 450	56, 000	113, 000
Dyeing and cleaning	6	4, 850	16	24		12, 350	9, 900	32, 900
Dyeing and finishing textiles	5	4, 400	15	24		12, 100	9, 850	32, 000
Electroplating	3	1, 400	3			1, 218	1, 150	4, 550
Fertilizers	5	103, 000	94			41, 424	714, 000	920, 000
Flouring- and grist-mill products	12	462, 000	110			56, 654	1, 511, 885	1, 655, 517
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	15	1, 188, 000	1, 275	4	34	534, 090	742, 000	1, 736, 000
Furniture (see also Mattresses and spring beds; Upholstering)	17	357, 900	488	7	57	197, 083	582, 212	917, 600
Hardware	4	3, 295	3			1, 500	3, 575	8, 500
Hats and caps, not including wool hats	3	2, 725	5	3		3, 500	7, 800	15, 420
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	3	103, 000	126			41, 600	79, 191	136, 592
Liquors, malt	3	400, 000	148			66, 036	280, 558	508, 740
Looking-glass and picture frames	8	36, 050	37	1	6	21, 830	51, 800	90, 500
Lumber, sawed	6	255, 500	116		10	44, 400	348, 600	497, 200
Marble and stone work	11	46, 050	91		5	47, 700	112, 985	237, 265
Masonry, brick and stone	4	22, 000	104		1	67, 625	108, 300	200, 000
Mattresses and spring beds (see also Furniture)	4	10, 700	25	1	1	11, 300	26, 440	53, 900
Millinery and lace goods	6	37, 000		69		12, 100	78, 000	132, 000
Painting and paperhanging	16	38, 800	111	39	1	70, 929	179, 350	301, 050
Photographing	19	20, 000	20	8	1	10, 185	11, 650	45, 800
Plumbing and gasfitting	9	19, 400	52			22, 635	38, 960	76, 300
Printing and publishing	24	446, 320	541	75	21	322, 302	301, 652	811, 377
Pumps, not including steam pumps	4	20, 650	44		1	17, 289	35, 000	71, 500
Roofing and roofing materials	4	13, 200	13			5, 288	41, 500	71, 500
Saddlery and harness	19	42, 500	85		3	39, 509	104, 600	193, 300
Sash, doors, and blinds (see also Wood, turned and carved)	8	306, 500	178	1	24	87, 945	261, 000	442, 000
Saws	3	112, 000	64			56, 050	161, 000	291, 000
Shirts	4	12, 300	11	45	6	21, 260	24, 800	59, 600
Slaughtering and meat-packing, not including retail butchering	7	1, 618, 000	892			345, 236	7, 890, 208	9, 014, 422
Soap and candles	3	12, 500	21			6, 600	33, 000	47, 500
Stencils and brands	3	1, 800	10		2	5, 400	5, 200	18, 000
Tinware, copperware, and sheet-iron ware	28	62, 760	117	2	13	50, 562	124, 305	240, 461
Tobacco, cigars and cigarettes	43	52, 025	189	9	34	83, 776	121, 482	298, 950
Trunks and valises	6	20, 600	47		1	18, 012	26, 600	60, 500
Upholstering (see also Furniture)	6	13, 425	24	2	1	12, 800	46, 000	72, 500
Watch and clock repairing	12	11, 850	14	1	3	10, 192	5, 770	30, 400
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	24	33, 365	64		3	21, 769	29, 815	77, 579
Window blinds and shades	3	22, 000	28	1		10, 900	32, 000	59, 000
Wood, turned and carved (see also Sash, doors, and blinds)	3	15, 000	44		1	20, 127	43, 155	93, 500
Wooden ware	3	124, 000	107	32	37	55, 250	59, 000	158, 000
All other industries (a)	45	2, 612, 825	1, 334	247	81	632, 933	2, 431, 535	3, 501, 107

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[a] Embracing awnings and tents; belting and hose, leather; boxes, paper; carriage and wagon materials; cheese and butter (factory); clothing, women's; cotton goods; engraving, wood; fruits and vegetables, canned and preserved; furniture, chairs; glue; grease and tallow; hairwork; hosiery and knit goods; iron and steel; liquors, distilled; lock- and gun-smithing; mineral and soda waters; oil, lard; oil, linseed; paper; patent medicines and compounds; regalia and society banners and emblems; starch; surgical apparatus; telegraph and telephone apparatus; varnish; and woolen goods.

JERSEY CITY, N. J.

[Statistics collected under the direction of DANIEL VAN WINKLE, Chief Special Agent. See Note on page 379.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	584	$11, 899, 915	7, 962	2, 426	750	$4, 622, 655	$49, 738, 985	$60, 473, 905
Blacksmithing (see also Wheelwrighting)	40	32, 500	75		3	38, 013	29, 285	108, 420
Boots and shoes, including custom work and repairing	39	29, 415	39	3	2	16, 451	34, 138	79, 200
Brass castings	4	180, 600	111		4	47, 729	89, 781	157, 886
Bread and other bakery products	46	75, 150	109	13	3	61, 238	322, 104	459, 888
Carpentering	42	41, 800	189	4	5	94, 420	170, 382	330, 521
Carriages and wagons (see also Wheelwrighting)	6	22, 600	41		2	22, 100	28, 000	69, 000
Clothing, men's	22	59, 000	91	12	4	51, 723	179, 425	294, 000
Confectionery	6	24, 500	12	7	16	11, 592	41, 340	70, 790
Cooperage	6	167, 700	281		11	103, 748	377, 546	630, 529
Dentistry, mechanical	4	9, 500	7		2	4, 825	10, 500	24, 850
Drugs and chemicals	8	560, 000	243	2	4	124, 645	1, 266, 202	1, 517, 214
Foundery and machine-shop products	23	768, 300	604	12	5	303, 847	510, 514	1, 041, 471
Furniture (see also Mattresses and spring beds; Upholstering)	3	3, 600	17			4, 700	6, 700	19, 300
Iron and steel	3	850, 000	403		12	210, 000	771, 340	1, 464, 500
Iron railing, wrought	3	2, 200	4		1	1, 910	1, 975	5, 900
Kindling wood	4	28, 400	29		3	11, 250	18, 600	36, 500
Liquors, malt	5	356, 500	101			45, 399	235, 874	416, 886
Lock- and gun-smithing	4	550	1			225	1, 450	4, 200
Marble and stone work	12	35, 850	87		3	38, 150	48, 000	120, 200
Masonry, brick and stone	5	23, 400	110		1	50, 500	36, 900	112, 750
Mattresses and spring beds (see also Furniture)	5	25, 000	41	5	4	12, 878	46, 476	75, 000
Painting and paperhanging	30	40, 350	151		1	69, 890	60, 400	165, 970
Photographing	14	39, 800	37	10	2	20, 870	25, 750	75, 950
Plumbing and gasfitting	24	46, 650	65		10	32, 565	79, 283	146, 762
Printing and publishing	5	66, 200	85		8	42, 337	28, 466	100, 174

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

JERSEY CITY, N. J.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Saddlery and harness	9	$5, 150	4			$2, 100	$5, 550	$13, 400
Sash, doors, and blinds (see also Wood, turned and carved)	6	28, 000	32		1	15, 024	52, 508	85, 372
Shipbuilding	25	263, 500	360			237, 542	217, 712	541, 766
Shirts	4	8, 600	4	30		5, 500	26, 400	38, 225
Slaughtering and meat-packing, not including retail butchering	20	1, 272, 200	423		10	303, 800	17, 404, 689	18, 551, 783
Sugar and molasses, refined	3	2, 100, 000	680		5	473, 316	20, 759, 961	22, 799, 614
Tinware, copperware, and sheet-iron ware	24	62, 400	79		4	37, 910	63, 500	133, 814
Tobacco, cigars and cigarettes	40	80, 125	127	1	7	55, 507	83, 454	185, 703
Upholstering (see also Furniture)	8	4, 450	11		3	5, 237	11, 476	23, 150
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	17	15, 700	40		3	20, 050	19, 650	60, 100
Wood, turned and carved (see also Sash, doors, and blinds)	3	13, 500	34			11, 500	27, 700	52, 000
All other industries (a)	62	4, 556, 725	3, 235	2, 327	611	2, 030, 164	6, 645, 954	10, 461, 117

a Embracing awnings and tents; baskets, rattan and willow ware; billiard tables and materials; boxes, wooden, packing; bridges; coffins, burial cases, and undertakers' goods; coppersmithing; corsets; crucibles; dyeing and cleaning; explosives and fireworks; fancy articles; flouring- and grist-mill products; hardware; hosiery and knit goods; ink; iron bolts, nuts, washers, and rivets; iron forgings; iron pipe, wrought; iron doors and shutters; ivory and bone work; lamps and reflectors; lard, refined; leather, curried; leather, tanned; looking-glass and picture frames; mineral and soda waters; models and patterns; oil, castor; paints; paper; patent medicines and compounds; pencils, lead; pumps; rubber and elastic goods; silk and silk goods; soap and candles; sporting goods; steam fittings and heating apparatus; stone- and earthen-ware; tobacco, chewing, smoking, and snuff; trunks and valises; umbrellas and canes; watch and clock repairing; wheelbarrows; window blinds and shades; wirework; and zinc.

KANSAS CITY, MO.

[Statistics collected under the direction of E. J. NICKERSON, Special Agent.]

All industries	224	$2, 147, 305	2, 127	233	188	$1, 426, 713	$3, 723, 916	$6, 382, 681
Blacksmithing (see also Wheelwrighting)	17	13, 850	47		1	29, 800	18, 000	73, 200
Boots and shoes, including custom work and repairing)	18	7, 575	42		2	24, 600	21, 225	63, 281
Bread and other bakery products	8	82, 700	76	20	5	56, 350	284, 600	366, 300
Brick and tile	15	75, 000	315		87	163, 020	51, 392	369, 900
Brooms and brushes	3	1, 700	12		2	5, 300	5, 725	17, 000
Carpentering	26	45, 150	279			202, 300	447, 050	775, 500
Carriages and wagons (see also Wheelwrighting)	5	29. 000	44			25, 800	41, 900	105, 000
Clothing, men's	5	41, 344	71	4		48, 334	96, 120	165, 436
Confectionery	5	6, 200	10	4	4	8, 250	14, 800	27, 000
Flouring- and grist-mill products	4	71, 500	56			27, 300	581, 400	683, 450
Foundery and machine-shop products	8	221, 500	207		8	129, 770	243, 500	471, 000
Furniture	7	2, 825	13			8, 050	14, 200	30, 000
Lumber, planed	4	46, 000	71			43, 800	92, 000	206, 000
Marble and stone work	4	16, 200	29		2	15, 300	26, 100	54, 000
Painting and paperhanging	5	4, 100	28			18, 920	22, 570	55, 500
Paints	3	120, 000	41			20, 000	180, 000	255, 000
Photographing	3	6, 750	9	2		6, 400	4, 350	18, 600
Printing and publishing	4	255, 000	159	49	12	152, 800	130, 600	432, 000
Saddlery and harness	8	23, 400	35	1		19, 156	46, 580	85, 500
Slaughtering and meat-packing, not including retail butchering	3	437, 500	253		35	166, 500	739, 071	965, 000
Tinware, copperware, and sheet-iron ware	4	11, 400	18			8, 550	20, 450	37, 000
Tobacco, cigars and cigarettes	13	70, 200	75		9	50, 860	109, 050	210, 600
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	4	6, 500	12			5, 800	4, 400	14, 100
All other industries (a)	48	551, 911	225	153	21	183, 753	529, 433	902, 314

a Embracing awnings and tents; bags, other than paper; baking and yeast powders; bookbinding and blank-book making; boxes, wooden, packing; carpets, rag; cement; cheese and butter (factory); clothing, women's; drain and sewer pipe; engraving and die-sinking; furniture, chairs; hand-stamps; hats and caps; iron work, architectural and ornamental; liquors, distilled; liquors, malt; looking-glass and picture frames; mattresses and spring beds; mineral and soda waters; models and patterns; patent medicines and compounds; refrigerators; roofing and roofing materials; shipbuilding; shirts; show-cases; soap and candles; tools; trunks and valises; upholstering; vinegar; watch and clock repairing; and wire.

CITY OF LANCASTER, PA.

[Statistics collected under the direction of WILLIAM H. LEBKICHER, Special Agent.]

All industries	313	$3, 792, 740	2, 741	1, 044	467	$1, 177, 249	$2, 942, 312	$5, 404, 937
Blacksmithing (see also Wheelwrighting)	14	8, 925	8		3	3, 826	5, 303	21, 708
Boots and shoes, including custom work and repairing	13	23, 400	30	2		12, 977	17, 105	40, 033
Boxes, cigar	5	18, 450	9	16	6	7, 184	19, 681	32, 193
Bread and other bakery products	24	31, 150	24	2	10	10, 928	61, 763	98, 234
Brick and tile	8	53, 500	93		22	26, 922	14, 454	53, 659
Brooms and brushes	3	7, 000	9	1	1	4, 360	5, 000	15, 400
Carpentering	11	7, 975	57			24, 966	47, 423	86, 633
Carriages and wagons (see also Wheelwrighting)	12	151, 600	226		13	79, 101	123, 025	242, 760
Carriage and wagon materials	5	72, 500	81		4	30, 169	66, 900	125, 000
Clothing, men's	5	121, 265	124	44		44, 200	133, 000	214, 875
Coffins, burial cases, and undertakers' goods	4	5, 550	4		1	1, 698	5, 200	10, 800
Confectionery	7	79, 100	26	16	4	14, 803	36, 990	67, 160
Cotton goods	5	1, 382, 000	484	737	240	298, 734	857, 505	1, 654, 132
Foundery and machine-shop products	10	184, 650	168		3	67, 126	104, 319	228, 023
Furniture	7	67, 500	39		3	19, 123	28, 994	68 877
Hand-knit goods	4	15, 500	14	7	5	6, 948	19, 102	29, 300
Leather, curried	6	51, 400	29			11, 430	146, 189	177, 485
Leather, tanned	7	66, 400	42			15, 349	144, 035	178, 123
Liquors, malt	8	186, 000	45			13, 927	84, 365	139, 275
Marble and stone work	4	47, 500	15		4	7, 777	18, 049	34, 932

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF LANCASTER, PENN.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Masonry, brick and stone	3	$225	9	....	....	$3,700	$4,100	$10,550
Painting and paperhanging	9	2,800	33	....	....	13,520	14,697	35,174
Photographing	4	8,700	6	4	....	3,625	3,100	11,071
Plumbing and gasfitting	5	5,800	6	....	....	3,440	13,700	23,945
Printing and publishing	6	177,600	171	17	21	66,918	51,517	157,770
Saddlery and harness	7	33,280	35	....	....	13,536	18,614	40,069
Sash, doors, and blinds	4	69,000	77	....	....	28,210	59,800	108,700
Stone- and earthen-ware	3	8,100	8	....	1	2,383	1,128	5,600
Tinware, copperware, and sheet-iron ware	15	88,700	61	....	1	28,642	43,708	90,359
Tobacco, cigars and cigarettes	50	128,720	147	50	18	53,835	63,312	236,435
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	3	1,100	....	....	1	156	800	2,400
All other industries (a)	42	687,350	661	148	106	257,736	729,434	1,163,662

a Embracing agricultural implements; bags, paper; bookbinding and blank-book making; boxes, fancy and paper; boxes, wooden, packing; carpets, rag; combs; cooperage; cordage and twine; cork cutting; cutlery and edge tools; dyeing and finishing textiles; files; glue; hardware; hardware, saddlery; hats and caps; iron and steel; lock- and gun-smithing; looking-glass and picture frames; lumber, sawed; mineral and soda waters; musical instruments, organs and materials; shirts; slaughtering and meat-packing; soap and candles; tobacco, chewing, smoking, and snuff; upholstering; watch and clock repairing; watches; wood, turned and carved; and wooden ware.

CITY OF LAWRENCE, MASS.

[Statistics collected under the direction of ROBERT A. HARMON, Special Agent.]

All industries	229	$18,698,977	7,819	7,908	992	$5,544,513	$13,862,142	$25,058,246
Blacksmithing	11	25,725	28	....	....	15,051	10,637	40,298
Boots and shoes, including custom work and repairing	21	4,860	112	....	....	8,977	15,433	34,179
Brass castings	3	4,600	10	....	....	4,913	6,150	16,400
Bread and other bakery products	8	46,600	57	1	....	28,951	124,747	174,820
Carpentering	19	29,650	163	....	....	76,738	152,105	276,407
Carriages and wagons	6	13,050	42	....	....	20,521	12,661	43,495
Cotton goods (see also Mixed textiles)	7	5,350,400	1,264	3,235	246	1,310,358	2,915,195	5,059,904
Dyeing and finishing textiles	3	1,645,000	1,069	140	102	489,408	993,441	2,593,000
Flouring- and grist-mill products	3	258,000	28	....	....	14,960	479,375	510,132
Foundery and machine-shop products	21	296,362	268	24	12	137,296	232,929	473,244
Marble and stone work	7	21,200	24	....	....	10,478	9,341	27,448
Masonry, brick and stone	5	14,750	136	....	....	40,114	82,733	131,497
Mineral and soda waters	3	9,000	22	....	....	11,158	11,418	31,090
Mixed textiles (see also Cotton goods; Woolen goods)	3	2,620,500	1,171	1,073	122	796,785	1,907,652	3,442,798
Painting and paperhanging	18	8,125	54	....	....	20,278	13,048	46,967
Paper	3	410,000	313	157	1	176,114	610,545	972,050
Photographing	6	7,800	5	2	....	2,724	4,606	18,460
Plumbing and gasfitting	3	6,300	13	....	1	6,836	21,975	34,181
Printing and publishing	4	35,000	32	....	9	20,500	12,450	45,540
Saddlery and harness	5	7,675	11	....	....	6,047	8,806	19,412
Sash, doors, and blinds	3	11,245	37	....	....	19,625	61,813	90,416
Soap and candles	4	54,300	25	....	....	11,075	81,890	113,420
Tinware, copperware, and sheet-iron ware	9	26,550	37	....	....	21,036	42,146	89,400
Tobacco, cigars and cigarettes	6	1,210	9	2	....	5,985	7,719	19,187
Upholstering	4	4,900	10	....	....	6,300	18,500	32,900
Woolen goods (see also Mixed textiles; Worsted goods)	3	3,050,000	1,497	1,168	132	896,854	2,189,989	3,823,378
Worsted goods (see also Woolen goods)	5	4,211,385	852	2,091	367	1,149,434	3,101,068	5,676,428
All other industries (a)	36	521,800	530	15	....	235,997	733,770	1,221,795

a Embracing awnings and tents; baking and yeast powders; belting and hose, leather; bookbinding and blank-book making; brooms and brushes; carriage and wagon materials; coffee and spices, roasted and ground; combs; confectionery; cooperage; drugs and chemicals; files; furniture; leather board; liquors, malt; looking-glass and picture frames; lumber, planed; models and patterns; patent medicines and compounds; paving materials; pumps; sewing machines and attachments; shirts; slaughtering and meat-packing; stone- and earthen-ware; and wood, turned and carved.

CITY OF LOUISVILLE, KY.

[Statistics collected under the direction of C. K. CARON, Chief Special Agent. See Note on page 379.]

All industries	1,108	$21,767,013	13,480	2,829	1,139	$5,835,545	$21,207,110	$35,423,203
Agricultural implements	6	1,915,100	678	10	10	261,661	640,600	1,220,700
Baskets, rattan and willow ware	7	2,800	6	....	1	1,916	1,755	7,820
Blacksmithing (see also Wheelwrighting)	49	45,110	80	....	....	38,528	36,875	129,315
Bookbinding and blank book making	3	49,400	32	22	....	20,140	53,150	95,800
Boots and shoes, including custom work and repairing	115	284,000	465	127	25	218,019	393,225	774,262
Boot and shoe uppers	5	14,050	23	11	....	18,857	69,600	102,980
Boxes, wooden, packing	4	58,672	56	....	3	27,400	55,400	107,000
Brass castings	6	69,600	52	....	9	20,020	80,020	114,276
Bread and other bakery products	69	192,000	193	21	6	69,431	377,311	592,925
Brick and tile	16	127,350	299	....	16	68,140	45,680	151,175
Brooms and brushes	8	15,900	58	8	2	24,810	35,600	75,980
Carpentering	44	168,900	369	....	5	163,897	385,650	718,600
Carriages and wagons (see also Wheelwrighting)	30	338,250	376	2	14	156,422	390,540	717,575
Clothing, men's	35	701,800	782	763	4	300,511	724,536	1,308,718
Clothing, women's	3	45,000	2	220	25	53,300	275,600	388,900
Coffee and spices, roasted and ground	3	39,500	21	....	8	20,500	159,000	209,200
Coffins, burial cases, and undertakers' goods	3	110,300	68	3	....	29,100	41,700	120,800
Confectionery	17	170,900	90	17	5	38,814	151,749	263,430
Cooperage	22	272,200	537	....	7	254,931	368,660	762,800
Cutlery and edge tools (see also Hardware)	5	54,600	73	....	1	31,979	28,600	75,350

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF LOUISVILLE, KY.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Dentistry, mechanical	10	$32,500	8			$6,075	$14,700	$49,500
Drugs and chemicals (see also Patent medicines and compounds)	4	23,000	13			5,400	22,300	46,050
Dyeing and cleaning	3	11,500	4	3		2,300	1,700	9,170
Flouring- and grist-mill products	8	260,000	94			35,350	837,167	971,850
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	32	2,044,750	1,533		35	612,155	1,312,881	2,343,039
Furniture (see also Mattresses and spring beds; Upholstering)	18	421,600	543	4	32	220,000	359,705	797,400
Furniture, chairs	7	130,900	184	10	40	85,676	117,845	241,670
Glass	3	295,000	132	1	36	32,917	37,079	123,075
Hairwork	6	8,400		8		2,431	10,265	25,600
Hardware (see also Cutlery and edge tools)	3	10,500	14			6,850	6,500	21,800
Ink	3	9,500	9	2		3,908	5,600	11,800
Instruments, professional and scientific	3	11,500	6			3,820	1,800	11,000
Iron and steel	3	392,000	468		2	149,187	305,784	514,623
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	4	33,500	31			12,004	19,940	48,493
Jewelry	7	25,099	31	2	1	14,794	28,384	53,703
Leather, curried	5	94,000	43			11,825	228,090	275,400
Leather, tanned	13	1,610,000	374	1	10	160,653	1,261,931	1,855,590
Liquors, distilled	15	1,049,000	218		1	89,855	953,900	1,382,500
Liquors, malt	20	712,000	275	1	2	134,291	575,533	959,221
Lithographing (see also Printing and publishing)	4	26,200	43	12	10	22,324	22,526	59,270
Lock- and gun-smithing	3	2,100	10			4,458	11,500	19,400
Looking-glass and picture frames	4	3,162	6			2,130	4,510	12,040
Lumber, planed (see also Wood, turned and carved)	9	268,768	235		2	106,475	336,997	611,204
Lumber, sawed	3	300,000	70		7	25,582	126,375	212,500
Marble and stone work	17	140,375	167			80,714	133,846	319,500
Masonry, brick and stone	4	50,650	78		7	35,674	53,300	113,150
Mattresses and spring beds (see also Furniture)	10	15,450	35	6		15,573	40,280	75,850
Millinery and lace goods	7	61,000	3	79	5	20,240	96,600	149,900
Mineral and soda waters	7	19,900	15		4	7,872	10,100	30,593
Mixed textiles (see also Woolen goods)	3	410,000	79	154	112	100,862	446,570	654,329
Musical instruments, pianos and materials	5	40,700	26			12,833	13,800	42,200
Painting and paperhanging	23	26,850	111		5	43,248	37,550	116,727
Patent medicines and compounds (see also Drugs and chemicals)	9	119,500	33	10	5	14,186	166,000	352,800
Photographing	11	27,900	32	4	1	18,306	27,650	68,685
Plumbing and gasfitting	17	35,650	81		3	34,560	54,421	123,975
Printing and publishing (see also Lithographing)	36	1,333,500	668	104	65	416,551	433,164	1,188,067
Pumps, not including steam pumps	5	22,250	24		2	11,160	12,010	53,789
Roofing and roofing materials	8	16,300	26		2	11,687	32,700	58,350
Saddlery and harness	35	396,150	398	19	23	159,571	520,525	882,542
Shirts	8	64,300	9	100		19,594	30,774	65,315
Show-cases	3	2,100	6		2	1,950	2,650	6,900
Slaughtering and meat-packing, not including retail butchering	23	2,144,500	358		8	141,092	3,438,459	4,287,158
Stone- and earthen-ware	4	10,900	23		4	8,900	4,950	18,400
Tinware, copperware, and sheet-iron ware	45	178,900	151		5	73,548	228,395	419,030
Tobacco, chewing, smoking and snuff (see also Tobacco, cigars and cigarettes).	9	460,000	712	436	203	188,517	1,162,891	2,312,802
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	51	248,237	336	67	111	141,148	245,863	684,842
Trunks and valises	7	59,800	98		17	44,101	72,300	164,100
Upholstering (see also Furniture)	4	13,100	13	3		5,000	22,900	38,200
Vinegar	3	42,500	15			5,210	64,805	89,000
Watch and clock repairing	9	5,200	5			3,300	1,885	15,650
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	16	26,750	35			17,594	19,270	64,500
Wood, turned and carved (see also Lumber, planed)	6	93,000	62		36	26,299	50,756	111,767
Woolen goods (see also Mixed textiles)	4	425,000	92	154	114	102,212	451,970	669,079
All other industries (a)	76	2,826,140	1,155	445	86	495,267	2,412,485	3,686,539

a Embracing artificial limbs; awnings and tents; axle-grease; bagging, flax, hemp, and jute; baking and yeast powders; bells; belting and hose, leather; bluing; boxes, cigar; boxes, fancy and paper; bridges; buttons; carriage and wagon materials; carriages and sleds, children's; cars, railroad, street, and repairs; cement; coppersmithing; cordage and twine; cork cutting; cotton goods; drain and sewer pipe; dyeing and finishing textiles; electrical apparatus and supplies; electroplating; files; glass, cut, stained, and ornamented; grease and tallow; handles, wooden; hats and caps; iron bolts, nuts, washers, and rivets; iron forgings; labels and tags; lapidary work; lightning rods; malt; models and patterns; musical instruments, organs and materials; nets and seines; oil, linseed; oleomargarine; paints; paper; pickles, preserves, and sauces; refrigerators; sash, doors, and blinds; saws; scales and balances; shipbuilding; soap and candles; sporting goods; stencils and brands; stereotyping and electrotyping; toys and games; umbrellas and canes; and wirework.

CITY OF LOWELL, MASS.

[Statistics collected under the direction of FREDERICK HOLTON, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	283	$20,465,192	9,218	9,503	1,318	$5,996,591	$16,315,062	$33,935,777
Belting and hose, leather	3	49,500	21			12,368	116,944	144,340
Blacksmithing (see also Wheelwrighting)	17	20,600	38			17,628	21,400	56,200
Boots and shoes, including custom work and repairing	10	10,750	34	5		15,110	29,609	55,448
Boxes, wooden, packing	3	72,000	55			22,900	88,450	128,800
Bread and other bakery products	4	53,500	35	3	4	21,530	147,600	196,065
Carpentering	17	159,500	281		1	119,230	423,399	627,450
Carriages and wagons (see also Wheelwrighting)	4	56,000	33			16,655	24,040	56,611
Clothing, men's	5	35,500	14	45		16,695	37,225	73,050
Confectionery	5	19,300	9	10		7,987	41,760	66,976
Cotton goods	11	11,279,011	3,430	7,846	879	2,995,636	8,084,722	19,510,955
Dyeing and finishing textiles	4	3,000,000	777	120	70	412,733	1,063,324	1,993,751
Flouring- and grist-mill products	4	69,000	13			6,701	137,886	156,765
Foundery and machine-shop products	37	1,216,860	1,745	19	47	848,950	1,080,046	2,378,799
Furniture	4	24,000	38			15,886	23,205	51,235
Leather, tanned	3	50,000	44			19,423	241,659	288,452

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF LOWELL, MASS.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Marble and stone work	9	$32, 650	77	....	....	$35, 813	$35, 463	$99, 860
Masonry, brick and stone	10	54, 000	217	....	....	86, 600	133, 467	276, 595
Painting and paperhanging	8	24, 800	43	....	....	24, 130	40, 305	77, 900
Patent medicines and compounds	3	278, 000	144	61	5	116, 200	261, 300	550, 000
Photographing	8	9, 900	9	6	....	5, 295	4, 675	20, 697
Printing and publishing	6	90, 000	122	12	42	64, 905	43, 014	153, 432
Saddlery and harness	7	23, 500	20	1	....	9, 263	15, 175	34, 693
Sash, doors, and blinds (see also Wood, turned and carved)	5	112, 000	97	....	3	42, 336	76, 089	143,141
Screws	3	18, 500	19	....	....	8, 250	11, 550	26, 600
Soap and candles	5	120, 000	40	....	....	18, 066	71, 682	140, 875
Tinware, copperware, and sheet-iron ware	8	68, 600	55	....	....	26, 171	55, 225	101, 480
Tobacco, cigars and cigarettes	7	6, 900	15	....	....	6, 316	7, 913	21, 941
Watch and clock repairing	3	1, 600	1	....	....	450	1, 050	3, 750
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	5	4, 850	8	....	....	3, 800	5, 175	12, 105
Wood, turned and carved (see also Sash, doors, and blinds)	3	86, 000	87	....	12	31, 640	39, 860	87, 420
Woolen goods (see also Worsted goods)	7	1, 975, 509	840	705	164	470, 835	1, 895, 781	3, 326, 945
Worsted goods (see also Woolen goods)	7	634, 862	240	486	99	191, 727	1, 005, 625	1, 367, 320
All other industries (*a*)	48	808, 000	617	184	32	304, 982	1, 050, 514	1, 706, 126

a Embracings awnings and tents; ammunition; bookbinding and blank-book making; boxes, fancy and paper; brass castings; clothing, women's; coffins, burial cases, and undertakers' goods; coppersmithing; cutlery and edge tools; drain and sewer pipe; drugs and chemicals; dyeing and cleaning; felt goods; files; hosiery and knit goods; housefurnishing goods; iron bolts, nuts, washers, and rivets; iron pipe, wrought; iron work, architectural and ornamental; leather, curried; lumber, sawed; mattresses and spring beds; mineral and soda waters; mixed textiles; paper; paving materials; perfumery and cosmetics; plumbing and gasfitting; refrigerators, roofing and roofing materials; scales and balances; shipbuilding; shirts; stencils and brands; trunks and valises; upholstering; and wirework.

CITY OF LYNN, MASS.

[Statistics collected under the direction of C. M. MERRITT, Special Agent.]

All industries	343	$5, 894, 575	8, 894	3, 489	37	$5, 833, 849	$17, 433, 455	$26, 828, 023
Blacking	7	10, 200	12	....	....	7, 480	28, 350	48, 808
Blacksmithing (see also Wheelwrighting)	12	8, 100	26	....	....	15, 220	10, 425	36, 200
Boot and shoe cut stock	35	605, 400	284	68	1	204, 040	3, 198, 200	3, 754, 500
Boot and shoe findings	12	65, 500	85	49	10	59, 600	105, 400	209, 700
Boots and shoes, including custom work and repairing	125	3, 595, 800	6, 915	3, 274	13	4, 685. 017	9, 847, 971	16, 979, 432
Boxes, fancy and paper	4	22, 000	35	78	....	45, 750	48, 000	123, 500
Bread and other bakery products	6	39, 100	53	2	1	26, 162	70, 150	124, 000
Brick and tile	3	19, 000	39	....	....	9, 100	11, 550	26, 000
Carpentering	15	36, 600	142	....	....	79, 500	213, 900	375, 500
Carriages and wagons (see also Wheelwrighting)	6	35, 000	51	....	....	31, 430	53, 400	103, 500
Foundery and machine-shop products	9	76, 000	97	....	....	51, 400	53, 200	144, 850
Lasts	5	20, 000	25	....	....	17, 750	8, 400	44, 500
Leather, curried	19	474, 650	421	5	2	230, 310	1, 905, 077	2, 283, 672
Leather, tanned	18	436, 650	318	....	4	170, 908	1, 375, 073	1, 669, 087
Marble and stone work	4	6, 200	19	....	....	8, 465	9, 524	23, 789
Needles and pins	3	28, 000	31	1	....	21, 000	41, 800	72, 500
Painting and paperhanging	7	8, 300	32	....	....	17, 659	19, 605	46, 329
Plumbing and gasfitting	4	23, 800	65	....	....	20, 360	47, 400	85, 000
Saddlery and harness	3	8, 000	12	....	....	5, 600	8, 700	21, 000
Shipbuilding	3	925	3	....	....	1, 200	560	1, 993
Tinware, copperware, and sheet-iron ware	4	10, 500	16	....	....	9, 400	16, 500	37, 200
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	3	700	4	....	....	2, 100	1, 670	5, 500
Wood, turned and carved	4	30, 000	36	4	....	18, 600	18, 200	44, 400
All other industries (*a*)	32	334, 150	173	8	6	95, 798	340, 400	567, 063

a Embracing bookbinding and blank-book making; boxes, wooden, packing; carriage and wagon materials; confectionery; cutlery and edge tools; engraving and die-sinking; fertilizers; flouring- and grist-mill products; furniture; glue; grindstones; iron nails and spikes, cut and wrought; iron railing, wrought; kindling wood; lumber, sawed; masonry, brick and stone; mineral and soda waters; patent medicines and compounds; sash, doors, and blinds; slaughtering and meat-packing; soap and candles; tobacco, cigars and cigarettes; and upholstering materials.

CITY OF MANCHESTER, N. H.

[Statistics collected under the direction of CHARLES A. LUCE, Special Agent.]

All industries	121	$15, 149, 153	4, 632	5, 748	458	$3, 370, 404	$7, 901, 066	$14, 136, 305
Blacksmithing	4	3, 300	18	....	....	8, 550	4, 200	21, 680
Bread and other bakery products	7	5, 550	20	1	....	8, 591	85, 250	109, 550
Carpentering	15	92, 500	105	....	....	46, 212	210, 400	374, 030
Carriages and wagons	3	44, 000	47	....	....	23, 600	28, 500	63, 000
Cotton goods	5	8, 808, 584	2, 450	4, 569	229	2, 019, 531	4, 123, 141	7, 604, 568
Flouring- and grist-mill products	4	27, 000	16	....	....	7, 518	156, 750	172, 812
Foundery and machine-shop products	12	354, 000	500	19	9	194, 492	353, 029	717, 851
Leather, curried	3	43, 750	26	....	....	10, 200	68, 900	96, 600
Leather, tanned	3	43, 750	13	....	....	6, 600	49, 842	67, 300
Marble and stone work	4	10, 000	36	....	....	17, 600	11, 900	37, 000
Painting and paperhanging	7	42, 500	68	18	....	42, 425	41, 953	112, 413
Photographing	5	7, 000	4	5	....	3, 880	2, 300	14, 550
Plumbing and gasfitting	3	24, 000	27		....	20, 160	47, 380	84, 118
Saddlery and harness	3	3, 950	7	....	....	3, 200	4, 800	10, 700
Sash, doors, and blinds	3	69, 000	79	....	3	27, 600	58, 000	97, 000
Tinware, copperware, and sheet-iron ware	5	11, 300	15	1	....	5, 250	9, 100	20, 000
Tobacco, cigars and cigarettes	3	8, 500	14	3	....	7, 946	8, 750	23, 810
All other industries (*a*)	32	5, 550, 469	1, 187	1, 132	217	917, 049	2, 636, 871	4, 509, 328

a Embracing belting and hose, leather; bookbinding and blank-book making; boots and shoes, including custom work and repairing; brass castings; brooms and brushes; carriage and wagon materials; confectionery; cooperage; dyeing and finishing textiles; emery wheels; files; furniture; hosiery and knit goods; liquors, malt; lumber, planed; lumber, sawed; masonry, brick and stone; paper; sewing machines and attachments; shoddy; soap and candles; stone- and earthen-ware; upholstering; wood, turned and carved; woolen goods; and worsted goods.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF MEMPHIS, TENN.

[Statistics collected under the direction of WILLIAM A. HILL, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	138	$2, 313, 975	2, 130	69	69	$845, 672	$2, 419, 341	$4, 413, 422
Boots and shoes, including custom work and repairing	3	5, 000	12			4, 800	3, 376	10, 600
Bread and other bakery products	7	16, 800	33		1	10, 650	37, 200	68, 000
Carpentering	5	12, 750	29			17, 300	29, 700	64, 500
Carriages and wagons (see also Wheelwrighting)	6	178, 400	158	2	1	51, 250	55, 250	176, 500
Clothing, men's	8	32, 100	85	39		63, 600	65, 000	175, 500
Confectionery	5	32, 500	53	3	2	18, 050	110, 500	160, 000
Foundery and machine-shop products	9	140, 800	189	2	9	83, 114	91, 274	252, 400
Lock- and gun-smithing	5	4, 600	9		1	4, 150	3, 300	11, 200
Lumber, sawed	5	196, 000	166		2	22, 500	212, 400	300, 660
Marble and stone work	6	22, 200	26			9, 100	12, 150	38, 900
Oil, cottonseed and cake	5	535, 000	415	2	18	120, 000	550, 000	835, 000
Painting and paperhanging	3	13, 500	26			5, 653	7, 300	20, 500
Plumbing and gasfitting	6	17, 400	58		6	19, 500	30, 400	73, 000
Printing and publishing	4	92, 000	101	6	5	67, 246	52, 939	165, 714
Saddlery and harness	4	17, 950	39			18, 400	35, 450	75, 020
Tinware, copperware, and sheet-iron ware	10	104, 500	88	10		42, 899	99, 500	203, 000
Upholstering	4	55, 000	22	3		11, 445	7, 308	34, 000
Wheelwrighting (see also Carriages and wagons)	5	1, 400	16			3, 500	2, 200	7, 700
All other industries (*a*)	38	836, 075	605	2	24	272, 515	1, 014, 094	1, 741, 228

a Embracing agricultural implements; blacksmithing; bookbinding and blank-book making; brick and tile; brooms and brushes; cars, railroad, street, and repairs; clothing, women's; corsets; cotton compressing; cotton goods; cotton-ties; flouring- and grist-mill products; furnishing goods, men's; liquors, malt; looking-glass and picture frames; lumber, planed; masonry, brick and stone; mineral and soda waters; musical instruments and materials (not specified); photographing; sash, doors, and blinds; scales and balances; sewing machines and attachments; shipbuilding; slaughtering and meat-packing; soap and candles; stencils and brands; stone- and earthen-ware; tobacco, cigars and cigarettes; and trunks and valises.

CITY OF MILWAUKEE, WIS.

[Statistics collected under the direction of A. A. SOPER, Chief Special Agent. See Note on page 379.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	844	$18, 766, 914	16, 015	3, 922	949	$6, 946, 105	$28, 975, 872	$43, 473, 812
Baskets, rattan and willow ware	4	90, 600	108	15	161	46, 660	38, 825	114, 300
Blacksmithing (see also Wheelwrighting)	34	54, 850	103			52, 264	31, 410	122, 540
Bookbinding and blank-book making	7	21, 700	56	47	18	31, 505	26, 681	78, 713
Boots and shoes, including custom work and repairing	59	296, 275	462	55	9	162, 263	380, 074	665, 183
Brass castings	6	108, 300	140	2	2	51, 112	76, 436	167, 114
Bread and other bakery products	36	61, 350	102	16	29	37, 254	255, 449	358, 866
Brick and tile	5	328, 500	346		43	89, 720	77, 276	225, 808
Brooms and brushes	4	13, 000	50	5		15, 240	16, 720	47, 620
Carpentering	47	149, 780	745			311, 581	543, 315	986, 685
Carpets, rag	5	5, 100	19	25		4, 900	12, 550	22, 350
Carriages and wagons (see also Wheelwrighting)	11	97, 000	148		2	62, 265	76, 500	184, 000
Clothing, men's	52	1, 895, 128	1, 902	2, 350	50	912, 657	2, 243, 365	3, 763, 987
Clothing, women's	4	64, 000	34	163		29, 900	109, 000	147, 160
Coffee and spices, roasted and ground	9	257, 621	125	19	15	89, 550	693, 042	931, 640
Confectionery	4	144, 054	110	30	20	43, 542	378, 370	474, 922
Cooperage	39	142, 250	526		35	234, 115	337, 880	680, 445
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	3	41, 500	20			10, 692	22, 870	44, 392
Cordage and twine	3	5, 000	9			3, 200	10, 000	16, 600
Dentistry, mechanical	5	8, 000	10	1	2	4, 500	10, 500	30, 000
Drugs and chemicals	6	40, 872	15	12		9, 386	55, 179	85, 393
Flouring- and grist-mill products	11	1, 066, 000	265			136, 266	3, 795, 289	4, 204, 708
Foundery and machine-shop products	30	1, 286, 445	1, 437		30	673, 392	1, 173, 907	2, 252, 784
Furnishing goods, men's	3	7, 000	7	9	1	1, 890	17, 000	28, 850
Furniture (see also Mattresses and spring beds; Upholstering)	16	329, 800	497	14	15	212, 501	223, 301	568, 268
Furs, dressed	3	61, 000	14	38	5	25, 000	89, 500	136, 000
Hairwork	3	8, 500		11		2, 800	6, 050	13, 200
Hand-knit goods	5	26, 000	2	538	52	14, 500	45, 500	83, 000
Hardware	5	11, 700	19		10	8, 600	14, 900	32, 160
Hats and caps, not including wool hats	3	26, 000	8	14		7, 500	17, 928	34, 000
Jewelry	4	15, 000	18			8, 316	31, 000	47, 000
Leather, curried	17	800, 425	375			160, 441	1, 874, 595	2,219, 978
Leather, dressed skins	5	71, 500	46			20, 900	67, 925	104, 581
Leather, tanned	17	1, 008, 525	407			173, 861	1, 612, 400	2, 101, 195
Lithographing (see also Printing and publishing)	4	69, 125	116	2	13	57, 751	79, 640	166, 860
Liquors, distilled	2	142, 000	20			9, 180	95, 425	145, 650
Liquors, malt	13	4, 732, 909	1, 040			525, 573	2, 259, 345	4, 034, 319
Looking-glass and picture frames	4	12, 975	10			7, 222	19, 900	35, 470
Lumber, planed (see also Sash, doors, and blinds)	3	70, 000	115	4	11	35, 000	50, 000	117, 000
Marble and stone work	11	95, 300	167		2	73, 256	106, 450	220, 396
Masonry, brick and stone	4	8, 500	27		2	12, 000	14, 000	34, 750
Mattresses and spring beds (see also Furniture)	4	3, 800	8	5	2	2, 550	12, 000	17, 500
Mineral and soda waters	6	34, 200	44	5	5	14, 208	31, 450	62, 950
Painting and paperhanging	31	53, 950	204		2	68, 105	95, 607	206, 546
Plumbing and gasfitting	8	47, 600	95		1	43, 600	71, 700	138, 400
Printing and publishing (see also Lithographing)	24	434, 700	518	43	48	268, 270	200, 486	675, 087
Pumps, not including steam pumps	4	4, 075	9			3, 150	4, 622	11, 500
Saddlery and harness	29	73, 300	107		38	44, 451	112, 620	199, 525
Sash, doors, and blinds (see also Lumber, planed)	7	261, 000	512		18	139, 100	303, 000	557, 000
Shipbuilding	8	136, 500	227			110, 413	133, 963	301, 705
Shirts	3	2, 100	4	17		4, 990	5, 790	17, 650

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF MILWAUKEE, WIS.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Slaughtering and meat-packing, not including retail butchering	7	$789, 000	928	....	25	$187, 596	$5, 529, 618	$6, 099, 486
Soap and candles	5	120, 000	50	4	11	24, 620	204, 100	280, 090
Stone- and earthen-ware	8	69, 700	67	....	....	17, 511	21, 755	66, 600
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	29	95, 950	150	....	4	56, 687	106, 994	215, 544
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	3	331, 000	200	6	20	78, 500	786, 645	978, 281
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	56	238, 375	733	4	77	301, 934	344, 939	835, 506
Trunks and valises	4	183, 000	218	....	45	76, 720	115, 800	244, 600
Upholstering (see also Furniture)	6	11, 900	46	....	....	22, 800	97, 500	146, 500
Vinegar	5	62, 000	32	....	....	18, 415	42, 000	149, 000
Watch and clock repairing	4	4, 100	8	....	1	3, 780	4, 800	12, 675
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	13	47, 500	67	....	....	27, 870	29, 800	80, 950
Wirework	5	4, 750	8	....	....	3, 140	3, 185	10, 885
All other industries (*a*)	69	2, 084, 830	2, 160	468	125	1, 059, 440	3, 728, 001	6, 437, 945

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a Embracing agricultural implements; artificial feathers and flowers; artificial limbs; bags, paper; baking and yeast powders; boot and shoe uppers; boxes, cigar; boxes, fancy and paper; boxes, wooden, packing; bridges; carriages and sleds, children's; carriage and wagon materials; drain and sewer pipe; dyeing and cleaning; electroplating; engraving and die-sinking; engraving, wood; fertilizers; files; food preparations; furniture, chairs; galvanizing; gloves and mittens; ink; iron and steel; lightning rods; lumber, sawed; mixed textiles; models and patterns; musical instruments, organs and materials; musical instruments, pianos and materials; oil, linseed; paints; patent medicines and compounds; pickles, preserves, and sauces; refrigerators; roofing and roofing materials; safes, doors, and vaults, fire-proof; scales and balances; show-cases; starch; steam fittings and heating apparatus; stencils and brands; stereotyping and electrotyping; straw goods; tools; toys and games; type founding; wood preserving; wood, turned and carved; and woolen goods.

CITY OF MINNEAPOLIS, MINN.

[Statistics collected under the direction of CHARLES W. JOHNSON, Special Agent.]

All industries	401	$9, 002, 650	4, 702	457	185	$2, 582, 253	$24, 274, 623	$29, 973, 476
Blacksmithing (see also Wheelwrighting)	29	30, 250	68	....	....	39, 695	43, 313	132, 200
Boots and shoes, including custom work and repairing	34	153, 050	100	4	....	63, 500	123, 280	240, 265
Boxes, fancy and paper	3	1, 600	3	4	5	2, 085	1, 900	6, 800
Bread and other bakery products	7	38, 300	44	10	1	19, 250	139, 960	185, 355
Brick and tile	6	21, 000	108	....	....	37, 350	11, 200	65, 600
Carpentering	13	36, 700	164	....	....	88, 500	188, 800	343, 000
Carriages and wagons (see also Wheelwrighting)	13	40, 100	102	....	....	56, 930	78, 300	174, 700
Clothing, men's	25	105, 675	190	40	5	118, 150	197, 750	386, 700
Cooperage	11	68, 000	282	....	35	148, 914	235, 514	447, 152
Flouring- and grist-mill products	29	3, 820, 500	721	....	....	555, 669	19, 011, 239	20, 502, 305
Foundery and machine-shop products	15	474, 700	380	....	....	200, 500	451, 640	807, 783
Furniture (see also Mattresses and spring beds)	14	126, 300	190	2	1	88, 450	125, 000	273, 000
Furs, dressed	4	7, 700	3	16	....	3, 960	15, 200	25, 800
Liquors, malt	3	180, 000	58	1	....	25, 083	106, 870	190, 678
Lock- and gun-smithing	4	2, 200	7	....	....	3, 950	2, 200	10, 700
Lumber, planed (see also Sash, doors, and blinds)	6	66, 500	81	....	....	32, 742	49, 950	131, 577
Lumber, sawed	16	2, 405, 000	877	13	30	374, 500	1, 649, 430	2, 740, 848
Marble and stone work	5	16, 300	40	....	....	17, 050	22, 300	53, 000
Mattresses and spring beds (see also Furniture)	3	9, 000	17	3	....	7, 000	17, 500	37, 000
Mineral and soda waters	5	10, 600	14	....	....	5, 400	12, 300	23, 200
Photographing	6	25, 500	12	4	....	7, 880	5, 100	23, 376
Plumbing and gasfitting	3	26, 500	35	....	....	17, 100	49, 300	79, 000
Printing and publishing	14	142, 000	196	10	13	123, 900	104, 000	321, 500
Pumps, not including steam pumps	3	5, 500	17	....	....	7, 500	12, 000	24, 500
Saddlery and harness	14	36, 950	71	....	....	33, 560	55, 100	118, 400
Sash, doors, and blinds (see also Lumber, planed)	5	201, 000	246	....	35	112, 746	374, 000	601, 193
Slaughtering and meat-packing, not including retail butchering	4	39, 000	37	....	1	14, 300	197, 990	270, 600
Tinware, copperware, and sheet-iron ware	21	37, 200	88	....	....	42, 870	87, 175	174, 300
Tobacco, cigars and cigarettes	5	12, 650	28	....	....	16, 350	13, 400	52, 700
Watch and clock repairing	14	7, 475	22	....	1	11, 300	7, 480	30, 400
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	9	8, 600	29	....	....	14, 511	12, 761	36, 377
All other industries (*a*)	58	846, 800	472	350	58	291, 528	866, 671	1, 463, 467

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a Embracing agricultural implements; awnings and tents; bags, other than paper; bookbinding and blank-book making; boxes, wooden, packing; brass castings; brooms and brushes; carpets, rag; coffee and spices, roasted and ground; confectionery; corsets; cotton goods; cutlery and edge tools; drain and sewer-pipe; dyeing and cleaning; electroplating; files; flavoring extracts; furnishing goods, men's; glass, cut, stained, and ornamented; gloves and mittens; hosiery and knit goods; iron work, architectural and ornamental; leather, dressed skins; looking-glass and picture frames; masonry, brick and stone; models and patterns; musical instruments, organs and materials; oil, linseed; oil, lubricating; painting and paperhanging; paper; pickles, preserves, and sauces; saws; shirts; show-cases; soap and candles; steam fittings and heating apparatus; stencils and brands; tools; trunks and valises; washing-machines and clothes-wringers; wirework; wood, turned and carved; and woolen goods.

CITY OF MOBILE, ALA.

[Statistics collected under the direction of ERWIN LEDYARD, Special Agent.]

All industries	91	$525, 708	622	37	45	$261, 643	$830, 961	$1, 335, 579
Blacksmithing	7	900	9	....	....	4, 176	1, 830	8, 000
Boots and shoes, including custom work and repairing	6	3, 300	10	2	....	6, 400	6, 700	17, 500
Bread and other bakery products	9	25, 200	25	4	2	9, 558	42, 470	75, 000
Carpentering	9	11, 600	117	....	....	37, 080	73, 500	127, 750
Carriages and wagons	4	10, 400	26	....	....	12, 600	19, 500	43, 100
Flouring- and grist-mill products	6	28, 000	49	....	....	18, 000	329, 500	387, 500
Foundery and machine-shop products	5	59, 808	73	....	5	28, 550	19, 547	59, 900
Furniture	3	3, 700	8	1	1	2, 400	7, 750	13, 650
Lumber, sawed	3	147, 000	105	....	....	39, 500	111, 000	185, 000
Painting and paperhanging	3	5, 500	14	....	....	4, 700	4, 500	13, 500

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF MOBILE, ALA.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Printing and publishing	5	$37, 000	27			$17, 740	$27, 941	$58, 375
Saddlery and harness	3	10, 600	7		1	3, 750	6, 200	13, 140
Tinware, copperware, and sheet-iron ware	7	12, 950	28			10, 600	28, 400	52, 750
Tobacco, cigars and cigarettes	5	8, 300	19		2	9, 816	7, 000	19, 000
All other industries (a)	16	161, 450	105	30	34	56, 773	145, 123	261, 414

a Embracing bookbinding and blank-book making; brooms and brushes; confectionery; cotton goods; lock- and gun-smithing; lumber, planed; marble and stone work; plumbing and gasfitting; sash, doors, and blinds; scales and balances; shipbuilding; and wheelwrighting.

CITY OF NASHVILLE, TENN.

[Statistics collected under the direction of FRANC M. PAUL, Special Agent.]

All industries	268	$3, 892, 380	3, 815	538	438	$1, 312, 765	$5, 312, 527	$8, 597, 278
Blacksmithing	22	7, 625	38		2	13, 995	19, 126	51, 038
Bookbinding and blank-book making	4	49, 000	20	21	3	12, 650	41, 125	74, 200
Boots and shoes, including custom work and repairing	27	17, 225	71	1	4	28, 633	37, 685	95, 159
Bread and other bakery products	9	90, 700	77	6	7	52, 040	165, 674	250, 967
Brick and tile	4	57, 000	164		51	38, 920	27, 060	80, 938
Carpentering	17	56, 450	213			92, 142	162, 190	302, 205
Carriages and wagons	9	385, 500	515			68, 570	404, 400	780, 331
Clothing, men's	4	15, 500	20	203	10	22, 600	57, 200	97, 875
Coffins, burial cases, and undertakers' goods	4	6, 850	10			4, 750	14, 250	38, 550
Confectionery	3	24, 000	14	73	10	11, 500	113, 000	146, 225
Cooperage	6	6, 300	53			19, 165	24, 140	63, 650
Flouring- and grist-mill products	6	385, 000	96			51, 172	1, 315, 721	1, 542, 516
Foundery and machine-shop products	13	143, 300	206		7	69, 755	288, 786	487, 407
Furniture	7	189, 000	278	7	105	105, 178	244, 445	489, 625
Leather, curried	3	36, 000	18			7, 300	169, 362	187, 010
Leather, tanned	4	59, 000	31		3	18, 000	121, 735	174, 791
Lock- and gun-smithing	5	3, 400	2		1	1, 025	3, 000	7, 925
Looking-glass and picture frames	4	11, 500	25		4	8, 164	15, 375	31, 675
Lumber, sawed	7	330, 000	458		44	114, 600	248, 836	520, 125
Marble and stone work	5	25, 500	92			32, 240	36, 425	114, 446
Painting and paperhanging	7	11, 000	40			20, 615	25, 275	66, 468
Patent medicines and compounds	7	61, 500	31		3	11, 769	27, 750	80, 300
Plumbing and gasfitting	6	20, 000	52		1	20, 725	64, 358	101, 950
Printing and publishing	17	495, 400	222	32	40	163, 314	144, 437	436, 981
Saddlery and harness	11	32, 600	131	1	10	42, 975	133, 450	235, 430
Tinware, copperware, and sheet-iron ware	12	118, 150	143		2	47, 003	101, 870	254, 698
Tobacco, cigars and cigarettes	3	2, 200	11		2	4, 110	3, 800	14, 310
Watch and clock repairing	8	7, 300	13			12, 125	10, 095	31, 080
All other industries (a)	34	1, 245, 380	766	194	129	237, 810	1, 291, 957	1, 839, 403

a Embracing bags, paper; baskets, rattan and willow ware; boxes, wooden, packing; brooms and brushes; coffee and spices, roasted and ground; corsets; cotton goods; electroplating; furniture, chairs; instruments, professional and scientific; liquors, distilled; liquors, malt; masonry, brick and stone; mattresses and spring beds; mineral and soda waters; oil, cottonseed and cake; pumps; sash, doors, and blinds; show-cases; slaughtering and meat-packing; stencils and brands; trunks and valises; wooden ware; and woolen goods.

CITY OF NEWARK, N. J.

[Statistics collected under the direction of P. T. QUINN, Chief Special Agent. See Note on page 379.]

All industries	1, 319	$25, 679, 885	22, 151	5, 246	2, 649	$13, 171, 339	$44, 604, 335	$69, 252, 705
Blacksmithing (see also Wheelwrighting)	45	19, 425	70		3	36, 030	30, 637	109, 258
Boot and shoe uppers	4	18, 100	11	6	2	10, 072	30, 940	51, 000
Boots and shoes, including custom work and repairing	41	452, 760	793	233	72	562, 331	1, 148, 583	1, 949, 872
Boxes, fancy and paper	9	96, 800	82	533	57	114, 838	120, 350	357, 450
Brass castings	11	135, 000	197	4	6	94, 630	100, 468	273, 110
Bread and other bakery products	83	181, 460	249	9	16	130, 415	677, 948	999, 211
Brooms and brushes	9	29, 375	39	20	10	29, 158	40, 817	89, 192
Buttons	17	188, 100	376	199	158	278, 510	224, 500	613, 380
Carpentering	62	222, 550	1, 072		23	554, 510	653, 618	1, 390, 874
Carpets, rag	8	2, 185	5			1, 772	2, 620	7, 700
Carriage and wagon materials	4	123, 475	95			53, 969	93, 461	202, 506
Carriages and wagons (see also Wheelwrighting)	16	264, 450	243	1	6	112, 663	186, 450	422, 817
Celluloid and celluloid goods	5	1, 209, 000	452	174	109	242, 498	388, 262	1, 251, 540
Cement	4	215, 300	76			34, 045	79, 650	140, 700
Clothing, men's	42	469, 144	463	559	27	448, 898	1, 155, 044	2, 077, 351
Clothing, women's	4	21, 500	10	23		10, 225	34, 800	50, 300
Coffee and spices, roasted and ground	3	50, 000	19			11, 289	49, 550	77, 784
Coffins, burial cases, and undertakers' goods	3	95, 000	33		6	29, 880	35, 000	93, 500
Confectionery	13	87, 100	129	14	6	62, 277	367, 905	521, 350
Cooperage	3	1, 600	7			3, 115	5, 950	11, 415
Corsets	8	162, 800	53	340	61	113, 698	213, 080	568, 133
Cotton goods	3	1, 314, 000	305	894	155	433, 955	545, 462	1, 598, 397
Cutlery and edge tools (see also Hardware)	22	274, 211	433	1	78	243, 132	195, 172	548, 705
Dentistry, mechanical	23	51, 500	7	2	7	6, 285	22, 834	96, 484
Drugs and chemicals	15	1, 590, 150	417	25	22	202, 498	766, 982	1, 280, 329
Engraving and die-sinking	11	70, 300	62	7	8	43, 555	15, 582	89, 954
Fancy articles	12	178, 000	337	31	162	247, 351	158, 015	542, 499
Files	6	50, 900	139	8	29	74, 170	72, 250	169, 145
Flouring- and grist-mill products	4	55, 000	20			9, 201	186, 400	225, 118
Foundery and machine-shop products	52	1, 460, 250	1, 269	4	60	683, 364	910, 772	1, 957, 177

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF NEWARK, N. J.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Furniture (see also Mattresses and spring beds; Upholstering)	19	$153, 450	128	3	15	$69, 520	$93, 770	$218, 603
Furs, dressed	3	23, 200	13	9	5	10, 285	42, 315	78, 495
Glass, cut, stained, and ornamented	4	33, 000	29		4	16, 890	36, 912	64, 693
Gold and silver, reduced and refined	4	60, 000	20		1	9, 350	368, 386	424, 500
Hardware (see also Cutlery and edge tools)	28	292, 350	279	22	41	139, 863	376, 743	672, 736
Hardware, saddlery	35	750, 200	788	133	150	410, 836	756, 541	1, 524, 008
Hat and cap materials	4	19, 500	41	7	1	24, 300	15, 300	57, 530
Hats and caps, not including wool hats	33	721, 300	1, 637	572	104	909, 315	1, 269, 130	2, 596, 578
Ink	3	12, 700	13	1	4	5, 500	16, 500	29, 000
Iron and steel	3	600, 000	281			126, 144	471, 946	771, 078
Jewelry	65	2, 517, 899	1, 726	259	178	1, 087, 446	1, 931, 054	4, 002, 677
Kindling wood	13	11, 450	41		10	17, 766	28, 620	62, 723
Lamps and reflectors	3	42, 500	29	1	20	19, 550	11, 860	48, 600
Lapidary work	6	5, 400	25		4	9, 900	8, 200	29, 506
Leather, curried	32	1, 863, 183	1, 207	25	77	729, 112	6, 744, 728	8, 300, 722
Leather, tanned	27	1, 652, 350	1, 142	3	66	680, 973	4, 952, 176	6, 345, 856
Liquors, malt	19	1, 612, 800	689			305, 933	1, 592, 798	2, 812, 300
Looking-glass and picture frames	7	17, 530	18		8	11, 156	26, 750	47, 650
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	3	24, 000	60		16	27, 850	57, 330	104, 785
Marble and stone work	14	132, 135	216		34	177, 359	108, 710	364, 775
Masonry, brick and stone	8	56, 000	58		11	30, 811	59, 000	108, 546
Mattresses and spring beds (see also Furniture)	3	2, 550	5	2	1	3, 074	10, 500	17, 900
Mineral and soda waters	8	35, 200	46		6	22, 669	53, 970	93, 147
Models and patterns	5	5, 250	9			4, 351	2, 024	12, 077
Painting and paperhanging	28	20, 875	87		10	48, 648	65, 975	156, 159
Photographing	11	14, 650	22	1	4	13, 289	10, 004	41, 252
Plumbing and gasfitting	43	200, 050	179		18	104, 975	185, 420	382, 356
Printing and publishing	23	273, 950	262	25	27	169, 463	156, 200	422, 505
Saddlery and harness	38	494, 625	628	69	25	274, 753	674, 430	1, 180, 404
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	12	231, 375	283	30	19	136, 825	191, 089	386, 996
Sewing machines and attachments	6	203, 300	1, 009			430, 654	602, 100	1, 062, 150
Shirts	11	171, 900	60	513	21	164, 549	264, 094	507, 806
Silk and silk goods	3	328, 500	95	158	61	105, 140	280, 390	468, 250
Slaughtering and meat-packing, not including retail butchering	7	232, 000	88			53, 822	1, 368, 288	1, 527, 660
Soap and candles	3	20, 300	7		1	2, 450	8, 866	14, 095
Springs, steel, car, and carriage	3	66, 393	87		1	44, 050	125, 250	191, 100
Stationery goods	6	42, 000	44	4	14	20, 748	17, 040	58, 200
Stone- and earthen-ware	6	38, 700	42	1	3	24, 138	10, 694	53, 750
Tinware, copperware, and sheet-iron ware	8	210, 700	256	37	72	118, 916	359, 584	515, 913
Tobacco, cigars and cigarettes	61	153, 745	176	46	33	102, 892	331, 672	550, 372
Trunks and valises	13	786, 800	1, 106	90	167	549, 322	1, 059, 855	2, 013, 923
Umbrellas and canes	3	650	2		1	1, 248	1, 179	6, 400
Upholstering (see also Furniture)	4	3, 300	6	1	3	2, 850	4, 355	9, 680
Upholstering materials	3	62, 500	45	76	15	39, 600	75, 000	126, 000
Varnish	16	390, 000	78		3	52, 262	521, 007	792, 774
Watch and clock repairing	12	14, 500	15		1	10, 800	14, 500	52, 830
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	23	43, 550	46		7	25, 791	28, 135	75, 660
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	10	26, 050	27		7	16, 090	30, 716	52, 800
All other industries (*a*)	72	1, 944, 990	1, 538	271	297	910, 789	10, 670, 327	12, 239, 934

a Embracing agricultural implements; awnings and tents; belting and hose, leather; bookbinding; boot and shoe findings; brick and tile; carriages and sleds, children's; clocks; cordage and twine; cork cutting; dyeing and cleaning; electric lights; electroplating; felt goods; fertilizers; food preparations; gas machines and meters; hammocks; handles, wooden; hosiery and knit goods; instruments, professional and scientific; iron railing, wrought; ivory and bone work; lasts; lime; lock- and gun-smithing; lumber, sawed; mixed textiles; mucilage and paste; musical instruments, pianos and materials; oil, lubricating; oilcloth, enameled; oilcloth, floor; paints; pickles, preserves, and sauces; refrigerators; roofing and roofing materials; rubber and elastic goods; sand and emery paper and cloth; saws; shipbuilding; silversmithing; silverware; smelting and refining; sporting goods; sugar and molasses, refined; surgical appliances; toys and games; watch and clock materials; wirework; and wooden ware.

CITY OF NEW BEDFORD, MASS.

[Statistics collected under direction of C. W. CHAPMAN, Special Agent.]

All industries	330	$7, 681, 082	3, 915	1, 538	359	$2, 058, 751	$5, 907, 874	$9, 835, 955
Blacksmithing (see also Wheelwrighting)	22	25, 150	60			22, 596	23, 200	64, 425
Boots and shoes, including custom work and repairing	12	135, 550	201	63		99, 834	252, 900	386, 825
Bread and other bakery products	6	73, 300	85	1		31, 713	210, 433	265, 755
Carpentering	40	53, 950	225			82, 935	160, 228	277, 976
Carriages and wagons (see also Wheelwrighting)	5	92, 000	111			53, 466	72, 396	148, 236
Clothing, men's	3	8, 000	3	23		3, 202	20, 300	30, 150
Confectionery	3	9, 000	8	10		5, 700	22, 640	34, 140
Cooperage	13	71, 600	79			27, 200	67, 150	111, 880
Foundery and machine-shop products	7	252, 370	205	13		93, 237	100, 927	262, 774
Furniture (see also Upholstering)	5	3, 300	17			7, 060	4, 100	12, 710
Leather, curried	4	46, 800	60	1		21, 982	194, 634	234, 630
Leather, tanned	3	42, 200	36			13, 881	73, 388	90, 772
Lumber, planed (see also Sash, doors, and blinds)	4	12, 600	19			8, 328	8, 548	21, 500
Marble and stone work	8	10, 350	39			18, 723	10, 791	35, 695
Masonry, brick and stone	17	7, 850	77			33, 416	23, 850	69, 551
Painting and paperhanging	22	28, 300	112			33, 226	48, 600	113, 545
Photographing	10	110, 200	143	91		57, 000	60, 550	144, 900
Plumbing and gasfitting	4	4, 200	10			4, 094	9, 100	16, 250
Printing and publishing	6	37, 000	66	3	10	44, 580	47, 620	112, 600
Pumps, not including steam pumps	3	3, 700	6			1, 475	1, 500	4, 645

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF NEW BEDFORD, MASS.—Continued.

Manufacturing and mechanical industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Saddlery and harness	7	$12, 900	22		1	$10, 240	$21, 500	$37, 930
Sash, doors, and blinds (see also Lumber, planed)	3	36, 000	41			19, 200	29, 200	64, 600
Shipbuilding	23	40, 575	115			69, 366	113, 589	195, 944
Slaughtering and meat-packing, not including retail butchering	3	18, 000	10			2, 600	205, 450	232, 970
Soap and candles	10	900, 000	93	11		49, 276	1, 094, 373	1, 288, 981
Tinware, copperware, and sheet-iron ware	11	36, 100	58			23, 815	45, 560	88, 250
Tobacco, cigars and cigarettes	6	11, 500	15	2		7, 150	16, 750	28, 620
Upholstering (see also Furniture)	3	3, 500	14	7		7, 000	5, 800	16, 000
Watch and clock repairing	4	5, 900	10	1		4, 900	1, 025	7, 570
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	10	6, 000	18			6, 875	6, 670	19, 835
All other industries (*a*)	53	5, 583, 187	1, 957	1, 312	348	1, 194, 681	2, 955, 202	5, 416, 296

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a Embracing blacking; bookbinding and blank-book making; boxes, fancy and paper; boxes, wooden, packing; brass and copper, rolled; brass castings; brick and tile; brooms and brushes; cleansing and polishing preparations; coffee and spices, roasted and ground; coffins, burial cases, and undertakers' goods; cordage and twine; cotton goods; drugs and chemicals; electroplating; files; flouring- and grist-mill products; furnishing goods, men's; glass; glass, cut, stained, and ornamented; hairwork; hats and caps; ink; instruments, professional and scientific; iron and steel; jewelry; kindling wood; lock- and gun-smithing; looking-glass and picture frames; mattresses and spring beds; mineral and soda waters; models and patterns; oil, lubricating; paints; paving materials; roofing and roofing materials; shirts; sporting goods; steam fittings and heating apparatus; and wirework.

CITY OF NEW HAVEN, CONN.

[Statistics collected under the direction of T. ATTWATER BARNES, Special Agent.]

Manufacturing and mechanical industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	587	$9, 703, 737	9, 998	4, 780	378	$5, 761, 374	$14, 482, 163	$24, 040, 225
Blacksmithing	28	17, 300	52		3	28, 872	24, 950	82, 950
Bookbinding and blank-book making	5	67, 500	82	16	3	40, 399	61, 713	134, 875
Boots and shoes, including custom work and repairing	10	26, 600	79	34	3	51, 038	70, 277	157, 460
Boxes, fancy and paper	3	31, 000	47	230	3	64, 000	115, 687	223, 814
Brass castings	6	104, 000	168	8		85, 800	121, 000	275, 000
Bread and other bakery products	30	108, 250	162	28	14	83, 996	343, 190	475, 892
Brooms and brushes	3	6, 500	10	2		4, 300	11, 000	20, 800
Carpentering	47	144, 034	287		1	143, 257	300, 957	494, 734
Carriage and wagon materials	17	399, 199	234	3		125, 236	150, 972	360, 675
Carriages and wagons	26	910, 400	956	11	6	553, 892	810, 529	1, 699, 154
Clothing, men's	44	463, 966	400	350		291, 375	583, 698	1, 122, 080
Clothing, women's	10	2, 500	25	15		6, 960	42, 240	54, 960
Coffee and spices, roasted and ground	4	55, 000	22	4	2	15, 100	127, 000	161, 000
Confectionery	10	32, 650	37	22	8	19, 257	97, 353	169, 450
Corsets	9	500, 600	193	2, 614	17	448, 560	1, 300, 459	2, 109, 459
Cutlery and edge tools (see also Hardware; Tools)	3	25, 800	40			25, 000	6, 400	43, 600
Drain and sewer pipe	3	47, 063	22			8, 500	13, 000	26, 500
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	20	292, 750	376		12	203, 359	304, 091	637, 894
Furniture (see also Upholstering)	9	143, 600	142	4	2	64, 164	95, 915	193, 102
Hardware (see also Cutlery and edge tools; Tools)	11	978, 500	1, 851	48	39	945, 315	753, 716	1, 954, 260
Marble and stone work	10	34, 100	68			27, 058	24, 925	67, 494
Masonry, brick and stone	18	70, 400	227			107, 466	162, 667	305, 585
Matches	3	118, 000	62	78		42, 195	268, 219	355, 876
Models and patterns	5	3, 750	21			13, 515	5, 010	28, 200
Painting and paperhanging	27	32, 100	131		3	63, 267	69, 074	175, 775
Paper	3	135, 500	39	12	2	15, 500	81, 560	173, 400
Patent medicines and compounds	4	80, 800	15	4		7, 320	82, 650	120, 800
Photographing	14	15, 000	15	4	2	9, 500	15, 000	52, 000
Plumbing and gasfitting	18	83, 500	115		5	58, 459	99, 100	193, 125
Printing and publishing	12	234, 000	156	5	3	118, 382	58, 225	247, 000
Saddlery and harness	15	23, 700	47			20, 883	32, 486	73, 520
Sash, doors, and blinds	3	226, 000	131			63, 025	152, 167	241, 401
Shipbuilding	8	39, 350	70			34, 431	59, 570	102, 226
Slaughtering and meat-packing, not including retail butchering	6	222, 000	360		5	180, 609	3, 734, 851	4, 160, 780
Soap and candles	5	19, 000	15	1		5, 498	51, 100	65, 095
Springs, steel, car, and carriage	4	173, 000	114			65, 500	116, 360	255, 600
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	3	92, 500	39			19, 374	65, 153	109, 328
Tinware, copperware, and sheet-iron ware	8	36, 075	30			15, 161	22, 626	45, 300
Tobacco, cigars and cigarettes	23	92, 550	101	17	6	60, 361	90, 752	214, 561
Tools (see also Cutlery and edge tools; Hardware)	3	238, 000	127		2	74, 538	81, 500	248, 035
Upholstering (see also Furniture)	3	6, 200	9	4		5, 300	6, 600	14, 300
All other industries (*a*)	94	3, 371, 000	2, 921	1, 266	237	1, 545, 712	3, 868, 421	6, 393, 165

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a Embracing agricultural implements; ammunition; artificial limbs; awnings and tents; bags, paper; baking and yeast powders; baskets, rattan and willow ware; blacking; boots and shoes, rubber; boxes, cigar; boxes, wooden, packing; brick and tile; bridges; buttons; carpets, rag; carriages and sleds, children's; clock cases and materials; clocks; coffins, burial cases, and undertakers' goods; cooperage; drugs and chemicals; dyeing and cleaning; engraving and die-sinking; files; fire-arms; flavoring extracts; food preparations; hand-stamps; hats and caps; iron and steel; iron bolts, nuts, washers, and rivets; iron forgings; iron railing, wrought iron work, architectural and ornamental; ivory and bone work; jewelry and instrument cases; kaolin and ground earths; lamps and reflectors; leather, curried; lime; lithographing; liquors, distilled; lock- and gun-smithing; lumber, sawed; mattresses and spring beds; millinery and lace goods; mixed textiles; musical instruments, organs and materials; musical instruments, pianos and materials; oleomargarine; paints; photographic apparatus; pumps; rubber and elastic goods; saws; screws; shirts; silk and silk goods; sporting goods; starch; stereotyping and electrotyping; stone- and earthen-ware; toys and games; varnish; vinegar; wheelwrighting; window blinds and shades; wire; wirework; and wood, turned and carved.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF NEW ORLEANS, LA.

[Statistics collected under the direction of E. A. DESLONDE, Chief Special Agent. See note on page 379.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	915	$8, 565, 303	7, 666	1, 286	552	$3, 717, 557	$10, 771, 892	$18, 808, 096
Blacksmithing (see also Wheelwrighting)	64	31, 020	147	1	8	71, 965	53, 975	185, 673
Bookbinding and blank-book making	6	11, 000	16		3	10, 211	5, 520	24, 369
Boot and shoe findings	9	57, 200	40	2	6	20, 270	98, 932	171, 080
Boots and shoes, including custom work and repairing	64	43, 200	269		6	116, 809	174, 745	367, 531
Boxes, fancy and paper	4	14, 600	41	12	46	29, 483	59, 400	125, 928
Boxes, wooden, packing	4	15, 200	15	12	6	7, 572	10, 220	25, 200
Bread and other bakery products	99	109, 020	317	8	17	120, 766	540, 450	981, 160
Brooms and brushes	6	11, 750	63		3	22, 614	89, 381	134, 619
Carpentering	22	58, 600	262		4	138, 595	226, 400	439, 850
Carriages and wagons (see also Wheelwrighting)	8	38, 700	92		6	51, 196	46, 500	135, 600
Clothing, men's	33	190, 300	276	628	30	175, 971	743, 407	1, 078, 559
Clothing, women's	6	83, 000	2	273		43, 875	113, 353	189, 278
Coffee and spices, roasted and ground	3	1, 300	3		1	1, 524	9, 510	11, 876
Coffins, burial cases, and undertakers' goods	7	2, 900	9			2, 911	4, 122	13, 866
Confectionery	21	132, 800	86	11	17	33, 754	274, 571	393, 040
Cooperage	53	53, 650	256			109, 839	105, 704	276, 618
Cordials and sirups	4	48, 000	30			11, 966	43, 030	82, 000
Cotton compressing	19	2, 135, 000	560			399, 780	105, 788	747, 500
Dentistry, mechanical	3	9, 200	6		3	5, 350	8, 250	20, 150
Drugs and chemicals	7	16, 700	13			4, 190	8, 850	22, 750
Dyeing and cleaning	12	6, 925	13	3	1	5, 080	3, 890	22, 850
Flouring- and grist-mill products	4	69, 600	31			13, 823	248, 480	317, 000
Food preparations (see page 39)	4	16, 000	12	1	3	5, 328	19, 600	47, 880
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	20	738, 375	748		9	405, 745	596, 800	1, 228, 300
Furniture (see also Mattresses and spring beds; Upholstering)	33	32, 976	62	1	6	30, 281	35, 429	104, 593
Galvanizing	3	700	1			360	700	3, 050
Hairwork	6	6, 100	6	6		3, 592	6, 900	17, 600
Instruments, professional and scientific	3	1, 600	3			1, 260	1, 700	5, 460
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	3	1, 800	10			3, 477	4, 200	14, 500
Liquors, malt	8	157, 613	113			54, 992	295, 353	457, 744
Lithographing (see also Printing and publishing)	3	2, 000	8			4, 500	3, 250	13, 500
Lock- and gun-smithing	12	2, 600	11			2, 700	1, 980	11, 670
Looking-glass and picture frames	5	7, 050	6		1	2, 892	8, 575	16, 559
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	7	78, 500	98		4	44, 873	162, 610	267, 280
Lumber, sawed	6	152, 200	53			17, 595	180, 985	234, 340
Marble and stone work	11	62, 550	65			32, 575	61, 208	134, 490
Masonry, brick and stone	16	17, 500	85		15	36, 500	30, 700	90, 500
Mattresses and spring beds (see also Furniture)	3	3, 450	8	1		2, 712	25, 500	39, 200
Mineral and soda waters	7	29, 100	37			18, 312	24, 350	75, 900
Oil, cottonseed and cake	7	785, 500	836	15	65	275, 165	1, 630, 150	2, 751, 150
Painting and paperhanging	12	10, 425	98			30, 412	33, 800	86 600
Photographing	12	39, 100	37	6	2	27, 390	19, 399	79, 765
Plumbing and gasfitting	9	16, 300	31			17, 441	40, 500	71, 600
Printing and publishing (see also Lithographing)	25	303, 050	503	4	17	407, 946	226, 600	764, 036
Rice cleaning and polishing	6	225, 000	162			56, 040	1, 328, 387	1, 573, 261
Saddlery and harness	23	169, 500	144	1	15	74, 674	204, 750	370, 505
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	4	285, 000	159			81, 800	246, 000	432, 000
Shipbuilding	17	145, 200	194			99, 366	101, 965	263, 850
Soap and candles	12	118, 450	45		6	19, 790	89, 990	142, 495
Sugar and molasses, refined	4	385, 000	190			50, 000	1, 340, 000	1, 483, 000
Surgical appliances	3	1, 550	5			2, 070	1, 675	6, 060
Tinware, copperware, and sheet-iron ware	34	94, 300	110		3	51, 271	105, 890	199, 559
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	8	348, 000	127	6	88	70, 540	242, 100	424, 085
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	47	175, 674	680	187	87	179, 999	152, 156	506, 612
Upholstering (see also Furniture)	12	8, 325	15			3, 335	9, 575	20, 640
Upholstering materials	3	30, 000	21	41	2	19, 530	100, 000	153, 000
Watch and clock repairing	13	11, 600	23			14, 795	8, 346	32, 379
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	10	13, 900	25		1	7, 708	7, 825	25, 112
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	3	5, 400	11			6, 225	21, 542	39, 404
All other industries (*a*)	43	944, 250	377	67	71	156, 822	426, 954	855, 360

a Embracing bags, other than paper; baskets, rattan and willow ware; brick and tile; brass castings; cars, railroad, street, and repairs; cordage and twine; cork cutting; cotton goods; cutlery and edge tools; fertilizers; flags and banners; fruits and vegetables, canned and preserved; gold and silver, reduced and refined; hammocks; hardware; ice, artificial; japanning; leather, curried; leather, tanned; liquors, distilled; mirrors; patent medicines and compounds; perfumery and cosmetics; plated and britannia ware; pumps; stencils and brands; stone- and earthen-ware; trunks and valises; umbrellas and canes; and vinegar.

CITY OF NEWPORT, KY.

[Statistics collected under the direction of JOHN H. BODLEY, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	94	$1, 700, 715	1, 608	35	105	$711, 019	$2, 526, 936	$3, 996, 995
Boots and shoes, including custom work and repairing	8	20, 300	29	8	6	15, 330	19, 800	43, 875
Bread and other bakery products	14	17, 500	19		4	7, 611	8, 925	19, 600
Carpentering	11	45, 300	46		4	16, 335	47, 236	103, 836
Carriages and wagons (see also Wheelwrighting)	3	31, 000	25			11, 120	18, 500	45, 600
Foundery and machine-shop products	3	117, 500	280		3	89, 011	309, 707	471, 349

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF NEWPORT, KY.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Iron and steel	3	$640,000	760			$305,500	$1,359,990	$2,033,950
Marble and stone work	3	5,500	16			7,500	5,000	17,000
Tinware, copperware, and sheet-iron ware	4	5,500	12		1	3,700	3,500	9,400
Tobacco, cigars and cigarettes	23	16,800	51		13	17,600	22,360	49,000
Wheelwrighting (see also Carriages and wagons)	4	2,300	11			3,503	2,200	7,550
All other industries (*a*)	18	799,015	359	27	74	233,809	729,718	1,196,435

a Embracing agricultural implements; awnings and tents; boxes, cigar; brick and tile; clothing, men's; confectionery; flouring- and grist-mill products; gold and silver leaf and foil; liquors, malt; lumber, planed; lumber, sawed; mineral and soda waters; printing and publishing; saddlery and harness; watch cases; and wheelbarrows.

CITY OF NEW YORK, N. Y.

[Statistics collected under the direction of CHARLES E. HILL, Chief Special Agent. See Note on page 379.]

All industries	11,339	$181,206,356	146,179	71,795	9,378	$97,030,021	$288,441,691	$472,926,437
Artificial feathers and flowers (see also Millinery and lace goods)	141	1,090,100	453	2,941	104	934,768	2,241,302	4,298,684
Artificial limbs (see also Surgical appliances)	7	23,500	17			11,137	6,056	44,620
Awnings and tents	23	108,600	120	77	7	74,212	314,808	457,035
Bags, other than paper	7	655,500	259	406	82	317,850	2,919,600	3,584,300
Bags, paper	10	69,700	123	95		74,709	154,600	299,847
Baskets, rattan and willow ware	21	82,080	69	29	8	35,715	77,822	171,030
Belting and hose, leather	11	399,209	234	18	5	150,694	1,362,860	1,699,729
Billiard tables and materials	7	315,469	100		2	63,174	278,443	439,330
Blacking	4	110,500	86			56,500	171,000	432,660
Blacksmithing (see also Wheelwrighting)	205	282,463	548		31	367,959	284,517	937,144
Bookbinding and blank-book making	114	2,340,650	1,837	2,059	172	1,553,704	2,290,627	4,927,886
Boot and shoe findings	7	22,350	27	8	14	18,687	34,692	81,100
Boot and shoe uppers	18	45,934	48	33	2	33,468	97,952	180,702
Boots and shoes, including custom work and repairing	839	1,898,669	4,326	1,078	183	2,474,050	3,621,822	7,663,000
Boxes, cigar	20	340,800	441	225	144	301,042	433,218	1,035,549
Boxes, fancy and paper	55	672,075	615	1,655	85	671,620	1,044,409	2,173,565
Boxes, wooden, packing	33	358,500	491		24	306,682	715,790	1,242,844
Brass castings	64	885,171	1,074	62	194	576,971	884,737	1,826,845
Bread and other bakery products	782	2,032,036	2,443	283	111	1,275,723	6,045,762	9,415,424
Brooms and brushes	45	729,750	506	146	42	281,924	981,918	1,573,561
Buttons	9	155,000	93	693	66	178,618	167,336	491,027
Carpentering	460	1,745,782	3,438		61	2,242,060	3,454,265	7,096,315
Carriages and sleds, children's	9	127,000	267	7	4	127,260	216,840	434,569
Carriages and wagons (see also Wheelwrighting)	139	1,133,900	1,517		85	965,719	1,041,825	2,613,361
Cars, railroad, street, and repairs	13	316,748	339		9	200,776	269,532	547,037
Chocolate	4	55,500	39	44		26,203	157,403	257,153
Cloth finishing	8	13,600	42		2	17,188	26,656	91,129
Clothing, men's	736	22,396,893	30,444	16,972	231	14,012,805	40,269,340	60,798,697
Clothing, women's	230	4,805,665	1,569	10,750	47	3,886,715	11,745,305	18,930,553
Coffee and spices, roasted and ground	30	1,439,650	363	64	13	267,670	4,766,520	5,974,458
Coffins, burial cases, and undertakers' goods	45	530,500	273	136	9	218,175	525,503	1,098,103
Combs	3	2,300	10		1	7,008	4,125	13,719
Confectionery	187	1,521,758	1,003	629	115	542,775	3,057,999	4,592,622
Cooperage	44	257,800	450		5	213,922	501,288	895,571
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	25	435,702	368		1	260,184	591,313	925,259
Cork cutting	11	53,660	31	19	4	20,710	55,666	121,148
Corsets	21	179,900	61	950	104	193,493	383,061	685,273
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	5	522,500	120	79	36	96,704	367,188	532,542
Cutlery and edge tools (see also Hardware)	21	41,900	66		2	43,791	17,113	92,760
Drugs and chemicals (see also Patent medicines and compounds)	27	2,027,923	383	198	7	305,969	2,639,415	3,694,178
Dyeing and cleaning	27	30,825	44	20		28,845	18,820	82,750
Dyeing and finishing textiles	23	475,500	373	54	20	247,445	194,544	690,236
Electroplating	58	170,050	385	44	27	213,405	153,812	572,718
Enameling	8	16,700	14	9		8,820	9,174	38,683
Engravers' materials	7	48,200	56	3		32,320	21,964	70,500
Engraving and die-sinking	98	143,780	252	4	47	143,792	89,636	448,483
Engraving, steel	21	531,300	455	189	60	1,154,510	384,214	1,798,550
Engraving, wood	58	16,178	133	4	5	102,986	13,709	218,305
Fancy articles	48	433,700	593	328	52	362,589	392,849	1,061,205
Fertilizers	8	502,000	193		5	88,463	172,122	314,961
Flags and banners	4	32,000	5	31		14,800	25,500	60,000
Flavoring extracts	5	19,500	14	5	1	8,625	38,648	63,362
Flouring- and grist-mill products	15	1,870,625	418			289,741	5,183,154	6,229,926
Food preparations (see page 39)	10	237,900	85	26	3	66,261	338,857	476,901
Foundery and machine-shop products (see also Steam fittings and heating apparatus.)	287	10,635,508	9,352	31	370	5,373,142	6,223,805	14,710,835
Fruits and vegetables, canned and preserved	4	200,000	69	178		56,200	335,000	450,000
Furnishing goods, men's	49	1,377,200	348	1,829	39	719,897	2,435,352	4,038,380
Furniture (see also Mattresses and spring beds; Upholstering)	299	4,353,683	5,531	192	215	3,361,306	4,204,602	9,605,779
Furs, dressed	60	1,950,875	830	1,588	22	868,615	2,943,357	4,474,018
Galvanizing	8	273,000	229		12	122,620	351,800	850,770
Gas and lamp fixtures	14	2,105,000	1,369	28	98	793,678	965,565	2,549,628
Glass, cut, stained, and ornamented	98	557,980	813	86	127	432,500	845,654	1,747,501
Gloves and mittens (see also Hosiery and knit goods)	5	492,000	31	127		63,600	569,950	916,500
Gold and silver leaf and foil	20	144,500	240	102	8	177,690	320,810	554,172
Gold and silver, reduced and refined	8	143,000	78			52,852	2,525,795	2,614,877
Grease and tallow	11	461,334	278	3	6	160,074	6,242,761	6,871,175
Hairwork	43	132,575	67	236	11	111,512	236,646	510,399
Hand-knit goods	6	3,100	2	42		7,162	8,917	19,722
Hand-stamps	13	33,200	48		1	25,478	23,330	99,560
Hardware (see also Cutlery and edge tools)	67	568,590	923	18	77	543,979	615,199	1,479,492

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF NEW YORK, N. Y.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Hat and cap materials	38	$387, 228	408	274	15	$275, 214	$651, 092	$1, 157, 826
Hats and caps, not including wool hats	111	1, 033, 575	1, 283	1, 302	46	1, 120, 846	2, 097, 760	4, 008, 503
Hosiery and knit goods (see also Cotton goods; Gloves and mittens)	8	310, 000	81	367	53	174, 349	376, 760	604, 214
Housefurnishing goods	5	11, 250	21		11	11, 108	9, 994	27, 243
Ink	3	59, 000	24	10	7	13, 030	136, 000	181, 500
Instruments, professional and scientific	44	304, 750	235	4	8	143, 446	97, 430	389, 307
Iron bolts, nuts, washers, and rivets	9	115, 050	122	6	2	60, 849	144, 720	249, 222
Iron pipe, wrought	7	329, 500	142		12	56, 519	468, 071	626, 065
Iron railing, wrought	29	104, 450	180		5	119, 352	146, 915	358, 170
Ivory and bone work	8	166, 972	171	59	14	91, 040	191, 774	333, 919
Japanning	9	8, 750	22		15	13, 876	4, 283	30, 100
Jewelry	240	2, 531, 838	1, 962	213	106	1, 365, 611	2, 533, 916	5, 002, 198
Kindling wood	41	475, 850	442	8	88	217, 042	727, 958	1, 213, 088
Lamps and reflectors	20	267, 000	296	3	9	171, 499	243, 739	602, 567
Lapidary work	26	99, 250	90	11	16	80, 226	128, 682	313, 230
Lard, refined	11	786, 366	492		10	254, 883	14, 317, 826	14, 758, 718
Lasts	3	7, 500	19	2		9, 219	3, 600	28, 516
Lead, bar, pipe, sheet, and shot	7	848, 575	95	3	1	53, 145	1, 189, 492	1, 619, 217
Leather, curried	14	234, 110	78			50, 393	336, 532	447, 319
Leather goods	45	481, 100	781	129	37	425, 280	951, 573	1, 762, 278
Leather, tanned	9	1, 065, 500	375	23	17	171, 418	909, 219	1, 161, 177
Liquors, malt	79	13, 491, 000	4, 245			2, 115, 067	10, 717, 421	19, 137, 882
Lithographing (see also Printing and publishing)	48	1, 227, 550	968	54	117	667, 762	602, 960	1, 738, 452
Lock- and gun-smithing	70	65, 625	96	2	23	63, 143	67, 547	214, 110
Looking-glass and picture frames	81	680, 350	923	7	64	485, 935	1, 177, 407	2, 071, 565
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	43	883, 197	736		26	425, 983	1, 152, 860	2, 220, 919
Malt	15	3, 150, 000	399			223, 678	2, 634, 413	3, 350, 731
Marble and stone work	146	2, 257, 388	2, 850		99	2, 080, 563	2, 193, 983	5, 771, 069
Masonry, brick, and stone	90	668, 650	1, 161		20	708, 777	1, 133, 852	2, 334, 659
Mattresses and spring beds (see also Furniture)	21	327, 750	206	83	9	150, 215	671, 066	1, 023, 494
Millinery and lace goods (see also Artificial feathers and flowers)	88	1, 251, 180	678	2, 665	128	996, 480	3, 237, 908	5, 153, 080
Mineral and soda waters	27	483, 948	384		41	242, 582	302, 387	784, 573
Mixed textiles (see also Cotton goods; Silk and silk goods)	74	1, 787, 350	1, 372	2, 834	495	1, 285, 649	2, 336, 577	4, 825, 424
Models and patterns	21	24, 300	64		3	44, 621	18, 169	100, 760
Musical instruments, organs and materials	34	346, 525	216	8	20	146, 893	114, 581	371, 421
Musical instruments, pianos and materials	48	4, 462, 370	3, 213		32	2, 821, 687	2, 972, 765	6, 913, 601
Oil, lubricating	4	36, 800	17			7, 300	58, 600	78, 750
Oleomargarine	4	610, 500	248			113, 676	4, 322, 695	5, 215, 393
Painting and paperhanging	293	841, 914	1, 794	19	39	1, 099, 719	1, 186, 478	3, 058, 487
Paints	26	1, 581, 600	439	22	24	250, 865	2, 144, 321	2, 932, 049
Paperhangings	11	1, 965, 000	825	84	420	415, 120	2, 054, 104	3, 499, 143
Patent medicines and compounds (see also Drugs and chemicals)	44	828, 500	176	133	22	146, 773	570, 332	1, 302, 313
Pens, gold	8	227, 550	121	5	16	116, 279	142, 366	365, 782
Perfumery and cosmetics	16	377, 050	135	162	4	92, 237	625, 900	1, 094, 700
Photographing	110	441, 100	583	162	23	363, 158	343, 177	1, 140, 427
Pickles, preserves, and sauces	13	204, 700	102	65	30	47, 660	272, 250	527, 856
Pipes, tobacco	10	85, 700	152	13	11	87, 258	102, 788	262, 188
Plumbing and gasfitting	401	967, 858	1, 889	1	118	1, 128, 260	1, 869, 728	3, 900, 414
Pocket-books	33	282, 650	489	76	54	284, 173	530, 373	1, 028, 352
Printing and publishing (see also Lithographing)	412	14, 774, 9[illegible]9	8, 015	979	584	5, 876, 868	7, 359, 559	21, 696, 354
Printing materials	5	64, 000	43		5	28, 850	79, 100	151, 000
Pumps, not including steam pumps	14	54, 650	51			35, 323	70, 896	151, 094
Refrigerators	18	206, 528	236	1	8	116, 067	270, 224	503, 869
Regalia and society banners and emblems	12	161, 200	56	16	3	30, 471	59, 701	142, 363
Roofing and roofing materials	88	260, 730	499		16	294, 540	483, 561	993, 110
Rubber and elastic goods	14	425, 200	242	149	14	189, 425	495, 338	859, 262
Saddlery and harness	174	400, 272	520	13	30	314, 444	405, 032	1, 037, 768
Safes, doors, and vaults, fire-proof	5	304, 000	302		15	169, 598	248, 410	518, 516
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	29	241, 600	461		9	258, 017	481, 458	867, 995
Scales and balances	6	167, 500	81		1	55, 304	66, 186	168, 234
Sewing machines and attachments	6	61, 500	180	3	13	110, 900	71, 950	269, 100
Shipbuilding	79	1, 409, 100	941			778, 728	915, 110	2, 071, 005
Shirts	64	1, 647, 700	574	2, 814	13	1, 195, 581	3, 574, 215	5, 608, 015
Show-cases	14	45, 500	94		1	55, 123	76, 300	168, 980
Silk and silk goods (see also Mixed textiles)	126	3, 431, 450	1, 975	4, 531	1, 435	2, 079, 535	3, 857, 330	7, 800, 250
Silverware	16	1, 049, 600	682	28	95	556, 903	688, 402	1, 527, 600
Slaughtering and meat-packing, not including retail butchering	58	1, 801, 000	876		19	575, 521	27, 763, 577	29, 297, 527
Soap and candles	30	2, 931, 325	496	85	53	275, 804	2, 790, 545	3, 697, 964
Spectacles and eyeglasses	23	49, 450	83		7	46, 662	32, 493	120, 808
Sporting goods	14	613, 000	120	257	17	127, 643	199, 582	486, 417
Stamped ware (see also Tinware, copperware, and sheet-iron ware)	8	49, 140	44		33	28, 180	41, 941	97, 280
Stationery goods	73	1, 500, 925	925	664	92	676, 547	1, 840, 317	3, 179, 734
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	16	712, 500	481		5	305, 198	848, 268	1, 295, 259
Stone- and earthen-ware	8	183, 900	189	11	6	90, 828	70, 020	209, 600
Sugar and molasses, refined	5	2, 730, 000	554			255, 783	10, 677, 746	11, 330, 883
Surgical appliances (see also Artificial limbs)	11	40, 600	16	12	1	9, 668	11, 243	60, 448
Telegraph and telephone apparatus	21	290, 508	379	31	6	263, 444	305, 566	753, 439
Tinware, copperware, and sheet-iron ware (see also Coppersmithing; Stamped ware).	177	993, 720	1, 419	22	164	748, 208	1, 611, 389	3, 063, 501
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	17	1, 015, 540	826	750	46	645, 237	2, 687, 697	4, 320, 972
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	761	5, 858, 448	9, 423	4, 575	478	6, 066, 455	8, 805, 147	18, 347, 108

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF NEW YORK, N. Y.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Toys and games	15	$143, 550	218	195	57	$83, 689	$96, 783	$257, 113
Trunks and valises	34	226, 050	270	18	22	171, 716	360, 581	666, 766
Type founding	20	779, 500	413	106	54	326, 856	224, 850	793, 257
Umbrellas and canes	61	989, 550	540	786	19	520, 739	2, 424, 070	3, 456, 144
Upholstering (see also Furniture)	91	592, 037	452	232	38	294, 810	1, 255, 276	1, 952, 289
Vault lights and ventilators	10	128, 450	89			50, 285	75, 140	210, 216
Vinegar	5	121, 500	32		2	17, 116	143, 500	205, 050
Watch and clock repairing	55	163, 255	149	3	2	89, 990	207, 515	361, 641
Whalebone and rattan	6	71, 950	47	7		24, 997	223, 016	277, 000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	175	210, 680	430		19	251, 290	263, 093	756, 406
Window blinds and shades	11	146, 350	109	11	4	81, 664	101, 850	282, 000
Wirework	38	478, 100	561	42	160	373, 666	540, 618	1, 250, 306
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	94	507, 520	784	3	38	441, 547	673, 614	1, 351, 789
All other industries (*a*)	53	5, 701, 150	1, 581	1, 809	266	1, 479, 670	5, 693, 964	8, 968, 184

a Embracing axle-grease; babbitt metal and solder; baking and yeast powders; bluing; bridges; brick and tile; bronze castings; calcium lights; carpets, other than rag; cigar molds; cleansing and polishing preparations; cordage and twine; electrical apparatus; felt goods; files; gas machines and meters; iron and steel; iron forgings; iron work, architectural and ornamental; jewelry and instrument cases; labels and tags; matches; mirrors; musical instruments and materials (not specified); needles and pins; oil, lard; saws; shoddy; soda-water apparatus; springs, steel, car, and carriage; stereotyping and electrotyping; straw goods; taxidermy; tinfoil; wooden ware; and worsted goods.

CITY OF NORFOLK, VA.

[Statistics collected under the direction of D. P. MORRIS, Special Agent.)

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	105	$570, 276	668	61	23	$317, 528	$861, 026	$1, 455, 987
Agricultural implements	3	71, 000	19			8, 250	31, 200	49, 500
Blacksmithing	8	2, 550	23			8, 350	9, 200	23, 800
Boots and shoes, including custom work and repairing	4	2, 500	7			3, 069	6, 450	12, 750
Bread and other bakery products	9	39, 200	66	15	7	25, 921	144, 000	200, 700
Carpentering	6	15, 300	57		1	25, 900	32, 100	74, 500
Carriages and wagons	4	81, 200	68		5	27, 500	75, 500	123, 800
Clothing, men's	9	22, 800	40	39		37, 305	39, 200	109, 800
Cooperage	3	906	6			2, 443	1, 950	6, 500
Flouring- and grist-mill products	5	96, 500	24			8, 762	287, 060	336, 737
Foundery and machine-shop products	4	73, 000	83		2	35, 800	33, 236	82, 850
Plumbing and gasfitting	3	3, 700	18		1	8, 700	9, 900	25, 200
Printing and publishing	5	55, 600	73			41, 000	27, 300	94, 400
Shipbuilding	3	26, 600	18			12, 100	15, 300	34, 300
Tinware, copperware, and sheet-iron ware	9	31, 000	71		3	33, 600	54, 173	108, 400
Tobacco, cigars and cigarettes	7	5, 500	24		1	9, 850	9, 294	25, 000
Watch and clock repairing	3	10, 000	14			9, 052	4, 100	18, 000
All other industries (*a*)	20	22, 920	57	7	3	19, 926	81, 063	138, 750

a Embracing coffee and spices, roasted and ground; coffins, burial cases, and undertakers' goods; confectionery; iron railing, wrought; kindling wood; leather, tanned; lumber, planed; marble and stone work; masonry, brick and stone; painting and paperhanging; pumps; saddlery and harness; shirts; stationery goods; and wheelwrighting.

CITY OF OAKLAND, CAL.

[Statistics collected under the direction of JAMES R. HARDENBERG, Chief Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	72	$1, 371, 457	1, 369	13	5	$759, 917	$2, 012, 695	$3, 181, 066
Boots and shoes, including custom work and repairing	4	37, 000	19	2		8, 257	9, 760	23, 802
Bread and other bakery products	6	10, 400	22	1		14, 700	54, 900	88, 000
Carriages and wagons	4	20, 872	31	1		20, 800	29, 500	75, 800
Flouring- and grist-mill products	3	240, 000	44			24, 974	710, 000	800, 510
Foundery and machine-shop products	4	21, 500	22			11, 440	15, 200	36, 500
Liquors, malt	3	105, 000	67			28, 235	102, 327	183, 500
Lumber, planed	3	169, 535	108			77, 538	72, 000	178, 000
Marble and stone work	3	4, 500	12			7, 550	7, 400	18, 970
Plumbing and gasfitting	5	67, 000	41		2	23, 810	44, 780	79, 000
Saddlery and harness	6	17, 050	19			9, 638	15, 560	37, 688
Shipbuilding	3	120, 300	166			187, 911	482, 268	686, 296
Tobacco, cigars and cigarettes	6	7, 800	17		1	4, 850	11, 650	26, 000
All other industries (*a*)	22	550, 500	801	9	2	340, 214	457, 350	947, 000

a Embracing bags, other than paper; blacksmithing; boxes, wooden, packing; brooms and brushes; carpentering; confectionery; furniture; hats and caps; ice, artificial; iron railing, wrought; leather, tanned; painting and paperhanging; stone- and earthen-ware; terra-cotta ware; tinware, copperware, and sheet-iron ware; upholstering; and upholstering materials.

CITY OF OMAHA, NEBR.

[Statistics collected under the direction of PHILIP ANDRES, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	154	$1, 835, 800	1, 466	64	158	$726, 918	$2, 527, 476	$4, 280, 866
Blacksmithing (see also Wheelwrighting)	7	14, 550	11			6, 240	6, 225	20, 575
Boots and shoes, including custom work and repairing	9	22, 650	29			15, 930	12, 550	38, 760
Bread and other bakery products	5	24, 800	36	3	4	17, 050	61, 300	103, 400
Brick and tile	8	35, 100	76		45	42, 960	30, 730	101, 771
Carpentering	10	12, 500	77			26, 900	57, 780	109, 760
Clothing, men's	4	26, 400	28		1	21, 918	26, 950	55, 268
Cooperage	5	23, 000	41			25, 500	48, 387	78, 000
Foundery and machine-shop products	4	43, 000	77			39, 543	26, 748	85, 000
Furniture	3	8, 650	5	2		2, 700	10, 350	17, 800
Jewelry	3	49, 000	25		2	14, 500	105, 000	210, 000

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF OMAHA, NEBR.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Liquors, malt	4	$285, 000	93			$37, 595	$133, 117	$259, 460
Marble and stone work	3	4, 400	7			2, 100	3, 800	11, 100
Masonry, brick and stone	6	25, 500	140		12	40, 200	65, 036	129, 000
Painting and paperhanging	7	30, 750	64		5	29, 515	34, 239	88, 000
Printing and publishing	9	145, 750	127	22	51	112, 380	112, 300	284, 461
Saddlery and harness	3	68, 950	21		1	11, 713	33, 900	50, 400
Slaughtering and meat-packing, not including retail butchering	5	249, 200	147		1	49, 420	790, 256	991, 790
Tinware, copperware, and sheet-iron ware	7	32, 000	51			22, 150	49, 300	94, 000
Tobacco, cigars and cigarettes	8	35, 450	43	2	14	28, 267	51, 200	113, 194
Wheelwrighting (see also Blacksmithing)	4	5, 700	7			4, 772	3, 830	14, 572
All other industries (*a*)	40	693, 450	361	35	22	175, 565	864, 478	1, 428, 955

a Embracing billiard tables and materials; boxes, wooden, packing; brass castings; brooms and brushes; carpets, rag; carriages and wagons; clothing, women's; coffee and spices, roasted and ground; drugs and chemicals; dyeing and cleaning; fertilizers; flouring- and grist-mill products; furs, dressed; iron and steel; liquors, distilled; looking-glass and picture frames; lumber, sawed; mineral and soda waters; oil, linseed; paints; patent medicines and compounds; photographing; plumbing and gasfitting; rubber and elastic goods; safes, doors, and vaults, fire-proof; shirts; show-cases; upholstering; vinegar; watch and clock repairing; and wirework.

CITY OF OSWEGO, N. Y.

[Statistics collected under the direction of ADELBERT E. BUELL, Special Agent.]

All industries	179	$2, 611, 238	1, 754	272	106	$756, 435	$3, 646, 845	$5, 619, 944
Blacksmithing (see also Wheelwrighting)	11	3, 120	10			2, 782	4, 275	14, 850
Boots and shoes, including custom work and repairing	16	13, 750	25			9, 576	21, 556	45, 983
Bread and other bakery products	7	42, 200	23	4		10, 021	49, 651	74, 746
Carpentering	11	21, 100	61		1	21, 960	26, 323	55, 575
Cooperage	12	24, 250	47		6	12, 637	44, 595	66, 010
Flouring- and grist-mill products	5	465, 000	74			37, 102	1, 136, 974	1, 591, 759
Foundery and machine-shop products	5	416, 818	363		2	153, 904	258, 311	552, 780
Furniture	4	19, 500	19	1		8, 902	17, 100	37, 000
Liquors, malt	3	68, 000	12		1	6, 146	30, 970	55, 125
Lumber, planed	4	160, 500	111			47, 300	163, 605	238, 932
Marble and stone work	4	11, 500	7			1, 875	3, 585	11, 399
Painting and paperhanging	6	20, 300	38		2	13, 264	20, 000	42, 350
Photographing	3	10, 150	5	1		1, 732	3, 290	7, 857
Plumbing and gasfitting	3	12, 000	17			10, 100	33, 240	55, 054
Printing and publishing	3	110, 000	70		14	27, 956	15, 401	66, 580
Saddlery and harness	4	4, 800	8			2, 950	6, 600	12, 200
Shipbuilding	7	27, 500	58			23, 072	22, 030	50, 563
Tinware, copperware, and sheet-iron ware	15	19, 300	34			15, 394	27, 700	63, 950
Wheelwrighting (see also Blacksmithing)	5	8, 600	13			5, 405	5, 400	14, 900
All other industries (*a*)	51	1, 152, 850	759	266	80	344, 357	1, 756, 239	2, 562, 331

a Embracing baking and yeast powders; baskets, rattan and willow ware; boxes, cigar; boxes, fancy and paper; carriages and wagons; cement; coffins, burial cases, and undertakers' goods; confectionery; cutlery and edge tools; drain and sewer pipe; drugs and chemicals; dyeing and cleaning; gloves and mittens; hats and caps; hosiery and knit goods; instruments, professional and scientific; iron railing, wrought; leather, curried; leather, tanned; lime; lock- and gun-smithing; looking-glass and picture frames; lumber, sawed; malt; mineral and soda waters; mixed textiles; patent medicines and compounds; pumps; sash, doors, and blinds; shirts; soap and candles; sporting goods; starch; tobacco, cigars and cigarettes; upholstering; watch and clock repairing; window blinds and shades; and wood, turned and carved.

CITY OF PATERSON, N. J.

[Statistics collected under the direction of HENRY VAN GIESON, Special Agent.]

All industries	346	$12, 412, 942	10, 270	6, 576	2, 953	$6, 992, 487	$14, 623, 833	$26, 503, 350
Belting and hose, leather	4	36, 500	27			12, 434	57, 196	82, 345
Blacksmithing (see also Wheelwrighting)	19	14, 250	33			15, 479	14, 010	46, 390
Boots and shoes, including custom work and repairing	12	7, 900	34	2	1	10, 881	12, 957	29, 360
Brass castings	3	152, 000	234			112, 250	14, 500	183, 500
Bread and other bakery products	31	71, 390	40			14, 620	74, 439	134, 510
Card cutting and designing	4	4, 800	27		4	9, 550	4, 690	18, 350
Carpentering	22	100, 100	237	2	1	116, 408	308, 125	490, 982
Carriages and wagons (see also Wheelwrighting)	4	40, 000	43			21, 340	11, 700	48, 718
Cotton goods (see also Mixed textiles)	3	548, 877	324	344	209	284, 011	423, 226	1, 097, 020
Dentistry, mechanical	3	2, 000	3			1, 700	1, 500	5, 583
Dyeing and finishing textiles	10	511, 600	557	38	44	312, 265	412, 140	918, 583
Foundery and machine-shop products	27	1, 671, 500	2, 597	86	124	1, 055, 822	1, 695, 274	3, 029, 989
Liquors, malt	6	592, 000	138			59, 611	311, 265	546, 510
Looking-glass and picture frames	3	3, 000	6			1, 890	9, 950	14, 300
Marble and stone work	5	20, 500	28			11, 767	11, 615	40, 675
Mixed textiles (see also Cotton goods; Silk and silk goods)	6	799, 500	402	431	211	313, 050	631, 600	1, 164, 050
Painting and paperhanging	13	9, 650	42		2	22, 738	26, 490	60, 930
Photographing	3	11, 500	6	3	3	5, 300	4, 500	15, 000
Plumbing and gasfitting	7	20, 100	37			19, 232	35, 300	70, 815
Printing and publishing	4	61, 500	45	26	10	33, 891	29, 517	92, 522
Saddlery and harness	4	10, 800	15			9, 100	20, 000	38, 551
Silk and silk goods (see also Mixed textiles)	82	5, 660, 525	3, 543	4, 169	2, 697	3, 335, 045	8, 099, 161	14, 164, 465
Tinware, copperware, and sheet-iron ware	13	49, 100	91			37, 049	60, 873	125, 680
Tobacco, cigars and cigarettes	14	16, 400	37		3	14, 210	30, 030	62, 130
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	3	4, 400	5			2, 050	2, 450	5, 280
Wood, turned and carved	5	42, 300	79		10	29, 898	23, 150	62, 850
All other industries (*a*)	36	1, 950, 750	1, 640	1, 475	234	1, 170, 896	2, 298, 175	3, 954, 262

a Embracing bagging, flax, hemp, and jute; boxes, fancy and paper; brick and tile; carriage and wagon materials; clothing, men's; felt goods; files; flouring- and grist-mill products; furniture; glue; handles, wooden; iron and steel; iron bolts, nuts, washers, and rivets; lumber, planed; models and patterns; paints; paper; printing materials; shirts; shoddy; soap and candles; stationery goods; thread, linen; tobacco, chewing, smoking, and snuff; toys and games; wire; and worsted goods.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF PEORIA, ILL.

[Statistics collected under the direction of HENRY C. BESTOR, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	296	$4, 160, 707	3, 619	313	135	$1, 507, 666	$9, 556, 476	$14, 228, 134
Agricultural implements	5	250, 000	241		4	87, 500	217, 000	438, 000
Baking and yeast powders	3	9, 200	9	7		5, 675	27, 150	43, 500
Blacksmithing (see also Wheelwrighting)	15	11, 950	34			13, 986	15, 490	44, 370
Boots and shoes, including custom work and repairing	26	8, 025	29			11, 007	16, 750	45, 225
Carpentering	22	97, 400	265			96, 827	265, 400	429, 550
Carpets, rag	3	1, 700	5	1		2, 555	4, 100	9, 450
Carriages and wagons (see also Wheelwrighting)	6	66, 000	52		10	26, 200	62, 000	110, 232
Coffins, burial cases, and undertakers' goods	5	18, 500	4			1, 550	11, 000	23, 725
Clothing, men's	15	160, 750	97	179		64, 045	422, 853	603, 865
Cooperage	15	43, 300	216		4	96, 460	193, 391	330, 650
Flouring- and grist-mill products	3	80, 000	29			16, 500	263, 250	309, 500
Foundery and machine-shop products	7	142, 100	210			97, 932	124, 100	268, 750
Furniture (see Upholstering)	6	41, 700	47			25, 596	41, 735	90, 625
Furs, dressed	3	4, 400	7	14		4, 600	8, 300	16, 750
Hairwork	3	800		4		560	1, 800	4, 000
Liquors, distilled	14	1, 679, 000	1, 076			480, 000	5, 735, 000	8, 196, 000
Liquors, malt	3	153, 000	44			16, 695	81, 528	127, 667
Lock- and gun-smithing	5	3, 700	12			3, 752	3, 429	12, 300
Lumber, planed	4	109, 000	74		3	36, 615	56, 000	120, 500
Marble and stone work	8	17, 300	32			16, 650	25, 500	57, 650
Mineral and soda waters	3	23, 500	12		2	3, 046	6, 400	15, 300
Painting and paperhanging	17	11, 840	50		1	15, 970	24, 950	58, 400
Plumbing and gasfitting	6	62, 500	74	1	10	34, 448	103, 500	176, 000
Printing and publishing	12	100, 750	121	21	37	82, 069	52, 575	186, 215
Saddlery and harness	6	22, 470	37			16, 715	47, 612	94, 518
Slaughtering and meat-packing, not including retail butchering	3	205, 000	174		19	15, 900	713, 881	756, 033
Tinware, copperware, and sheet-iron ware	16	81, 775	62		1	31, 506	89, 800	150, 650
Tobacco, cigars and cigarettes	10	24, 525	53		21	30, 509	43, 092	95, 430
Upholstering (see also Furniture)	3	1, 200	4			1, 790	1, 800	6, 300
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	5	3, 400	12			5, 272	7, 200	15, 700
All other industries (*a*)	44	725, 922	537	86	23	165, 736	889, 890	1, 391, 279

a Embracing awnings and tents; baskets, rattan and willow ware; bookbinding and blank-book making; boxes, cigar; boxes, fancy and paper; bread and other bakery products; brick and tile; brooms and brushes; buttons; coffee and spices, roasted and ground; confectionery; cordage and twine; corsets; drugs and chemicals; electroplating; engraving and die-sinking; files; glucose; grease and tallow; hats and caps; housefurnishing goods; iron work, architectural and ornamental; lime; looking-glass and picture frames; lumber, sawed; pumps; roofing and roofing materials; safes, doors, and vaults, fire-proof; saws; shipbuilding; shirts; show-cases; soap and candles; starch; stone- and earthen-ware; trunks and valises; and wire.

CITY OF PETERSBURG, VA.

[Statistics collected under the direction of S. S. NORTHINGTON, Special Agent]

All industries	115	$1, 755, 415	2, 209	1, 245	742	$602, 749	$3, 290, 116	$4, 643, 015
Agricultural implements	3	31, 000	68			21, 430	22, 490	50, 565
Blacksmithing (see also Wheelwrighting)	7	3, 080	9			2, 400	2, 625	9, 000
Boots and shoes, including custom work and repairing	15	680	23			4, 800	5, 104	15, 116
Bread and other bakery products	8	6, 750	32	2	1	7, 462	40, 600	57, 900
Carpentering	7	5, 975	63			17, 850	27, 600	52, 700
Clothing, men's	5	6, 130	16	9		8, 186	18, 380	36, 280
Cotton goods	5	855, 100	201	368	167	111, 052	458, 890	747, 812
Flouring- and grist-mill products	4	107, 500	28			8, 400	181, 360	210, 545
Painting and paperhanging	3	1, 050	8			2, 075	3, 000	5, 923
Photographing	3	1, 300					1, 400	4, 200
Printing and publishing	3	12, 000	29		2	15, 252	14, 800	37, 000
Tinware, copperware, and sheet-iron ware	4	6, 200	20			6, 600	16, 160	33, 600
Tobacco, chewing, smoking, and snuff	14	658, 500	1, 516	864	502	347, 345	2, 395, 196	3, 194, 245
Watch and clock repairing	3	800	2			250	1, 000	3, 325
Wheelwrighting (see also Blacksmithing)	5	2, 225	11			2, 595	2, 720	8, 400
All other industries (*a*)	26	57, 125	183	2	10	46, 992	98, 851	176, 404

a Embracing brick and tile; brooms and brushes; carriages and wagons; coffins, burial cases, and undertakers' goods; cooperage; foundery and machine-shop products; lock- and gun-smithing; lumber, planed; marble and stone work; masonry, brick and stone; patent medicines and compounds; plumbing and gasfitting; saddlery and harness; sash, doors, and blinds; slaughtering and meat-packing; soap and candles; tobacco, cigars and cigarettes; upholstering; and upholstering materials.

CITY OF PHILADELPHIA, PA.

[Statistics collected under the direction of WILLIAM ABBOTT, Chief Special Agent. See note on page 379.]

All industries	8, 567	$187, 148, 857	113, 075	56, 818	15, 634	$64, 265, 966	$199, 155, 477	$324, 342, 935
Agricultural implements	8	454, 000	336		8	179, 547	392, 875	739, 808
Artificial feathers and flowers (see also Millinery and lace goods)	6	81, 500	34	264	84	65, 330	91, 070	229, 500
Artificial limbs (see also Surgical appliances)	5	10, 300	16			5, 124	2, 000	11, 700
Awnings and tents	14	42, 900	79	50	11	25, 964	85, 989	143, 984
Bags, other than paper	5	198, 000	42	110		40, 215	478, 820	551, 000
Bags, paper	11	305, 200	96	261	6	94, 543	510, 327	712, 128
Baking and yeast powders (see also Drugs and chemicals)	3	9, 000	7	6	1	3, 548	26, 000	48, 500
Baskets, rattan and willow ware	11	26, 900	16		26	7, 154	20, 291	53, 611
Belting and hose, leather	8	279, 750	74		6	41, 165	361, 871	467, 545
Billiard tables and materials	3	25, 000	16			10, 300	26, 300	49, 700

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF PHILADELPHIA, PA.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Blacking	4	$175,000	42	97	5	$44,488	$220,061	$479,466
Blacksmithing (see also Wheelwrighting)	258	397,730	611		23	299,259	347,786	926,533
Bluing	4	50,200	17	19	1	12,500	25,438	75,300
Bone-, ivory-, and lamp-black	3	418,000	76	2	16	28,900	213,500	282,000
Bookbinding and blank-book making	51	853,250	812	795	138	537,419	709,317	1,631,970
Boot and shoe findings	15	95,450	53	57	2	40,821	100,230	174,420
Boot and shoe uppers	4	7,800	6	14	3	5,370	13,893	23,175
Boots and shoes, including custom work and repairing	581	2,970,190	4,931	2,337	267	2,788,409	4,819,017	9,034,496
Boxes, cigar	12	59,150	51	25	13	28,145	70,480	145,612
Boxes, fancy and paper	33	417,000	208	1,172	55	263,216	376,762	838,688
Boxes, wooden, packing	46	329,870	369	11	47	169,990	443,531	722,767
Brass castings (see also Bronze castings)	38	782,001	541	19	65	246,812	832,830	1,369,151
Bread and other bakery products	849	2,633,908	2,014	221	113	918,666	3,613,201	5,735,533
Brick and tile (see also Terra-cotta ware)	78	2,342,453	2,646		311	836,108	444,591	1,698,536
Bronze castings (see also Brass castings)	4	110,150	41		1	21,583	394,589	501,412
Brooms and brushes	60	447,884	455	56	199	190,105	416,276	792,179
Buttons	16	156,400	317	166	112	164,113	141,339	377,482
Card cutting and designing	5	8,993	15	12	6	8,665	10,920	33,320
Carpentering	326	1,556,630	2,695		6	1,338,545	3,014,618	5,131,862
Carpets, other than rag (see also Woolen goods)	170	7,194,483	5,686	2,378	759	3,029,331	8,964,581	14,263,510
Carpets, rag	58	61,375	146	1	12	47,254	97,419	196,060
Carriage and wagon materials	4	75,000	48			20,200	65,200	101,000
Carriages and sleds, children's	8	44,800	80	2	1	37,751	99,651	171,742
Carriages and wagons (see also Wheelwrighting)	110	1,921,300	1,562		16	767,834	823,643	2,057,119
Cars, railroad, street, and repairs	19	1,397,792	1,192	2	3	567,852	2,321,956	3,174,145
Cleansing and polishing preparations	4	176,300	31	3	7	16,100	37,175	110,000
Cloth finishing	5	107,000	64	11	17	32,702	36,236	92,000
Clothing, men's	426	8,726,276	6,716	10,849	81	4,085,239	11,853,139	18,506,748
Clothing, women's	49	792,950	308	2,300	48	479,436	1,503,610	2,466,410
Coffee and spices, roasted and ground	16	509,500	121	64	4	75,753	1,068,586	1,294,986
Coffins, burial cases, and undertakers' goods	33	191,300	119	12	2	70,147	131,720	309,000
Combs	4	46,500	62	2	3	31,906	39,200	81,420
Confectionery	173	1,236,390	742	412	163	355,329	1,834,108	2,653,074
Cooperage	72	424,650	648		17	258,270	586,245	997,601
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	8	145,500	87	2	1	47,104	139,749	238,923
Cordage and twine	10	925,500	301	178	158	220,033	1,090,500	1,541,748
Cork cutting	7	45,050	33	12	19	19,264	26,810	59,000
Corsets	10	62,800	20	171	2	44,018	129,061	205,505
Cotton goods (see also Hosiery and knit goods; Mixed textiles)	145	8,332,550	3,784	5,099	1,910	3,073,791	8,422,633	14,268,696
Crucibles	5	170,250	50			26,060	144,271	212,189
Cutlery and edge tools (see also Hardware; Tools)	33	1,120,292	784	6	68	349,917	305,873	942,522
Dentists' materials	4	715,000	255	60	11	156,175	159,000	564,000
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	54	10,185,164	1,856	337	44	1,063,056	7,481,307	11,804,793
Dyeing and cleaning	11	32,050	48	1	2	10,747	23,540	49,600
Dyeing and finishing textiles	57	2,359,846	1,462	188	202	789,709	1,773,696	4,316,405
Electrical apparatus and supplies (see also Telegraph and telephone apparatus).	3	15,000	16		1	7,472	7,149	20,770
Electroplating	20	83,463	71	4	11	34,102	32,175	100,594
Engravers' materials	3	5,300	7		1	6,920	3,700	11,764
Engraving and die-sinking	14	41,150	52	1	4	28,288	18,421	74,546
Engraving, steel	5	49,550	41	10	18	30,630	24,695	89,433
Engraving, wood	20	17,725	72	3	2	46,088	12,965	95,559
Fancy articles	18	153,600	127	39	13	76,155	129,512	254,506
Fertilizers	13	610,400	259		1	114,101	668,281	977,750
Files (see also Saws)	12	229,450	266	4	69	115,275	145,628	318,513
Fire-arms	3	65,000	53		3	25,500	18,500	64,500
Flouring- and grist-mill products	17	237,800	82			37,947	1,693,531	1,954,715
Food preparations (see page 39)	10	376,500	100	83	10	61,127	226,722	371,003
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	226	12,231,058	9,305	68	563	4,635,977	6,179,841	13,455,238
Fruits and vegetables, canned and preserved	7	252,000	72	138	32	59,442	454,000	553,700
Furnishing goods, men's	21	123,740	61	331	36	87,540	317,736	498,507
Furniture (see also Mattresses and spring beds; Upholstering)	195	3,149,073	2,821	60	108	1,337,419	2,461,654	4,839,853
Furniture, chairs	23	90,850	257	12	45	132,058	164,163	389,194
Furs, dressed	15	235,000	50	151	5	58,900	290,800	493,700
Galvanizing	5	330,000	210		5	103,632	678,320	912,875
Gas and lamp fixtures	5	251,500	283	43	11	133,759	93,085	355,228
Gas machines and meters	9	468,500	354	7	15	151,653	223,498	464,804
Glass	10	1,202,419	1,358	128	751	655,023	696,393	1,621,959
Glass, cut, stained, and ornamented	13	55,100	102	12	10	49,545	47,333	134,962
Glue	3	1,657,500	438	75	47	157,000	1,190,700	1,626,000
Gold and silver leaf and foil	7	224,000	156	157	10	134,800	339,750	519,344
Grease and tallow	11	268,975	68		1	39,379	933,943	1,120,198
Hairwork	18	84,100	23	57	6	20,677	40,260	83,737
Hand-knit goods	6	82,100	16	566	315	82,700	107,335	215,000
Hardware (see also Cutlery and edge tools; Tools)	39	575,700	496	9	73	246,017	423,770	853,588
Hat and cap materials	6	39,600	21	2	5	11,430	79,600	132,100
Hats and caps, not including wool hats	63	792,253	1,237	549	50	702,889	1,058,691	2,300,786
Hosiery and knit goods (see also Cotton goods; Woolen goods)	95	3,402,690	2,103	4,935	1,268	2,009,528	4,530,480	8,173,415
Ink	11	395,800	79	4	11	60,508	168,175	358,050
Instruments, professional and scientific	26	347,086	224	7	14	137,798	87,307	349,126
Iron and steel	16	2,999,245	1,897		171	1,045,570	2,580,512	4,257,179
Iron bolts, nuts, washers, and rivets	10	876,500	801	60	218	307,581	767,388	1,395,606
Iron forgings	10	323,800	325		20	128,422	323,893	561,487
Iron nails and spikes, cut and wrought	4	21,350	11	1	5	5,383	17,735	30,518
Iron pipe, wrought	3	615,000	574	1	12	92,000	319,000	510,000
Iron railing, wrought	15	100,250	108		1	35,845	99,648	180,032
Ivory and bone work	10	208,750	251	29	63	111,638	151,499	353,019
Japanning	5	13,100	33	8	4	8,765	8,298	26,625
Jewelry	29	426,901	378	24	27	210,369	410,166	783,886
Jewelry and instrument cases	3	25,000	37	13		11,300	13,600	35,000
Kindling wood	27	93,550	103		14	34,162	102,698	177,629

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF PHILADELPHIA, PA.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Lamps and reflectors	11	$123,550	86	12	6	$47,958	$51,326	$137,036
Lasts	6	37,400	29	8	16	18,295	10,890	44,234
Lead, bar, pipe, sheet, and shot	3	365,000	29	....	2	23,076	620,500	758,000
Leather, curried	22	251,706	123	1	2	72,950	761,037	907,552
Leather, dressed skins	54	2,584,747	2,068	102	88	1,158,148	4,895,342	6,741,796
Leather, tanned	6	440,165	47	....	.....	28,717	231,725	308,970
Liquors, malt	96	7,258,350	1,311	....	1	720,069	3,409,205	5,897,811
Lithographing (see also Printing and publishing)	23	647,550	472	64	59	259,978	255,692	743,331
Lock- and gun-smithing	29	57,400	48	....	4	23,922	27,330	81,573
Looking-glass and picture frames	55	700,143	663	18	67	312,889	558,094	1,180,400
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	5	209,000	112	....	5	47,366	184,371	292,634
Lumber, sawed	9	383,300	151	....	....	89,386	444,635	610,464
Malt	18	2,075,000	225	....	....	79,902	1,441,230	1,879,460
Mantels, slate, marble, and marbleized	8	61,800	124	....	2	47,812	86,851	174,136
Marble and stone work	110	1,764,488	1,418	....	2	683,818	1,026,589	2,104,721
Masonry, brick and stone	78	256,100	556	....	1	246,727	328,641	735,838
Matches	3	106,300	18	32	11	14,393	69,455	184,000
Mattresses and spring beds (see also Furniture)	25	121,250	112	46	13	46,403	250,090	353,399
Millinery and lace goods (see also Artificial feathers and flowers)	40	593,300	85	1,139	54	205,942	1,063,779	1,518,578
Mineral and soda waters	13	107,000	155	....	1	61,338	135,570	242,615
Mixed textiles (see also Cotton goods; Silk and silk goods; Woolen goods).	87	8,391,651	4,009	5,394	1,212	3,120,014	8,759,101	14,998,779
Models and patterns	23	58,525	94	10	4	52,132	27,151	117,639
Musical instruments and materials (not specified)	6	16,200	21	2	....	13,222	7,180	29,500
Musical instruments, organs and materials	8	37,000	40	....	5	14,254	8,340	32,164
Musical instruments, pianos and materials	5	169,500	153	....	1	87,044	81,145	217,924
Oil, lubricating	3	43,000	40	....	....	16,480	267,311	330,870
Painting and paperhanging	349	727,227	1,986	3	30	792,067	784,484	2,097,052
Paints (see also Varnish)	21	1,776,742	375	24	2	219,450	1,546,326	2,068,505
Paperhangings	4	820,000	263	1	137	161,120	384,252	708,979
Paper	7	960,000	343	109	....	201,850	871,000	1,411,830
Patent medicines and compounds (see also Drugs and chemicals)	35	1,648,800	141	112	2	130,995	366,934	1,159,198
Perfumery and cosmetics	8	132,867	34	53	3	32,515	148,488	229,305
Photographing	47	267,450	169	85	10	109,203	86,381	317,120
Photographing materials	3	41,000	11	27	2	13,510	50,400	81,000
Pickles, preserves, and sauces	6	21,900	23	3	1	7,312	55,662	86,280
Pipes, tobacco	5	70,600	219	13	42	89,565	66,800	209,500
Plated and britannia ware (see also Silverware)	9	136,200	140	30	10	52,474	70,542	149,805
Plumbing and gasfitting	241	719,744	954	....	28	402,186	758,213	1,510,645
Pocket-books	5	250,000	271	209	48	120,000	219,500	412,000
Printing and publishing (see also Lithographing)	181	5,728,911	3,707	470	909	2,141,415	2,849,913	6,834,964
Printing materials	5	45,200	38	....	5	22,470	18,298	52,366
Pumps, not including steam pumps	3	27,500	10	....	....	3,890	20,355	36,984
Refrigerators	6	75,992	39	....	1	20,595	68,180	107,963
Regalia and society banners and emblems	11	78,890	46	123	6	34,273	75,085	139,834
Roofing and roofing materials	105	365,755	439	3	4	185,748	283,982	620,167
Saddlery and harness	116	333,964	434	7	13	178,725	369,038	729,299
Safes, doors, and vaults, fire-proof	4	117,000	110	....	....	67,500	81,015	195,930
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	25	819,771	543	....	8	265,263	426,866	802,109
Saws	3	1,402,500	1,051	6	134	587,750	566,780	1,517,000
Scales and balances	7	123,000	151	....	9	77,511	56,350	195,500
Sewing machines and attachments	6	1,170,300	434	8	51	223,500	221,650	618,977
Shipbuilding	51	3,321,731	1,706	....	....	1,273,322	1,529,504	3,267,981
Shirts	49	708,294	171	2,169	52	531,994	1,028,104	1,796,311
Shoddy (see also Mixed textiles)	8	125,500	56	33	2	28,997	400,977	481,895
Show-cases	7	19,950	30	....	3	15,416	22,540	53,515
Silk and silk goods (see also Mixed textiles)	47	1,313,900	953	1,708	259	620,620	1,615,485	3,162,340
Silverware (see also Plated and britannia ware)	6	102,000	68	3	4	44,131	75,283	169,384
Slaughtering and meat-packing, not including retail butchering	19	1,965,625	359	....	....	165,353	7,042,781	7,869,114
Soap and candles	32	1,410,262	345	60	27	266,085	1,412,038	2,033,403
Sporting goods	3	26,000	30	11	1	19,500	20,000	55,000
Springs, steel, car, and carriage	7	297,500	158	....	4	77,662	437,770	611,900
Stationery goods	8	52,500	41	15	24	18,557	215,600	263,912
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	12	215,000	239	....	11	104,906	220,342	451,380
Stencils and brands	10	66,100	42	2	6	19,592	36,432	85,683
Stereotyping and electrotyping (see also Type founding)	5	226,000	172	17	2	104,982	51,050	223,500
Stone- and earthen-ware	7	237,500	195	20	20	76,700	40,410	187,900
Straw goods	6	46,200	46	187	6	46,000	105,704	222,218
Sugar and molasses, refined	11	6,072,000	1,078	....	5	474,017	21,943,943	24,294,929
Surgical appliances (see also Artificial limbs)	6	120,500	63	44	4	43,314	69,821	149,273
Telegraph and telephone apparatus (see also Electrical apparatus and supplies).	3	37,000	33	....	3	9,643	21,344	57,840
Terra-cotta ware (see also Brick and tile)	4	71,000	55	....	....	16,150	18,150	57,000
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	272	1,334,322	1,480	48	118	698,297	1,305,687	2,660,969
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	4	274,000	79	54	15	40,400	288,351	500,570
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	473	1,268,465	1,742	253	143	802,546	1,085,525	2,617,725
Tools (see also Cutlery and edge tools; Hardware)	6	1,541,282	661	....	....	279,214	216,458	695,160
Toys and games	8	79,100	99	77	149	50,278	51,525	138,886
Trunks and valises	21	113,100	139	....	3	62,485	160,022	280,742
Type founding (see also Stereotyping and electrotyping)	4	810,000	279	2	25	146,694	89,400	417,132
Umbrellas and canes	28	1,368,900	616	996	165	478,847	1,777,364	2,804,874
Upholstering (see also Furniture)	71	189,000	218	60	18	114,563	292,950	554,230
Upholstering materials	3	95,000	15	49	....	24,100	71,000	122,000
Varnish (see also Paints)	5	228,000	53	....	7	29,116	159,275	307,910
Vinegar	8	50,285	26	1	3	19,280	81,644	129,960
Washing-machines and clothes-wringers	3	2,500	5	....	....	1,700	850	4,050
Watch and clock repairing	14	46,065	16	1	2	9,184	9,995	30,772

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF PHILADELPHIA, PA.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Watch cases	9	$530, 175	363	54	10	$208, 722	$492, 480	$908, 180
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	87	140, 275	188	....	6	86, 568	86, 932	252, 997
Whips	5	23, 500	23	....	6	8, 250	13, 200	44, 000
Window blinds and shades	23	95, 950	104	17	16	40, 133	133, 767	230, 616
Wire	3	60, 500	24	12	....	13, 300	77, 810	100, 950
Wirework	14	97, 250	109	1	51	58, 816	142, 441	268, 382
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds.)	31	170, 950	302	17	48	113, 383	108, 743	280, 652
Wooden ware	8	196, 000	86	....	....	35, 950	49, 560	112, 315
Woolen goods (see also Carpets, other than rag; Mixed textiles; Worsted goods).	89	11, 752, 900	5, 316	4, 543	1, 385	3, 506, 951	14, 211, 518	21, 349, 810
Worsted goods (see also Woolen goods)	24	4, 459, 639	1, 477	2, 071	789	1, 295, 168	6, 000, 940	8, 327, 282
All other industries (*a*)	55	4, 974, 144	1, 506	804	107	858, 368	4, 796, 307	7, 080, 594

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a Embracing cardboard; carpets, wood; cheese and butter (factory); clothing, horse; coal-tar; collars and cuffs, paper; dentistry, mechanical; foundery supplies; gloves and mittens; gold and silver, reduced and refined; grindstones; hand-stamps; housefurnishing goods; iron work, architectural and ornamental; lard, refined; lightning rods; liquors, distilled; millstones; mucilage and paste; oil, lard; oil, linseed; oilcloth, floor; oleomargarine; paving materials; pens, steel; registers, car-fare; rubber and elastic goods; sand and emery paper and cloth; sewing-machine cases; soda-water apparatus; spectacles and eyeglasses; stamped ware; taxidermy; tinfoil; wood pulp; and zinc.

BOSTON, *December* 3, 1882.

DEAR SIR: One of the most respectable journals of the country has recently offered objections to the manufacturing statistics of the Tenth Census, based upon a comparison of the average annual product (gross), per hand employed, in Philadelphia with the corresponding product of other cities, especially Jersey City, Brooklyn, Chicago, and New York.

The journal referred to, after stating that Philadelphia shows an average annual product of but $1,752, proceeds to say:

"New York is credited with an annual average product of $2,056 per hand employed; Chicago with $3,106; Brooklyn with $3,751; and Jersey City with $5,574! See how these figures fail when put to the test!

"If the cities last mentioned were engaged, in large proportion, in manufactures of the precious metals, jewelry, watches, costly laces, silks, velvets, and the like, the figures might be capable of explanation. But there is no such proportion; nothing of the kind."

I need not say to you, as a statistician, that comparisons like the above are absolutely inconclusive; but the fact that a journal of candor and intelligence can make such a statement shows the desirableness of some public explanation, to anticipate other unreflecting criticisms upon the census statistics of manufactures.

The writer of the paragraph quoted assumes that it is in manufactures of silks and jewelry and articles of that nature that the proportion of materials to products ranges highest. The fact is quite otherwise. Mr. Wyckoff's report shows that the value of the materials consumed in the silk manufactures of the country is only a trifle above one-half the value of the products. The returns of the jewelry manufacture in New York show the value of the materials to be almost exactly fifty per cent. of the value of the product.

On the other hand, there are industries of gigantic dimensions in which the value of the materials used reaches 80, 90, and even 94 per cent. of the value of the product! And it is the prosecution of these industries, in three of the cities named, which accounts for the seemingly disproportionate returns thence made of the value of manufactured products.

Take the case of Jersey City, which caps the climax of incredibility, in the opinion of the writer of the article just quoted.

The tables already published give the following figures for this city:

Industries.	Value of materials.	Value of products.
Meat-packing	$17, 404, 689	$18, 551, 783
Sugar- and molasses-refining	20, 759, 961	22, 799, 614
All other	11, 155, 449	18, 229, 744
Total	49, 320, 099	59, 581, 141

Examine this table, and you will see that in this city nearly seventy per cent. of the reported product consists of the value of packed meats and of refined sugar and molasses, the cost of the raw materials being 92 per cent.

Deduct the value of materials of manufacture, as should be done in the case of every city prior to comparisons of this kind, and we have an average annual product per hand employed of but $960. Which, be it observed, INCLUDES, BESIDE THE COST OF LABOR, RENTS, FREIGHTS, INSURANCE, PROFITS ON CAPITAL INVESTED, INTEREST ON MONEY BORROWED, AND THE PROFITS OF THE MANUFACTURER.

Take the case of the next city named, Brooklyn: Of the total reported product of that city, more than one-third is furnished by a single interest—the sugar-refining industry—of which Brooklyn is the chief seat in this country. Of the $59,711,168 worth of refined sugar and molasses, the cost of the raw sugars and molasses was $56,423,868. The manufacture of silks and velvets is, we see, not needed to explain a very large gross product per hand employed. The sugar business does it adequately. Deduct the value of materials used in the manufactures of Brooklyn and the average annual product sinks to $991.

Again, Chicago is named as a city whose manufacturing products are reported at such enormous figures as to prove incontestably that the census is wrong.

Of the productions of this city, over one-third in value, viz, $85,324,371, is furnished by the meat-packing industry, the stock-yards and slaughter-houses of Chicago being without a parallel in the world. Of this enormous aggregate, seven-eighths is made up of the value of cattle and hogs slaughtered.

Deduct the value of the materials consumed in the manufactures of Chicago, and we have an average annual product of but $861, which is certainly within reason.

In the same way, deducting the value of materials, we find New York, with an average annual product of but $794, that city standing fourteenth on our list of the twenty largest cities (according to population).

In preparing this letter, I have drawn off the following table, which may be found to contain other matter of interest.

The first column shows THE RANK of the city named upon the list of twenty cities, in the respect of the aggregate number of persons employed in manufacturing establishments; the second, in the respect of the aggregate amount of wages paid in manufactures; *the third, in the respect of the aggregate gross product of all branches of manufactures; the fourth, in the respect of the average annual product per hand employed, after deduction of the value of materials.*

Cities.	HANDS EMPLOYED AND WAGES.		PRODUCT.	
	Number of hands.	Amount of wages.	Aggregate gross product.	Average net product.
New York, N. Y	1	1	1	14
Philadelphia, Pa	2	2	2	18
Chicago, Ill	3	3	3	7
Brooklyn, N. Y	7	5	4	2
Boston, Mass	4	4	5	11
Saint Louis, Mo	8	8	6	4
Cincinnati, Ohio	6	6	7	16
Baltimore, Md	5	9	8	20
Pittsburgh, Pa	9	7	9	5
San Francisco, Cal	11	10	10	1
Newark, N. J	10	11	11	12
Jersey City, N. J	18	18	12	3
Cleveland, Ohio	12	13	13	15
Buffalo, N. Y	15	14	14	9
Providence, R. I	13	12	15	8
Milwaukee, Wis	14	15	16	19
Louisville, Ky	16	17	17	13
Detroit, Mich	17	16	18	17
New Orleans, La	19	20	19	10
Washington, D. C	20	19	20	6

Now, a most striking feature of this table is the tendency on the part of *the greatest manufacturing cities*, as a class, *to show a smaller average annual product per hand employed* (column 4) than the less important manufacturing cities as a class.

The reason is perfectly evident. Where manufacturing capital is accumulated in vast amounts, where production is carried on upon the largest scale, with the most approved appliances and with most direct access to the greatest markets, there is found, other things equal, the power of producing at the lowest cost.

Let us see how this is borne out by the foregoing table.

First, take individual instances. New York, which is first in gross aggregate production, as it is also first in the number of hands employed and aggregate amount of wages paid, falls to fourteenth in respect to average annual product per hand employed. Philadelphia, which is second in the three respects first indicated, falls to eighteenth. Chicago, which ranks third in each of the three respects first indicated, falls to seventh in the last respect, moving in the same direction, though not so far as either New York or Philadelphia, probably because of the higher rate of interest and the greater risk to capital in a newer city. Boston, which is fifth in aggregate gross product, becomes eleventh in average annual product per hand employed; Baltimore falls from eighth to twentieth; Cincinnati, from seventh to sixteenth, etc.

On the other hand, San Francisco, the single large city of its coast, with markets all its own, is only tenth in aggregate gross product, but becomes first in what we may call individual product, *i. e.*, average annual product per hand employed; Washington, which can hardly be called a manufacturing city, doing little more than to supply its own market, rises from twentieth (column 3) to sixth (column 4); New Orleans, with manufactures aggregating only about eighteen millions, rises from nineteenth to tenth; Jersey City, whose manufactures, exclusive of meat-packing and sugar-refining, scarcely exceed eighteen millions, rises from twelfth to third, etc.

There are some apparent exceptions to this rule, such as Brooklyn, Saint Louis, Pittsburgh, and Providence, which, while large and prosperous manufacturing cities, move, though but slightly, in the direction of a higher relative rank in column 4 than in column 3; yet, if we name the cities which change more than one point in either direction, it will at once appear that the great weight of manufacturing power is on the side of those which stand relatively higher in respect to aggregate gross production than on the side of those which reverse the relation.

(1) Those cities which stand higher in column 3 than in column 4, by more than one point, are New York, Philadelphia, Chicago, Boston, Cincinnati, Baltimore, Cleveland, and Milwaukee.

(2) Those cities which stand higher in column 4 than in column 3, by more than one point, are Brooklyn, Saint Louis, Pittsburgh, San Francisco, Jersey City, Buffalo, Providence, Louisville, New Orleans, and Washington.

The aggregate manufacturing production of the first class of cities is considerably more than twice that of the second.

Were we to limit our enumeration to those cities which change more than two points, we should lose from the former list only Cleveland, while we should lose from the latter list the two cities which constitute by far its most important members, Brooklyn and Saint Louis. The former class would then show an aggregate manufacturing product of nearly four times the latter.

The subject might be pursued at great length, but the above will suffice to indicate the class of criticism which must be applied to tables like those of the Manufacturing Statistics of Cities before they can be rejected on internal evidence.

Truly yours,

FRANCIS A. WALKER.

Hon. CHARLES W. SEATON,
Superintendent of Census.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF PITTSBURGH, PA.

[Statistics collected under the direction of A. B. MILLS, Chief Special Agent. See note on page 379.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	1, 112	$52, 645, 010	32, 011	1, 681	3, 238	$17, 168, 989	$42, 109, 777	$75, 915, 033
Agricultural implements	4	600, 000	292		7	132, 769	239, 710	555, 150
Baking and yeast powders (see also Drugs and chemicals)	3	18, 000	8	7	1	7, 776	27, 747	57, 100
Blacksmithing (see also Wheelwrighting)	45	40, 075	88		3	47, 278	39, 354	136, 963
Bookbinding and blank-book making	3	9, 000	17	14	1	10, 195	5, 350	19, 545
Boot and shoe uppers	3	13, 500	9	8		12, 160	21, 600	40, 500
Boots and shoes, including custom work and repairing	25	494, 320	498	22		128, 376	382, 826	611, 378
Boxes, fancy and paper	4	13, 000	10	26		12, 145	13, 040	31, 865
Brass castings	12	175, 500	84			37, 429	91, 440	175, 125
Bread and other bakery products	62	384, 320	168	81	19	103, 594	411, 174	695, 906
Brick and tile	19	322, 900	291		46	122, 604	127, 084	385, 477
Bridges	3	590, 000	692		3	339, 164	648, 836	1, 214, 932
Brooms and brushes	6	77, 300	102	4	14	39, 570	111, 909	200, 450
Carpentering	32	60, 389	150			76, 195	156, 024	287, 981
Carpets, rag	6	2, 424	10	5	1	4, 355	5, 773	13, 245
Carriages and wagons (see also Wheelwrighting)	16	241, 300	182		1	102, 550	146, 140	346, 413
Cars, railroad, street, and repairs	4	102, 500	67			37, 400	74, 500	134, 925
Clothing, men's	92	750, 000	775	475		314, 325	1, 105, 200	1, 708, 560
Clothing, women's	16	29, 000	25	147		16, 500	80, 000	130, 000
Coffee and spices, roasted and ground	9	330, 000	34	57	1	35, 380	1, 108, 390	1, 276, 420
Coffins, burial cases, and undertakers' goods	4	53, 500	9	[illegible]		8, 720	34, 400	63, 600
Coke	10	262, 650	154		2	54, 284	114, 352	208, 535
Confectionery	7	85, 200	57	43	13	50, 550	147, 965	250, 775
Cooperage	17	494, 735	414		77	154, 596	868, 555	1, 152, 892
Cutlery and edge tools (see also Hardware)	3	355, 000	326			175, 184	259, 793	499, 000
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	5	251, 448	53			28, 010	62, 240	158, 646
Dyeing and cleaning	4	11, 500	4	9		4, 550	2, 550	13, 375
Flouring- and grist-mill products	3	213, 500	47			21, 942	581, 701	691, 127
Foundery and machine-shop products	66	4, 102, 133	2, 693		33	1, 390, 224	2, 664, 749	5, 530, 309
Furniture (see also Upholstering)	15	440, 950	329	12	11	164, 616	269, 848	543, 838
Furniture, chairs	3	2, 900	9	2	2	4, 664	5, 700	13, 650
Glass	46	5, 268, 000	4, 185	138	1, 473	2, 501, 431	1, 997, 303	5, 231, 971
Grease and tallow	3	17, 000	11			5, 050	196, 201	222, 091
Hardware (see also Cutlery and edge tools)	6	576, 566	495	11	90	203, 969	413, 164	741, 794
Iron and steel	39	25, 190, 000	14, 559	10	1, 063	8, 072, 110	19, 288, 063	35, 490, 634
Iron bolts, nuts, washers, and rivets	4	380, 000	358		52	148, 709	571, 943	867, 760
Iron forgings	5	130, 500	84		13	52, 410	86, 419	194, 387
Iron pipe, wrought	3	869, 150	585		60	196, 582	1, 187, 025	1, 558, 250
Leather, curried	3	92, 500	25			13, 500	217, 010	282, 406
Leather, tanned	3	92, 500	30		1	17, 000	145, 850	200, 000
Liquors, malt	23	1, 275, 108	284		4	136, 483	655, 373	1, 150, 787
Looking-glass and picture frames	4	76, 000	16	1	6	12, 400	33, 500	62, 336
Lumber, planed (see also Wood, turned and carved)	18	561, 647	281		9	154, 643	615, 325	1, 054, 395
Lumber, sawed	6	279, 000	96		9	26, 945	259, 900	383, 420
Marble and stone work	11	84, 200	70			36, 021	32, 096	86, 769
Masonry, brick and stone	16	21, 825	107		6	53, 577	64, 430	156, 586
Models and patterns	4	8, 200	13			6, 389	3, 050	16, 980
Oil, lard	4	65, 000	11		1	6, 280	118, 464	141, 831
Oil, lubricating	6	42, 500	42	2		25, 113	241, 100	311, 500
Painting and paperhanging	27	92, 930	128		3	66, 438	72, 461	188, 730
Paints	3	237, 000	80			33, 232	281, 706	360, 390
Patent medicines and compounds (see also Drugs and chemicals)	5	346, 000	76	59	3	47, 283	322, 508	740, 164
Photographing	5	21, 050	13	4		10, 809	3, 093	33, 075
Plumbing and gasfitting	26	124, 686	106		1	49, 864	97, 837	197, 755
Printing and publishing	42	1, 567, 600	654	48	34	465, 041	465, 977	1, 422, 481
Roofing and roofing materials	6	48, 300	50			22, 860	46, 500	93, 912
Saddlery and harness	19	96, 690	94	46	3	54, 832	98, 946	191, 475
Safes, doors, and vaults, fire-proof	3	59, 000	49		1	26, 350	25, 000	63, 575
Shipbuilding	15	93, 000	210			102, 080	144, 333	295, 288
Show-cases	3	35, 000	29		4	20, 200	72, 000	115, 500
Slaughtering and meat-packing, not including retail butchering	9	693, 000	91		19	41, 379	1, 302, 167	1, 451, 816
Soap and candles	4	111, 056	23			14, 212	83, 825	121, 248
Stencils and brands	3	8, 100	12		1	6, 797	1, 725	14, 740
Stone- and earthen-ware	4	85, 500	69	20	3	49, 450	67, 744	137, 181
Tinware, copperware, and sheet-iron ware	53	337, 000	183	64	51	121, 775	312, 956	561, 106
Tobacco, cigars and cigarettes	50	85, 910	211	15	19	83, 814	97, 690	274, 692
Upholstering (see also Furniture)	6	43, 250	33	36	1	30, 150	64, 608	139, 708
Watch and clock repairing	7	47, 900	15		2	10, 190	7, 650	27, 050
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	26	22, 300	55		2	26, 045	24, 412	82, 088
Wirework	3	7, 300	10		4	6, 099	12, 900	27, 200
Wood, turned and carved (see also Lumber, planed)	6	21, 800	26		1	16, 143	20, 279	50, 048
All other industries (*a*)	82	2, 903, 898	945	310	64	558, 229	2, 549, 294	4, 024, 232

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a Embracing artificial limbs; awnings and tents; axle-grease; bags, paper; bellows; bells; boxes, cigar; boxes, wooden, packing; brass and copper, rolled; bronze castings; coppersmithing; cordage and twine; cork cutting; crucibles; dentistry, mechanical; electroplating; engraving, steel; files; fire-arms; fruits and vegetables, canned and preserved; furs, dressed; galvanizing; glass, cut, stained, and ornamented; gold and silver leaf and foil; hairwork; hardware, saddlery; hats and caps; hosiery and knit goods; ink; iron nails and spikes, cut and wrought; iron railing, wrought; iron work, architectural and ornamental; jewelry; kaolin and ground earths; lamps and reflectors; lead, bar, pipe, sheet, and shot; liquors, distilled; lithographing; lock- and gun-smithing; malt; mantels, slate, marble, and marbleized; mineral and soda waters; pickles, preserves, and sauces; plated and britannia ware; regalia and society banners and emblems; saws; springs, steel, car, and carriage; steam fittings and heating apparatus; tobacco, chewing, smoking, and snuff; trunks and valises; umbrellas and canes; upholstering materials; varnish; washing-machines and clothes-wringers; whips; and wooden ware.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF PORTLAND, ME.

[Statistics collected under the direction of MARSHAL N. RICH, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	302	$4, 243, 225	4, 841	1, 550	738	$1, 541, 997	$6, 813, 962	$9, 832, 931
Blacksmithing (see also Wheelwrighting)	3	1, 350	8			4, 318	2, 800	11, 700
Bookbinding and blank-book making	5	42, 700	37	24		22, 500	51, 000	88, 500
Boots and shoes, including custom work and repairing	7	166, 000	260	152	5	141, 070	405, 100	629, 000
Bread and other bakery products	10	67, 900	73	3	4	35, 030	118, 836	179, 254
Brooms and brushes	3	45, 000	86	2	13	26, 000	174, 000	235, 000
Carpentering	11	21, 200	72			25, 850	29, 900	67, 350
Carriages and wagons (see also Wheelwrighting)	7	69, 500	88			49, 550	53, 443	136, 500
Coffee and spices, roasted and ground	5	30, 500	19	9		16, 065	159, 500	195, 000
Coffins, burial cases, and undertakers' goods	5	12, 000	11			7, 835	12, 252	32, 078
Clothing, men's	6	146, 800	27	84		38, 996	225, 500	348, 500
Confectionery	8	49, 200	36	36		13, 750	50, 700	83, 000
Cooperage	13	36, 700	81			34, 738	63, 400	117, 600
Drugs and chemicals	3	83, 000	27	2		9, 600	37, 250	62, 500
Flouring- and grist-mill products	5	37, 000	15			5, 800	124, 750	133, 760
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	8	527, 000	415		6	192, 867	322, 121	600, 400
Fruits and vegetables, canned and preserved	3	700, 000	1, 575	940	600	144, 000	618, 000	1, 050, 000
Furniture	11	75, 800	112	7	3	49, 800	110, 450	213, 800
Hats and caps, not including wool hats	3	18, 500	11	13		8, 850	28, 150	48, 300
Looking-glass and picture frames	3	4, 500	7		1	3, 500	8, 000	13, 800
Lumber, planed	4	85, 000	47		12	27, 180	236, 600	291, 056
Marble and stone work	4	6, 500	20			7, 500	7, 387	18, 000
Masonry, brick and stone	3	3, 800	20			9, 500	5, 200	18, 500
Painting and paperhanging	7	7, 500	33			12, 450	8, 350	26, 845
Photographing	6	18, 200	19	8	1	9, 300	7, 500	29, 300
Plumbing and gasfitting	6	16, 000	36			14, 650	40, 496	67, 600
Printing and publishing	15	155, 900	162	28	4	107, 184	80, 278	227, 189
Saddlery and harness	8	13, 700	32		1	13, 750	26, 650	56, 500
Shipbuilding	26	112, 400	157			76, 467	145, 804	242, 818
Slaughtering and meat-packing, not including retail butchering	3	150, 000	67			28, 000	595, 000	667, 000
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	3	4, 000	13			3, 900	12, 500	22, 000
Tinware, copperware, and sheet-iron ware	9	64, 700	49			22, 700	48, 700	111, 200
Tobacco, cigars and cigarettes	4	6, 900	21	7	1	8, 862	14, 500	29, 000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	6	3, 850	13		1	6, 420	3, 100	12, 600
All other industries (*a*)	79	1, 460, 125	1, 192	235	86	364, 015	2, 995, 745	3, 767, 281

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a Embracing agricultural implements; awnings and tents; babbitt metal and solder; belting and hose, leather; boot and shoe cut stock; boxes, fancy and paper; boxes, wooden, packing; brass castings; carriage and wagon materials; cutlery and edge tools; drain and sewer pipe; dyeing and finishing textiles; electroplating; emery wheels; engraving and die-sinking; engraving, steel; engraving, wood; fertilizers; files; flavoring extracts; food preparations; furnishing goods, men's; glass, cut, stained, and ornamented; grindstones; hairwork; hones and whetstones; instruments, professional and scientific; iron and steel; iron forgings; iron work, architectural and ornamental; ivory and bone work; lamps and reflectors; lasts; leather, dressed skins; leather, tanned; lock- and gun-smithing; matches; mineral and soda waters; models and patterns; musical instruments, organs and materials; oil, lubricating; paints; patent medicines and compounds; pickles, preserves, and sauces; plated and britannia ware; refrigerators; regalia and society banners and emblems; roofing and roofing materials; sash, doors, and blinds; show-cases; soap and candles; stationery goods; stone- and earthen-ware; straw goods; sugar and molasses, beet; sugar and molasses, refined; tools; trunks and valises; varnish; window blinds and shades; wood, turned and carved; and wool hats.

CITY OF POUGHKEEPSIE, N. Y.

[Statistics collected under the direction of SAMUEL J. FARNUM, Special Agent.]

All industries	140	$3, 728, 700	1, 766	493	223	$761, 711	$2, 781, 289	$4, 392, 900
Blacksmithing (see also Wheelwrighting)	5	11, 600	8			2, 575	2, 400	10, 100
Boots and shoes, including custom work and repairing	6	511, 400	148	80	76	44, 953	133, 815	202, 596
Bread and other bakery products	6	49, 000	27	1	15	13, 100	64, 100	98, 100
Carpentering	9	45, 100	81		1	29, 300	53, 600	107, 000
Carriages and wagons (see also Wheelwrighting)	7	66, 900	93			37, 457	58, 955	122, 409
Clothing, men's	5	60, 500	77	10	2	28, 400	78, 000	176, 500
Confectionery	3	52, 000	17	27	14	6, 850	32, 200	56, 000
Cooperage	4	64, 000	118			53, 500	100, 000	200, 000
Furniture	4	20, 700	25	2	1	6, 752	8, 450	20, 000
Iron and steel	3	913, 000	162			66, 016	565, 554	746, 543
Jewelry	4	41, 500	13		10	5, 600	3, 550	12, 850
Liquors, malt	6	76, 000	33			15, 001	75, 960	135, 301
Marble and stone work	3	19, 000	15		1	7, 685	8, 700	33, 150
Masonry, brick and stone	3	6, 500	34			10, 800	14, 000	30, 500
Painting and paperhanging	3	2, 900	14			2, 000	2, 600	7, 600
Photographing	3	8, 500	7	2		4, 300	2, 100	11, 500
Plumbing and gasfitting	3	6, 300	12			4, 200	3, 750	11, 850
Printing and publishing	6	94, 500	98		6	42, 773	16, 346	82, 420
Saddlery and harness	5	9, 500	14			5, 062	6, 570	17, 415
Sash, doors, and blinds	3	46, 000	48		8	6, 641	28, 800	57, 550
Soap and candles	3	38, 000	9			2, 636	27, 322	42, 073
Tinware, copperware, and sheet-iron ware	6	19, 800	42			14, 838	16, 535	42, 600
Tobacco, cigars and cigarettes	7	20, 700	33		5	12, 198	12, 000	36, 375
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	4	7, 000	10			2, 516	6, 200	14, 230
All other industries (*a*)	29	1, 538, 300	628	371	84	333, 558	1, 459, 982	2, 118, 238

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a Embracing agricultural implements; bags, paper; carpets, other than rag; carpets, rag; cutlery and edge tools; dyestuffs and extracts; flouring- and grist-mill products; foundery and machine-shop products; furniture, chairs; glass; hardware; hones and whetstones; leather, curried; leather, tanned; mattresses and spring beds; mineral and soda waters; musical instruments, pianos and materials; shipbuilding; shirts; silk and silk goods; slaughtering and meat-packing; stone- and earthen-ware; watch and clock repairing; and wood, turned and carved.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF PROVIDENCE, R. I.

[Statistics collected under the direction of J. ALBERT MONROE, Chief Special Agent. See note on page 379.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	1, 205	$27, 177, 006	16, 050	5, 125	1, 716	$9, 464, 110	$22, 794, 227	$42, 597, 512
Blacksmithing	62	70, 425	104	....	1	54, 428	54, 423	176, 463
Bookbinding and blank-book making	5	50, 300	41	25	1	26, 835	28, 100	83, 000
Boots and shoes, including custom work and repairing	81	27, 290	38	6	1	18, 463	38, 321	103, 298
Boxes, wooden, packing	4	19, 300	36	....	....	14, 434	36, 396	64, 000
Brass castings	9	103, 900	60	....	....	32, 269	115, 000	172, 921
Bread and other bakery products	19	115, 700	124	24	....	62, 577	305, 022	445, 586
Brooms and brushes	6	12, 700	14	1	2	7, 245	14, 085	28, 225
Carpentering	81	254, 750	688	....	2	341, 125	692, 060	1, 250, 164
Carriages and wagons	47	149, 505	164	....	1	85, 371	114, 910	271, 659
Clothing, men's	42	833, 877	417	535	35	393, 939	1, 090, 566	1, 869, 819
Clothing, women's	7	21, 400	6	59	....	18, 555	94, 825	137, 880
Coffee and spices, roasted and ground	5	42, 000	19	....	....	10, 676	121, 536	156, 194
Coffins, burial cases, and undertakers' goods	10	40, 000	32	2	....	18, 958	45, 923	91, 293
Confectionery	5	14, 800	13	9	4	10, 501	30, 188	68, 550
Cooperage	3	20, 732	27	....	2	14, 884	27, 150	60, 560
Cotton goods	17	2, 453, 854	609	1, 129	274	487, 393	1, 323, 024	2, 250, 273
Cutlery and edge tools (see also Hardware)	4	25, 550	45	....	....	15, 889	16, 660	45, 360
Dentistry, mechanical	20	20, 025	9	3	....	8, 046	9, 892	52, 750
Drugs and chemicals (see also Patent medicines and compounds)	5	52, 500	22	....	....	10, 924	78, 800	103, 000
Dyeing and cleaning	3	6, 000	6	8	....	6, 708	1, 788	15, 250
Dyeing and finishing textiles	7	2, 925, 000	853	148	130	412, 608	834, 807	2, 273, 254
Dyestuffs and extracts	4	144, 000	40	....	....	19, 195	162, 500	221, 705
Electroplating	10	65, 600	58	1	2	36, 162	136, 372	208, 164
Enameling	9	123, 000	93	45	9	44, 816	59, 263	136, 175
Engraving and die-sinking	24	17, 900	52	5	10	34, 941	6, 428	76, 764
Engraving, wood	6	1, 750	2	....	....	2, 146	2, 660	13, 130
Fancy articles	4	21, 500	25	6	2	11, 367	35, 084	70, 382
Files	7	437, 600	321	9	25	129, 944	140, 095	460, 950
Flouring and grist-mill products	4	217, 600	36	....	....	21, 106	392, 875	458, 896
Foundery and machine-shop products	55	3, 563, 975	3, 237	77	42	1, 552, 842	1, 912, 589	4, 522, 179
Furniture (see also Mattresses and spring beds)	15	218, 750	310	7	2	162, 150	415, 584	686, 705
Gas and lamp fixtures	3	91, 000	46	9	6	26, 500	34, 600	86, 600
Gold and silver, reduced and refined	6	138, 000	25	....	....	18, 627	1, 366, 471	1, 421, 160
Hairwork	7	21, 050	....	18	2	5, 300	18, 930	34, 945
Hardware (see also Cutlery and edge tools)	5	109, 300	142	....	1	63, 743	37, 484	154, 543
Ivory and bone work	4	36, 000	60	6	2	35, 230	17, 375	72, 667
Jewelry	142	2, 755, 070	2, 411	675	178	1, 614, 836	2, 495, 824	5, 444, 092
Lapidary work	7	22, 000	39	2	2	16, 682	11, 200	42, 333
Leather goods	3	45, 600	38	....	3	19, 420	63, 950	96, 815
Liquors, malt	3	160, 000	88	....	....	38, 785	233, 052	392, 163
Lock- and gun-smithing	5	4, 950	5	....	....	3, 702	2, 762	10, 515
Looking-glass and picture frames	7	30, 200	17	1	2	10, 103	31, 860	57, 745
Lumber, planed (see also Wood, turned and carved)	6	84, 000	63	....	....	28, 309	23, 910	69, 912
Marble and stone work	23	320, 800	276	....	5	130, 823	82, 740	299, 826
Masonry, brick and stone	29	60, 300	221	1	....	94, 064	129, 296	280, 096
Mattresses and spring beds (see also Furniture)	4	29, 700	21	6	....	9, 356	80, 260	113, 656
Mineral and soda waters	3	20, 500	14	....	....	6, 149	15, 240	41, 075
Models and patterns	3	5, 000	7	....	1	4, 389	1, 480	12, 432
Painting and paperhanging	65	69, 365	279	....	6	133, 185	111, 178	343, 205
Patent medicines and compounds (see also Drugs and chemicals)	22	373, 500	92	21	6	63, 209	285, 864	706, 442
Photographing	19	40, 750	30	28	1	26, 156	15, 101	80, 110
Plumbing and gasfitting	21	39, 550	76	....	....	42, 641	87, 796	181, 216
Printing and publishing	17	222, 050	289	11	60	219, 429	173, 200	536, 598
Pumps, not including steam pumps	3	11, 000	6	....	....	2, 663	7, 962	15, 000
Saddlery and harness	26	45, 700	75	2	2	36, 024	46, 274	112, 477
Shipbuilding	8	152, 500	83	....	....	51, 077	57, 883	133, 331
Shoddy	3	33, 000	35	26	4	14, 290	131, 154	179, 705
Slaughtering and meat-packing, not including retail butchering	6	273, 600	85	....	4	44, 362	1, 318, 116	1, 458, 740
Soap and candles	6	8, 900	10	....	....	2, 598	22, 925	37, 250
Stationery goods	4	24, 300	21	6	....	16, 898	23, 910	56, 425
Stencils and brands	3	9, 000	7	....	2	2, 665	8, 730	18, 580
Straw goods	3	2, 300	5	11	....	5, 553	547	10, 160
Tinware, copperware, and sheet-iron ware	40	121, 500	197	2	3	106, 811	196, 292	407, 332
Tobacco, cigars and cigarettes	32	24, 350	52	53	....	28, 774	56, 261	105, 844
Trunks and valises	3	21, 200	11	....	1	6, 958	14, 805	35, 530
Umbrellas and canes	3	1, 700	2	1	....	660	1, 050	5, 850
Wood, turned and carved (see also Lumber, planed)	4	12, 500	10	....	....	5, 413	12, 500	23, 900
Woolen goods (see also Worsted goods)	5	1, 929, 700	815	568	381	641, 391	1, 973, 001	3, 602, 947
Worsted goods (see also Woolen goods)	4	1, 250, 000	851	912	203	661, 588	2, 062, 630	3, 537, 000
All other industries (*a*)	68	6, 506, 388	2, 045	667	296	1, 159, 250	3, 203, 693	5, 804, 716

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a Embracing agricultural implements; belting and hose, leather; boots and shoes, rubber; boxes, cigar; boxes, fancy and paper; bridges; buttons; collars and cuffs, paper; corsets; cotton-ties; drain and sewer pipe; fire-arms; foundery supplies; furniture, chairs; furs, dressed; glass, cut, stained, and ornamented; hand-stamps; hats and caps; hooks and eyes; iron and steel; iron forgings; iron pipe, wrought; lead, bar, pipe, sheet, and shot; leather, dressed skins; lime; lithographing; musical instruments, organs and materials; oil, cottonseed and cake; paints; paving materials; pickles, preserves, and sauces; plated and britannia ware; rubber and elastic goods; safes, doors, and vaults, fire-proof; sash, doors, and blinds; saws; screws; sewing machines and attachments; shirts; silk and silk goods; silverware; sporting goods; starch; stone- and earthen-ware; taxidermy; toys and games; upholstering; watch cases; window blinds and shades; wire, and wirework.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF QUINCY, ILL.

[Statistics collected under the direction of A. L. LANGDON, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	318	$4, 078, 200	2, 866	151	309	$1, 271, 995	$5, 089, 880	$8, 103, 277
Agricultural implements	5	160, 000	137	....	....	52, 326	66, 019	174, 000
Blacksmithing (see also Wheelwrighting)	10	3, 150	16	....	....	4, 274	4, 975	13, 050
Boots and shoes, including custom work and repairing	18	5, 075	25	....	2	8, 063	8, 435	23, 130
Boxes, wooden, packing	3	16, 500	28	8	....	10, 000	15, 550	26, 240
Bread and other bakery products	19	56, 850	93	17	....	33, 875	134, 505	189, 785
Brick and tile	10	25, 400	68	....	2	15, 180	7, 660	29, 250
Carpentering	15	20, 550	69	....	1	26, 550	42, 325	95, 175
Carriages and wagons (see also Wheelwrighting)	5	277, 000	193	....	20	86, 355	150, 639	351, 300
Clothing, men's	12	30, 500	58	1	1	23, 270	45, 000	93, 500
Cooperage	39	23, 200	139	....	2	32, 725	60, 460	128, 975
Drugs and chemicals	8	33, 000	29	2	2	12, 690	18, 700	49, 500
Flouring- and grist-mill products	9	289, 000	99	....	....	60, 725	1, 555, 921	1, 723, 365
Foundery and machine-shop products	11	869, 900	425	....	15	213, 319	300, 826	954, 484
Furniture	7	199, 300	197	10	12	87, 750	59, 500	194, 700
Lime	5	51, 500	93	....	....	35, 505	70, 832	140, 675
Liquors, malt	7	406, 650	88	....	....	39, 970	171, 871	306, 980
Looking-glass and picture frames	3	4, 300	5	....	1	1, 470	5, 500	11, 000
Lumber, planed	4	62, 000	126	....	4	39, 000	69, 060	187, 000
Marble and stone work	4	9, 700	61	....	....	16, 000	24, 200	42, 200
Painting and paperhanging	8	5, 950	49	....	....	14, 040	11, 690	31, 584
Photographing	5	13, 500	10	3	....	4, 796	4, 335	17, 950
Printing and publishing	4	54, 000	80	4	17	56, 820	67, 500	135, 900
Saddlery and harness	12	49, 650	63	....	....	24, 211	53, 776	95, 300
Slaughtering and meat-packing, not including retail butchering	4	180, 000	100	....	1	18, 500	836, 000	967, 650
Tinware, copperware, and sheet-iron ware	16	32, 750	42	....	4	15, 674	36, 550	78, 300
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	4	740, 250	161	75	178	151, 075	822, 335	1, 176, 070
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	25	34, 625	85	....	10	31, 839	38, 602	102, 200
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	9	9, 600	26	....	1	10, 250	10, 100	26, 550
All other industries (*a*)	37	414, 300	301	31	36	145, 763	397, 074	737, 464

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a Embracing awnings and tents; bone-, ivory-, and lamp-black; bookbinding and blank-book making; brass castings; brooms and brushes; coffee and spices, roasted and ground; coffins, burial cases, and undertakers' goods; dyeing and cleaning; files; hairwork; hats and caps; lead, bar, pipe, sheet, and shot; lumber, sawed; mattresses and spring beds; mineral and soda waters; musical instruments, organs and materials; paper; saws; shirts; show-cases; soap and candles; steam fittings and heating apparatus; stencils and brands; stone- and earthen-ware; trunks and valises; vinegar; windmills; and wooden ware.

CITY OF READING, PA.

[Statistics collected under the direction of JOHN B. SNYDER, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	330	$7, 498, 256	5, 413	724	558	$2, 240, 290	$8, 396, 910	$13, 251, 095
Agricultural implements	3	2, 450	7	....	....	1, 992	2, 100	5, 500
Baskets, rattan and willow ware	3	400	6	....	....	1, 190	1, 750	4, 450
Blacksmithing	8	7, 450	21	....	....	6, 800	6, 165	20, 184
Boots and shoes, including custom work and repairing	18	90, 025	96	25	4	32, 865	66, 840	113, 947
Boxes, cigar	3	10, 750	8	8	....	5, 100	25, 450	44, 800
Boxes, fancy and paper	4	3, 800	6	10	....	3, 160	4, 750	10, 800
Bread and other bakery products	28	41, 300	73	1	13	25, 725	71, 950	139, 480
Brick and tile	10	197, 600	138	....	43	38, 617	81, 408	169, 424
Brooms and brushes	9	8, 128	23	1	5	7, 375	16, 600	38, 900
Carpentering	14	77, 850	106	....	2	34, 187	66, 442	131, 954
Carpets, rag	7	4, 300	34	3	3	10, 470	12, 100	31, 543
Carriages and wagons	4	22, 300	50	....	2	15, 000	20, 000	47, 100
Clothing, men's	9	150, 100	92	106	....	42, 805	113, 763	176, 600
Coffins, burial cases, and undertakers' goods	4	17, 900	9	....	....	3, 650	9, 050	19, 300
Confectionery	8	20, 100	16	8	3	7, 600	28, 400	49, 600
Foundery and machine-shop products	16	608, 265	758	1	28	284, 372	519, 619	967, 200
Furniture	6	80, 500	79	....	....	27, 700	54, 235	140, 230
Hardware	4	422, 363	529	12	78	182, 562	188, 241	579, 789
Iron and steel	8	2, 315, 000	1, 378	....	49	622, 237	2, 989, 949	4, 074, 447
Leather, curried	5	42, 867	27	1	....	10, 743	109, 095	135, 825
Leather, tanned	5	95, 233	47	3	2	18, 082	152, 224	184, 205
Liquors, malt	6	576, 000	79	....	....	43, 280	214, 041	389, 200
Marble and stone work	5	79, 500	31	....	1	11, 750	44, 400	84, 600
Painting and paperhanging	11	22, 100	64	....	1	17, 075	22, 665	59, 284
Photographing	4	5, 800	12	4	....	6, 935	4, 675	17, 500
Printing and publishing	9	221, 400	165	5	27	62, 444	65, 145	167, 400
Saddlery and harness	8	15, 000	20	....	....	6, 970	12, 100	25, 250
Shirts	3	5, 400	4	17	....	5, 180	12, 700	23, 800
Tinware, copperware, and sheet-iron ware	18	67, 725	54	1	....	20, 930	34, 590	64, 695
Tobacco, cigars and cigarettes	29	76, 000	63	111	15	33, 200	74, 378	154, 316
Wool hats	9	511, 000	386	174	63	205, 314	693, 996	1, 142, 334
All other industries (*a*)	52	1, 639, 650	1, 032	233	219	444, 980	2, 678, 089	4, 046, 438

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a Embracing bags, paper; bookbinding and blank-book making; boot and shoe uppers; coffee and spices, roasted and ground; cooperage; coppersmithing; cordage and twine; cotton goods; dentistry, mechanical; engraving and die sinking; fertilizers; files; flouring- and grist-mill products; furniture, chairs; hairwork; iron bolts, nuts, washers, and rivets; iron forgings; iron nails and spikes, cut and wrought; iron pipe, wrought; liquors, distilled; lock- and gun-smithing; looking-glass and picture frames; mantels, slate, marble, and marbleized; mineral and soda waters; mixed textiles; models and patterns; musical instruments, organs and materials; paints; paper; shoddy; soap and candles; spectacles and eyeglasses; stone- and earthen-ware; toys and games; umbrellas and canes; upholstering; watch and clock repairing; wood, turned and carved; and woolen goods.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF RICHMOND, VA.

[Statistics collected under the direction of JAMES A. CABELL, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	598	$6, 884, 386	9, 218	2, 872	1, 957	$3, 006, 456	$12, 141, 512	$20, 790, 106
Agricultural implements	5	219, 530	246	....	2	82, 904	114, 972	320, 988
Blacksmithing (see also Wheelwrighting)	8	1, 925	15	....	....	2, 410	2, 430	8, 170
Boots and shoes, including custom work and repairing	78	30, 900	224	13	3	38, 046	104, 060	208, 681
Boxes, cigar	3	6, 100	15	9	5	5, 700	21, 500	35, 600
Boxes, fancy and paper	3	18, 000	52	87	102	48, 596	26, 210	107, 410
Boxes, wooden, packing	8	97, 600	121	....	12	51, 671	114, 482	206, 011
Bread and other bakery products	20	59, 000	74	14	1	30, 311	148, 540	232, 060
Brick and tile	4	21, 500	64	....	19	17, 900	9, 125	36, 460
Carpentering	34	41, 000	158	....	2	58, 055	136, 410	272, 000
Carriages and wagons (see also Wheelwrighting)	9	63, 000	101	....	2	31, 750	56, 900	140, 000
Clothing, men's	24	155, 367	163	405	2	80, 308	169, 511	359, 022
Coffee and spices, roasted and ground	5	46, 000	36	1	1	13, 060	143, 000	241, 000
Confectionery	13	69, 700	63	7	6	23, 687	98, 624	151, 450
Cooperage	15	33, 700	238	....	9	36, 765	89, 722	155, 282
Drugs and chemicals (see also Patent medicines and compounds)	7	142, 500	247	....	3	39, 200	160, 250	247, 790
Dyeing and cleaning	5	5, 150	12	7	1	4, 800	10, 400	23, 600
Fertilizers	5	298, 000	172	3	....	28, 960	326, 450	476, 600
Flouring- and grist-mill products	5	1, 226, 500	191	....	....	79, 565	2, 147, 762	2, 443, 432
Foundery and machine-shop products	13	523, 500	1, 044	....	61	287, 993	541, 898	1, 056, 351
Furniture	26	108, 650	124	10	13	55, 605	96, 570	232, 010
Hairwork	4	7, 500	5	36	....	8, 200	16, 900	33, 000
Iron and steel	3	702, 000	1, 004	....	50	336, 311	1, 173, 801	1, 973, 916
Lock- and gun-smithing	4	4, 400	11	....	....	4, 200	5, 650	16, 700
Looking-glass and picture frames	7	8, 950	28	....	9	10, 400	21, 850	50, 500
Marble and stone work	7	20, 400	56	....	....	24, 200	28, 600	71, 100
Oil, lubricating	3	12, 000	7	....	1	990	11, 300	20, 500
Painting and paperhanging	9	14, 200	36	....	....	12, 250	19, 500	47, 850
Patent medicines and compounds (see also Drugs and chemicals)	8	37, 000	32	1	....	10, 150	25, 900	52, 900
Photographing	9	21, 000	36	1	2	17, 444	9, 900	49, 300
Plumbing and gasfitting	5	22, 000	28	....	7	15, 230	40, 500	79, 500
Printing and publishing	17	177, 300	241	4	24	131, 495	112, 834	328, 325
Saddlery and harness	12	38, 100	74	....	9	37, 644	71, 020	141, 400
Sash, doors, and blinds	6	73, 500	100	....	....	39, 092	201, 513	311, 184
Shipbuilding	4	3, 500	23	....	....	9, 300	8, 900	23, 500
Soap and candles	3	26, 000	17	1	....	7, 100	19, 400	38, 000
Tinware, copperware, and sheet-iron ware	26	88, 050	143	....	3	55, 800	135, 700	265, 500
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	39	1, 333, 100	2, 838	1, 704	1, 179	895, 657	3, 109, 076	6, 580, 984
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	26	140, 430	261	19	78	76, 770	152, 980	343, 702
Tobacco stemming	27	435, 184	369	470	202	81, 215	767, 973	1, 074, 005
Watch and clock repairing	10	15, 700	16	....	3	10, 361	7, 030	28, 300
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	24	27, 450	77	....	1	17, 976	25, 210	69, 000
All other industries (a)	55	509, 000	456	80	145	187, 385	1, 657, 159	2, 237, 023

a Embracing bagging, flax, hemp, and jute; bags, other than paper; bags, paper; baskets, rattan and willow ware; bookbinding and blank-book making; boot and shoe uppers; brass castings; brooms and brushes; coppersmithing; engraving, wood; food preparations; furs, dressed; grease and tallow; instruments, professional and scientific; iron bolts, nuts, washers, and rivets; iron forgings; iron work, architectural and ornamental; kindling wood; leather, tanned; liquors, vinous; lithographing; lumber, planed; mineral and soda waters; musical instruments, organs and materials; masonry, brick and tile; nets and seines; paints; paper; pumps; regalia and society banners and emblems; saws; slaughtering and meat-packing; stencils and brands; stone- and earthen-ware; trunks and valises; type founding; umbrellas and canes; upholstering; and wirework.

CITY OF ROCHESTER, N. Y.

[Statistics collected under the direction of JAMES S. GRAHAM, Chief Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	735	$13, 161, 870	9, 292	4, 052	1, 263	$5, 217, 713	$16, 446, 815	$26, 478, 266
Agricultural implements	3	23, 000	26	....	....	13, 744	13, 372	49, 055
Baking and yeast powders	3	30, 500	6	....	4	3, 034	128, 550	153, 000
Baskets, rattan and willow ware	3	250	1	....	....	300	1, 050	2, 475
Blacksmithing (see also Wheelwrighting)	32	29, 350	48	....	....	22, 853	23, 509	78, 476
Boots and shoes, including custom work and repairing	51	1, 180, 340	1, 341	879	152	849, 941	2, 235, 634	3, 636, 985
Boxes, cigar	3	14, 600	21	3	3	7, 170	16, 800	28, 000
Boxes, fancy and paper	3	12, 000	15	34	24	13, 495	32, 700	53, 943
Brass castings	3	12, 800	5	....	....	2, 634	9, 000	17, 000
Bread and other bakery products	38	136, 300	88	9	4	38, 399	210, 841	331, 583
Brick and tile	4	306, 000	213	....	15	61, 207	37, 825	172, 000
Brooms and brushes	3	1, 450	7	....	2	2, 800	12, 575	17, 900
Carpentering	61	194, 075	597	1	5	254, 691	620, 354	1, 099, 000
Carriages and wagons (see also Wheelwrighting)	9	564, 000	401	3	12	159, 427	232, 370	461, 989
Clothing, men's	16	1, 976, 200	598	1, 885	255	795, 900	3, 087, 000	4, 342, 000
Clothing, women's	4	74, 000	7	218	2	66, 000	173, 000	293, 000
Coffee and spices, roasted and ground	3	19, 000	14	1	1	5, 072	87, 000	119, 000
Confectionery	10	29, 850	25	8	3	11, 831	27, 050	60, 410
Cooperage	21	70, 850	134	....	....	44, 922	92, 340	171, 170
Cutlery and edge tools (see also Hardware)	9	208, 800	164	....	7	53, 105	110, 485	200, 700
Dentistry, mechanical	4	5, 500	2	....	....	1, 000	3, 500	10, 200
Engraving, wood	4	3, 500	8	....	....	3, 835	1, 150	11, 100
Files	3	45, 300	43	....	2	20, 300	20, 100	65, 250
Flouring- and grist-mill products	16	568, 500	118	....	....	69, 350	2, 330, 700	2, 550, 815
Foundery and machine-shop products (see also Steam fittings and heating apparatus).	32	988, 500	764	....	73	378, 826	606, 635	1, 282, 129
Furniture (see also Upholstering)	13	219, 000	498	5	83	220, 470	269, 650	647, 900

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF ROCHESTER, N. Y.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
Furniture, chairs	3	$200,000	285	10	31	$94,375	$110,000	$265,000
Hardware (see also Cutlery and edge tools)	3	43,500	36			12,300	28,700	52,000
Hats and caps, not including wool hats	4	5,000	7	2	1	3,700	7,000	14,300
Lasts	3	12,000	17			9,700	6,900	25,000
Leather, tanned	4	116,000	72		1	28,139	188,829	265,677
Liquors, malt	13	1,083,071	348		1	156,313	790,508	1,411,392
Lock- and gun-smithing	3	2,900	2			564	3,368	7,200
Looking-glass and picture frames	7	78,500	124	6	29	59,704	94,300	207,000
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	4	35,000	26			11,090	5,550	24,622
Lumber, sawed	4	220,000	77		10	27,500	100,500	164,000
Marble and stone work	9	264,300	235		1	91,452	90,308	247,323
Masonry, brick and stone	12	12,050	89			27,700	54,100	104,930
Mineral and soda waters	3	24,000	17		1	6,100	24,900	45,000
Models and patterns	3	1,900	5			3,345	820	6,725
Painting and paperhanging	31	18,575	84		3	37,147	35,371	99,311
Patent medicines and compounds	4	351,300	103	9	15	70,000	407,600	597,800
Perfumery and cosmetics	3	79,000	22	54	1	23,747	80,000	155,000
Photographing	15	52,600	33	17	7	26,452	23,790	79,900
Plumbing and gasfitting	12	36,600	63		2	26,890	58,750	120,200
Printing and publishing	13	474,838	344	41	93	236,180	307,825	660,888
Saddlery and harness	17	74,460	108	3		45,732	85,100	167,400
Safes, doors, and vaults, fire-proof	3	202,400	88		5	41,300	110,800	201,000
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	9	60,700	69		5	27,972	50,750	114,900
Shipbuilding	4	105,000	88			35,668	85,000	147,100
Shirts	5	17,500	4	30	1	9,106	11,350	28,300
Soap and candles	6	55,600	14		6	6,560	82,188	103,527
Steam fittings and heating apparatus (see also Foundery and machine-shop products).	3	76,500	37			17,610	81,700	136,500
Stone- and earthen-ware	3	14,500	14		1	6,900	4,000	15,500
Tinware, copperware, and sheet-iron ware	27	212,200	180	71	14	89,134	165,770	328,800
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	4	541,000	207	248	110	155,600	963,478	1,200,747
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	29	41,975	66	2	11	30,484	60,943	136,723
Upholstering (see also Furniture)	6	13,000	25			11,281	37,300	73,070
Watch and clock repairing	4	4,500	3		1	1,475	1,700	6,800
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	12	4,900	11			3,350	4,375	13,600
Whips	3	110,500	49	45	10	35,103	72,632	163,983
Wirework	3	12,000	11		2	6,528	15,300	28,930
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	11	103,200	129	20	22	69,851	92,339	245,309
All other industries (*a*)	82	1,687,136	1,056	448	232	562,355	1,769,781	2,954,729

a Embracing artificial limbs; awnings and tents; bags, paper; belting and hose, leather; blacking; bluing; bookbinding and blank-book making; boot and shoe cut stock; boot and shoe findings; boot and shoe uppers; boxes, wooden, packing; bridges; carpets, rag; carriages and sleds, children's; coffins, burial cases, and undertakers' goods; coppersmithing; cordage and twine; corsets; cotton goods; dentists' materials, drain and sewer pipe; explosives and fireworks; fancy articles; fruits and vegetables, canned and preserved; glass; gloves and mittens; hairwork; hand-stamps; hosiery and knit goods; ink; instruments, professional and scientific; iron forgings; iron railing, wrought; iron work, architectural and ornamental; ivory and bone work; jewelry; lamps and reflectors; liquors, vinous; lithographing; malt; mattresses and spring beds; millinery and lace goods; mixed textiles; musical instruments, pianos and materials; needles and pins; oil, lubricating; paper; pickles, preserves, and sauces; pumps; roofing and roofing materials; saws; scales and balances; show-cases; silk and silk goods; silverware; spectacles and eyeglasses; sporting goods; stencils and brands; stereotyping and electrotyping; tools; trunks and valises; and vinegar.

CITY OF SACRAMENTO, CAL.

[Statistics collected under the direction of JAMES R. HARDENBERG, Chief Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	160	$1,672,400	868	10	46	$547,692	$2,911,889	$4,093,934
Agricultural implements	3	14,000	6			3,840	18,050	31,125
Blacksmithing (see also Wheelwrighting)	8	23,600	27	1	2	19,990	14,700	43,300
Boots and shoes, including custom work and repairing	12	7,000	16			12,860	14,531	39,041
Bread and other bakery products	9	50,400	28		2	19,881	81,241	127,338
Carriages and wagons (see also Wheelwrighting)	4	69,000	42			24,477	26,600	74,445
Coffee and spices, roasted and ground	5	17,650	7			3,300	32,300	43,660
Confectionery	5	34,050	16			15,028	65,315	112,200
Cooperage	3	35,000	25		15	16,000	25,000	59,500
Foundery and machine-shop products	5	120,000	65		4	41,600	50,600	114,700
Furniture (see also Upholstering)	7	76,000	83		4	40,441	97,000	158,600
Liquors, malt	6	105,000	51			23,975	92,310	165,600
Lock- and gun-smithing	3	3,200	5		1	3,400	1,900	8,500
Marble and stone work	9	45,700	38			27,308	27,900	77,700
Plumbing and gasfitting	5	8,200	17		1	12,350	21,580	39,850
Saddlery and harness	11	50,200	57			37,144	78,725	138,324
Slaughtering and meat-packing, not including retail butchering	3	65,000	19			8,800	120,570	138,500
Tinware, copperware, and sheet-iron ware	7	12,100	19		2	17,360	21,500	52,400
Tobacco, cigars and cigarettes	8	14,600	25		2	9,232	68,680	102,100
Upholstering (see also Furniture)	3	9,600	9			6,480	9,400	20,750
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	4	4,500	11			9,588	3,600	18,500
All other industries (*a*)	40	907,600	302	9	13	194,698	2,040,407	2,527,801

a Embracing awnings and tents; baskets, rattan and willow ware; boxes, wooden, packing; brass castings; brick and tile; brooms and brushes, carpentering; carriage and wagon materials; clothing, men's; coffins, burial cases, and undertakers' goods; electrical apparatus and supplies; flavoring extracts, flouring- and grist-mill products; gloves and mittens; glue; grease and tallow; leather, dressed skins; leather, tanned; liquors, distilled; lumber, planed; malt; mineral and soda waters; patent medicines and compounds; pickles, preserves, and sauces; printing and publishing; roofing and roofing materials; sash, doors, and blinds; shirts; soap and candles; stone- and earthen-ware; umbrellas and canes; watch and clock repairing; wood, turned and carved; and woolen goods.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF SAINT JOSEPH, MO.

[Statistics collected under the direction of WILLIS M. SHERWOOD, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	238	$1, 423, 650	2, 040	94	124	$896, 762	$3, 210, 080	$5, 143, 585
Blacksmithing	19	18, 650	29	....	2	14, 145	18, 710	51, 000
Boots and shoes, including custom work and repairing	15	55, 100	65	10	....	40, 686	88, 030	156, 400
Brick and tile	10	31, 860	208	....	57	71, 235	41, 050	146, 055
Carpentering	30	31, 450	316	....	....	141, 356	229, 264	453, 950
Carriages and wagons	9	22, 800	52	....	3	26, 716	25, 500	67, 850
Clothing, men's	14	17, 350	39	14	....	19, 350	46, 000	88, 150
Cooperage	8	12, 150	49	....	4	20, 312	28, 300	57, 200
Drugs and chemicals	3	22, 850	9	5	2	5, 190	11, 625	46, 500
Flouring- and grist-mill products	4	108, 000	38	....	....	14, 400	292, 924	338, 056
Furniture	4	75, 350	106	....	3	49, 300	23, 100	96, 750
Liquors, malt	5	200, 000	44	....	....	21, 492	92, 582	165, 325
Lock- and gun-smithing	3	4, 400	4	....	....	2, 180	4, 200	9, 200
Marble and stone work	4	68, 000	77	....	1	35, 600	35, 500	87, 500
Masonry, brick and stone	5	10, 750	71	....	....	32, 390	44, 200	93, 500
Painting and paperhanging	14	10, 150	51	....	....	18, 887	20, 750	55, 900
Photographing	5	4, 700	7	2	....	4, 408	6, 550	21, 000
Printing and publishing	8	129, 500	112	....	11	85, 040	69, 708	194, 250
Saddlery and harness	8	81, 400	84	....	5	52, 096	164, 485	275, 800
Slaughtering and meat-packing, not including retail butchering	5	134, 500	190	....	14	37, 290	1, 224, 208	1, 439, 843
Tinware, copperware, and sheet-iron ware	10	37, 700	63	....	....	30, 925	83, 200	139, 700
Tobacco, cigars and cigarettes	12	20, 950	53	5	5	27, 397	60, 291	118, 340
All other industries (*a*)	43	326, 040	373	58	17	146, 367	599, 903	1, 041, 316

a Embracing baking and yeast powders; bluing; bookbinding and blank-book making; boxes, wooden, packing; bread and other bakery products; bridges; brooms and brushes; coffee and spices, roasted and ground; coffins, burial cases, and undertakers' goods; confectionery; coppersmithing; electroplating; foundery and machine-shop products; fruits and vegetables, canned and preserved; grease and tallow; hosiery and knit goods; looking-glass and picture frames; lumber, planed; mattresses and spring beds; mineral and soda waters; patent medicines and compounds; plumbing and gasfitting; pumps; roofing and roofing materials; shirts; show-cases; stone- and earthen-ware; trunks and valises; upholstering; vinegar; wheelwrighting; whips; and woolen goods.

CITY OF SAINT LOUIS, MO.

[Statistics collected under the direction of DAVID B. GOULD, Chief Special Agent. See Note on page 379.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	2, 924	$50, 832, 885	33, 980	4, 761	3, 084	$17, 743, 532	$75, 379, 867	$114, 333, 375
Agricultural implements	7	434, 000	443	....	5	190, 179	478, 140	856, 430
Artificial feathers and flowers	3	36, 000	9	50	15	25, 450	66, 000	147, 250
Awnings and tents	9	127, 200	47	165	5	54, 850	249, 185	388, 940
Bagging, flax, hemp, and jute	3	370, 000	149	161	76	150, 216	545, 900	867, 395
Bags, paper	4	88, 250	12	30	42	29, 700	174, 800	231, 500
Baking and yeast powders (see also Drugs and chemicals)	8	111, 700	48	26	10	39, 714	182, 900	323, 500
Baskets, rattan and willow ware	7	9, 015	13	....	....	6, 140	3, 960	18, 020
Blacksmithing (see also Wheelwrighting)	168	224, 745	343	....	6	188, 954	201, 598	616, 909
Bookbinding and blank-book making	10	132, 500	148	56	7	80, 700	105, 600	257, 087
Boot and shoe uppers	3	12, 000	13	....	....	7, 052	17, 400	29, 200
Boots and shoes, including custom work and repairing	184	679, 630	658	217	197	425, 664	874, 812	1, 634, 594
Boxes, cigar	[illegible]	57, 550	51	22	11	34, 100	47, 700	105, 600
Boxes, fancy and paper	6	21, 500	27	44	19	23, 300	45, 800	91, 200
Boxes, wooden, packing	11	40, 600	80	....	2	33, 601	75, 430	140, 400
Brass castings	14	186, 100	149	....	[illegible]	70, 087	395, 275	570, 450
Bread and other bakery products	195	719, 070	614	57	68	312, 913	1, 672, 843	2, 575, 350
Brick and tile	45	727, 250	787	....	153	307, 581	197, 588	701, 032
Brooms and brushes	25	95, 175	117	2	110	83, 349	149, 770	281, 280
Carpentering	185	361, 840	1, 108	....	9	667, 900	1, 585, 094	3, 005, 411
Carpets, rag	3	350	2	....	....	450	900	5, 100
Carriage and wagon materials	3	126, 000	189	....	3	91, 638	134, 440	264, 600
Carriages and wagons (see also Wheelwrighting)	39	740, 050	1, 012	8	51	447, 831	811, 865	1, 614, 236
Cars, railroad, street, and repairs	7	314, 200	601	....	....	293, 384	732, 460	1, 100, 809
Clothing, men's	100	1, 351, 335	1, 191	1, 652	12	779, 908	1, 895, 342	3, 425, 167
Clothing, women's	13	140, 800	75	451	30	119, 775	238, 700	483, 000
Coffee and spices, roasted and ground	6	230, 000	90	2	4	41, 840	391, 500	568, 000
Coffins, burial cases, and undertakers' goods	5	30, 500	23	4	....	12, 530	109, 200	157, 396
Confectionery	31	307, 560	207	185	21	159, 649	774, 790	1, 158, 185
Cooperage	78	493, 295	860	....	88	377, 056	798, 262	1, 431, 405
Coppersmithing (see also Tinware, copperware, and sheet-iron ware)	3	3, 500	9	....	1	6, 200	12, 000	24, 000
Cordage and twine	14	12, 875	37	....	40	16, 423	33, 250	67, 664
Corsets	3	720	2	3	....	1, 450	2, 410	6, 469
Cotton goods	3	825, 500	106	171	163	86, 325	335, 381	453, 295
Cutlery and edge tools (see also Hardware)	4	4, 000	20	....	....	9, 596	8, 450	24, 400
Dentistry, mechanical	8	6, 700	5	3	1	4, 184	6, 400	32, 400
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	15	696, 000	216	57	28	123, 940	665, 365	1, 166, 743
Dyeing and cleaning	5	16, 450	17	6	1	6, 950	2, 650	23, 900
Dyeing and finishing textiles	3	16, 000	14	5	4	7, 500	5, 500	22, 200
Electroplating	8	17, 600	29	1	2	12, 725	9, 120	43, 200
Engraving and die-sinking	7	9, 675	14	....	1	7, 165	10, 750	30, 000
Engraving, steel	10	72, 100	47	2	3	25, 050	62, 500	120, 900
Engraving, wood	3	12, 200	22	....	2	11, 350	1, 370	21, 070
Files	6	38, 900	35	....	....	17, 142	7, 870	34, 300
Flouring- and grist-mill products	24	2, 067, 500	668	....	....	488, 879	12, 031, 304	13, 783, 178
Food preparations (see page 39)	4	17, 100	13	....	....	4, 800	11, 375	30, 840

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF SAINT LOUIS, MO.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Foundery and machine-shop products (see also Iron work, architectural and ornamental).	62	$3, 605, 713	3, 433		33	$1, 854, 046	$2, 700, 844	$5, 952, 770
Fruits and vegetables, canned and preserved	3	31, 500	38	8	1	11, 614	54, 902	123, 250
Furniture (see also Mattresses and spring beds; Upholstering)	54	920, 702	1, 044	11	68	511, 915	1, 082, 825	1, 979, 683
Glass	5	280, 000	395		220	261, 098	238, 946	597, 277
Glass, cut, stained, and ornamented	3	11, 000	16			9, 450	7, 100	27, 600
Gloves and mittens	3	13, 000	29	35	4	18, 000	19, 000	46, 000
Glue	5	34, 350	24		4	13, 220	41, 575	73, 800
Grease and tallow	6	43, 250	20			9, 150	66, 220	107, 300
Hairwork	8	17, 600	6	23		7, 375	19, 350	40, 700
Hardware (see also Cutlery and edge tools)	10	210, 150	111		1	51, 321	102, 256	188, 862
Hats and caps, not including wool hats	9	60, 400	49	82	4	42, 865	77, 740	177, 531
Ink	3	9, 600	8			3, 568	7, 200	16, 234
Instruments, professional and scientific	4	54, 660	22			12, 700	35, 725	81, 450
Iron and steel	10	5, 960, 600	2, 158		110	616, 575	2, 823, 058	3, 950, 530
Iron bolts, nuts, washers, and rivets	4	235, 000	123		14	60, 498	301, 937	493, 560
Iron railing, wrought	6	23, 400	34		5	20, 760	25, 360	63, 400
Iron work, architectural and ornamental (see also Foundery and machine-shop products).	4	34, 000	44			17, 850	31, 860	67, 610
Jewelry	8	52, 000	55		7	37, 600	98, 000	189, 500
Labels and tags	3	10, 300	12			7, 868	10, 910	25, 500
Lamps and reflectors	7	291, 600	139		20	74, 139	376, 540	519, 300
Leather, curried	7	59, 250	40			16, 595	240, 797	282, 417
Leather, tanned	17	123, 450	82	3	7	39, 191	299, 926	399, 963
Lightning rods	3	54, 000	16			7, 250	14, 491	39, 292
Lime	4	64, 500	33			13, 800	32, 925	63, 200
Liquors, malt	23	4, 184, 600	1, 230		105	634, 988	2, 565, 074	4, 535, 630
Liquors, vinous	3	380, 000	30			18, 830	52, 000	131, 000
Lithographing (see also Printing and publishing)	5	71, 500	94	6	17	51, 265	83, 844	214, 989
Lock- and gun-smithing	17	5, 325	18			8, 514	4, 970	24, 714
Looking-glass and picture frames	19	323, 900	129	1	22	80, 251	102, 825	268, 682
Lumber, planed (see also Sash, doors, and blinds; Wood, turned and carved).	9	272, 350	335	2	22	152, 609	502, 742	756, 936
Lumber, sawed	3	620, 000	119			72, 086	251, 600	412, 000
Marble and stone work	56	237, 825	473		18	237, 207	245, 707	707, 721
Mattresses and spring beds (see also Furniture)	8	21, 750	50	19	10	24, 934	75, 436	155, 5[illegible]
Masonry, brick and stone	68	82, 375	386			206, 389	216, 321	575, 700
Mineral and soda waters	11	112, 100	97	5	27	45, 846	58, 090	193, 000
Models and patterns	3	11, 700	10			6, 400	1, 420	16, 400
Musical instruments and materials (not specified)	8	60, 000	10	1	1	5, 350	8, 775	28, 250
Musical instruments, organs and materials	3	10, 600	9			6, 000	5, 200	16, 600
Musical instruments, pianos and materials	7	21, 350	19			10, 398	8, 060	27, 200
Oil, lard	3	96, 000	25			13, 050	505, 750	539, 000
Paints (see also Varnish)	13	1, 688, 350	522	10	4	250, 532	2, 006, 480	2, 570, 860
Painting and paperhanging	119	369, 945	863	15	18	393, 932	549, 654	1, 255, 552
Patent medicines and compounds (see also Drugs and chemicals)	24	1, 383, 200	196	87	13	134, 696	482, 235	1, 145, 090
Photographing	25	86, 050	59	18	6	43, 130	48, 950	170, 094
Pickles, preserves, and sauces	3	48, 200	58	25	25	41, 999	134, 200	211, 200
Plumbing and gasfitting	61	115, 775	239		7	126, 099	214. 958	494, 683
Printing and publishing (see also Lithographing)	101	2, 480, 060	1, 978	175	117	1, 239, 299	1, 249, 094	3, 668, 257
Pumps, not including steam pumps	9	529, 850	109		2	65, 900	701, 570	926, 750
Refrigerators	3	28, 700	86		15	42, 950	183, 300	309, 500
Roofing and roofing materials	5	58, 700	75			48, 000	81, 900	177, 800
Saddlery and harness	92	1, 370, 350	1, 143	4	72	533, 442	1, 382, 074	2, 364, 858
Sash, doors, and blinds (see also Lumber, planed; Wood, turned and carved).	12	586, 195	661		43	275, 321	669, 871	1, 191, 670
Shipbuilding	7	243, 000	279			187, 380	265, 592	506, 712
Shirts	17	122, 100	52	274		84, 416	127, 100	278, 700
Show-cases	4	23, 000	74	4	1	28, 499	11, 750	89, 100
Slaughtering and meat-packing, not including retail butchering	32	1, 243, 000	564		20	269, 763	7, 085, 909	8, 421, 064
Soap and candles	15	718, 927	253	2	2	95, 763	1, 2[illegible], 701	1, 607, 511
Stencils and brands	6	4, 750	11		2	5, 925	5, 5[illegible]5	21, 425
Stone- and earthen-ware	5	34, 500	31		10	16, 090	19, 985	46, 430
Tinware, copperware, and sheet-iron ware (see also Coppersmithing)	120	418, 325	508	18	62	227, 546	553, 208	1, 095, 959
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	21	1, 146, 200	763	146	325	402, 959	3, 950, 956	4, 813, 769
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	201	272, 925	576	6	72	265, 967	312, 725	888, 993
Trunks and valises	14	105, 500	156		8	73, 125	205, 775	340, 560
Umbrellas and canes	4	1, 400	3			1, 020	1, 150	1, 370
Upholstering (see also Furniture)	18	209, 025	48	4	6	20, 850	62, 100	148, 727
Varnish (see also Paints)	3	26, 500	10			8, 962	35, 000	54, 600
Vinegar	14	249, 650	115	12	4	69, 520	296, 000	572, 400
Watch and clock repairing	17	36, 250	19		1	9, 367	13, 175	39, 740
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	52	51, 950	110		3	47, 508	42, 632	110, 121
Whips	4	1, 260	12			4, 6[illegible]0	8, 960	17, 414
Wirework	8	153, 700	134	4	38	60, 890	112, 620	371, 600
Wood, turned and carved (see also Lumber, planed; Sash, doors, and blinds).	18	28, 725	42		2	19, 183	19, 945	84, 207
All other industries (*a*)	85	6, 300, 388	2, 944	381	288	1, 471, 217	13, 722, 533	17, 276, 752

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a Embracing artificial limbs; babbitt metal and solder; bags other than paper; belting and hose, leather; billiard tables and materials; bluing, bone-, ivory-, and lamp-black; bridges; carriages and sleds, children's; cordials and sirups; cork cutting; dentists' materials; explosives and fireworks; fertilizers; flavoring extracts; furniture, chairs; furs, dressed; gold and silver, reduced and refined; hosiery and knit goods; ice, artificial; iron forgings; jewelry and instrument cases; lard, refined; lead, bar, pipe, sheet, and shot; liquors, distilled; malt; mantels, slate, marble, and marbleized; oil, castor; oil, cottonseed and cake; oil, lubricating; oil, neat's-foot; paving materials; perfumery and cosmetics; photographic apparatus; plated and britannia ware; regalia and society banners and emblems; safes, doors, and vaults, fire-proof; saws; silk and silk goods; silversmithing; sporting goods; stamped ware; stationery goods; steam fittings and heating apparatus; stereotyping and electrotyping; sugar and molasses, refined; surgical appliances; tar and turpentine; telegraph and telephone apparatus; terra-cotta ware; toys and games; type founding; upholstering materials; washing-machines and clothes-wringers; watch cases; window blinds and shades; wire; and wooden ware.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF SAINT PAUL, MINN.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	593	$3, 738, 791	3, 930	1, 092	208	$2, 254, 340	$5, 719, 067	$10, 286, 363
Awnings and tents	3	11, 750	8	19	4	7, 760	96, 000	129, 900
Blacksmithing (see also Wheelwrighting)	18	7, 500	31			15, 427	16, 450	53, 700
Bookbinding and blank-book making	4	43, 500	32	17	8	25, 541	17, 769	68, 941
Boots and shoes, including custom work and repairing	41	275, 150	286	18	21	158, 162	421, 198	716, 733
Boxes, cigar	3	4, 500	6	3		2, 602	4, 750	9, 500
Bread and other bakery products	20	64, 200	52	1	4	28, 095	171, 990	246, 800
Brick and tile	5	13, 000	74		2	15, 322	8, 027	32, 200
Brooms and brushes	4	6, 500	12	1		7, 100	13, 600	29, 600
Carpentering	58	127, 475	622			268, 516	568, 865	960, 642
Carpets, rag	3	210			1	150	800	1, 850
Carriages and wagons (see also Wheelwrighting)	6	103, 000	105			57, 760	82, 500	200, 000
Clothing, men's	22	264, 500	154	485	3	210, 490	553, 050	974, 200
Clothing, women's	9	31, 200	1	80		24, 100	93, 350	147, 900
Coffee and spices, roasted and ground	4	106, 500	11	6	9	11, 350	107, 750	153, 500
Confectionery	9	63, 000	41	5	1	23, 010	108, 450	156, 950
Cooperage	4	2, 400	10			5, 080	2, 100	11, 300
Dentistry, mechanical	14	14, 050	7		1	3, 670	7, 260	40, 530
Drugs and chemicals (see also Patent medicines and compounds)	5	13, 050	9			3, 800	16, 500	35, 300
Dyeing and cleaning	3	1, 650	1	1		550	750	3, 050
Flouring- and grist-mill products	7	143, 500	40			17, 464	461, 048	540, 927
Foundery and machine-shop products	9	104, 650	213			119, 750	239, 700	416, 500
Furniture (see also Upholstering)	13	75, 050	54			30, 096	60, 775	132, 150
Furs, dressed	5	120, 600	27	50	2	36, 810	163, 550	344, 000
Housefurnishing goods	5	108, 000	44	25	1	35, 740	321, 467	510, 270
Liquors, malt	11	371, 500	95	4	2	38, 960	167, 542	298, 972
Lithographing (see also Printing and publishing)	3	14, 000	14	1	1	9, 785	19, 657	37, 525
Lock- and gun-smithing	4	4, 400	7			3, 750	3, 850	13, 500
Looking-glass and picture frames	3	11, 750	3			1, 400	13, 000	19, 200
Lumber, planed	4	48, 000	44			24, 150	80, 000	128, 500
Malt	4	30, 500	18			9, 485	49, 300	74, 000
Marble and stone work	12	37, 500	67			39, 100	32, 555	90, 975
Masonry, brick and stone	58	126, 420	780			271, 687	274, 150	642, 668
Millinery and lace goods	3	13, 500		34		9, 500	33, 000	66, 500
Mineral and soda waters	3	7, 000	12			4, 436	7, 500	22, 000
Painting and paperhanging	24	20, 650	84			37, 620	67, 210	147, 500
Patent medicines and compounds (see also Drugs and chemicals)	5	14, 900	6	5	2	3, 038	6, 000	24, 000
Photographing	9	14, 625	13	2		6, 150	4, 640	28, 200
Plumbing and gasfitting	9	33, 350	47			23, 831	67, 800	115, 850
Printing and publishing (see also Lithographing)	19	502, 000	261	13	82	222, 384	146, 959	527, 764
Saddlery and harness	11	31, 193	54		2	28, 783	83, 760	147, 191
Shirts	4	4, 700	4	32		10, 800	4, 700	22, 500
Slaughtering and meat-packing, not including retail butchering	5	165, 000	31		2	17, 100	371, 050	429, 747
Tinware, copperware, and sheet-iron ware	20	30, 356	62		4	36, 820	91, 464	165, 593
Tobacco, cigars and cigarettes	27	79, 212	116	2	32	84, 778	147, 600	388, 674
Upholstering (see also Furniture)	4	2, 150	5			1, 600	3, 350	9, 500
Watch and clock repairing	14	13, 000	22			13, 970	5, 150	36, 700
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	15	43, 750	47			23, 610	28, 000	71, 400
All other industries (*a*)	48	414, 400	298	288	24	223, 258	473, 131	867, 461

a Embracing agricultural implements; baking and yeast powders; boot and shoe uppers; boxes, fancy and paper; brass castings; buttons; coffins, burial cases, and undertakers' goods; corsets; cutlery and edge tools; drain and sewer pipe; engraving and die-sinking; engraving, wood; explosives and fireworks; furnishing goods, men's; hairwork; hats and caps; instruments, professional and scientific; iron work, architectural and ornamental; ivory and bone work; kindling wood; liquors, distilled; lumber, sawed; models and patterns; musical instruments and materials (not specified); musical instruments, organs and materials; pumps; regalia and society banners and emblems; safes, doors, and vaults, fire-proof; sash, doors, and blinds; scales and balances; show-cases; soap and candles; steam fittings and heating apparatus; stereotyping and electrotyping; trunks and valises; type founding; vinegar; wirework; and wood, turned and carved.

CITY OF SALEM, MASS.

[Statistics collected under the direction of ELMER VALENTINE, Special Agent.]

All industries	241	$3, 978, 850	2, 632	1, 309	240	$1, 401, 592	$7, 264, 447	$9, 926, 564
Blacksmithing	13	10, 300	24			12, 442	10, 300	36, 510
Boot and shoe findings	5	16, 250	35	49		21, 960	70, 000	107, 300
Boots and shoes, including custom work and repairing	9	93, 000	379	305	12	221, 989	427, 016	789, 650
Bread and other bakery products	7	12, 300	20			10, 774	26, 131	42, 625
Carpentering	24	20, 150	86			46, 279	66, 347	135, 655
Coffins, burial cases, and undertakers' goods	3	6, 000	8			4, 880	2, 200	9, 320
Foundery and machine-shop products	10	47, 500	56			27, 230	50, 379	101, 943
Furniture	4	7, 700	20			7, 304	9, 830	18, 600
Leather, curried	36	703, 050	546	1		282, 111	3, 059, 359	3, 589, 511
Leather, tanned	29	452, 500	347			175, 149	1, 926, 956	2, 336, 634
Looking-glass and picture frames	3	6, 500	3	1		1, 900	4, 500	10, 300
Marble and stone work	5	19, 000	28			11, 208	9, 600	29, 453
Masonry, brick and stone	5	12, 300	44			20, 850	17, 320	42, 790
Painting and paperhanging	21	12, 100	58			24, 138	25, 059	71, 390
Plumbing and gasfitting	4	7, 500	15			7, 600	8, 700	22, 100
Printing and publishing	4	29, 000	29	8	1	12, 864	16, 740	40, 661
Saddlery and harness	8	11, 500	16			7, 194	11, 025	25, 002
Shipbuilding	5	9, 500	15			7, 140	4, 685	13, 640
Tinware, copperware, and sheet-iron ware	5	68, 500	45	7		24, 254	15, 700	51, 954
Tobacco, cigars and cigarettes	5	21, 500	15	21		10, 404	15, 500	31, 500
All other industries (*a*)	36	2, 412, 700	843	917	227	463, 922	1, 487, 100	2, 420, 026

a Embracing artificial limbs; bagging, flax, hemp, and jute; bookbinding and blank-book making; boxes, wooden, packing; brass castings; brick and tile; carriages and wagons; cars, railroad, street, and repairs; clothing, men's; confectionery; cooperage; cordage and twine; cotton goods; dentistry, mechanical; drugs and chemicals; files; flouring- and grist-mill products; lasts; liquors, malt; lumber, planed; musical instruments, organs and materials; oil, lubricating; oilcloth, floor; paints; patent medicines and compounds; sash, doors, and blinds; wheelwrighting; and window blinds and shades.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF SALT LAKE CITY, UTAH.

[Statistics collected under the direction of A. A. LEONARD, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	166	$860, 415	696	114	118	$425, 537	$812, 736	$1, 610, 133
Awnings and tents	3	900	6	4	....	3, 437	7, 000	13, 800
Blacksmithing	12	7, 200	22	....	....	12, 971	7, 994	35, 164
Boots and shoes, including custom work and repairing	19	74, 885	124	29	36	60, 484	107, 880	206, 601
Bread and other bakery products	9	28, 200	17	6	4	11, 912	63, 120	96, 672
Brick and tile	6	53, 325	28	....	26	7, 967	5, 111	24, 612
Carpentering	4	10, 650	14	....	....	8, 910	14, 300	29, 800
Carriages and wagons	5	11, 400	25	....	1	14, 980	13, 515	36, 600
Confectionery	3	7, 000	3	1	....	1, 475	16, 860	26, 180
Dentistry, mechanical	6	8, 100	4	2	....	2, 250	2, 850	18, 950
Flouring- and grist-mill products	4	52, 000	10	....	....	4, 650	107, 830	125, 875
Foundery and machine-shop products	7	87, 000	64	9	2	42, 171	44, 510	117, 770
Furniture	4	25, 350	22	4	4	13, 250	18, 325	49, 387
Jewelry	3	2, 600	7	....	....	6, 783	9, 150	19, 362
Lime	3	36, 000	16	....	2	7, 150	3, 040	16, 770
Liquors, malt	3	100, 500	32	....	1	16, 125	60, 125	108, 020
Marble and stone work	3	4, 400	5	....	....	3, 868	3, 300	9, 400
Masonry, brick and stone	3	120	2	....	....	250	200	1, 535
Painting and paperhanging	3	5, 500	17	....	5	11, 600	5, 600	24, 740
Photographing	5	6, 600	8	4	2	5, 663	3, 170	16, 300
Printing and publishing	6	154, 600	114	11	17	91, 861	64, 054	202, 625
Saddlery and harness	11	23, 300	30	....	4	14, 230	42, 195	66, 067
Tinware, copperware, and sheet-iron ware	3	32, 000	24	....	5	21, 200	47, 400	85, 070
All other industries (*a*)	41	128, 725	102	44	9	62, 350	165, 707	278, 833

a Embracing baking and yeast powders; baskets, rattan and willow ware; bluing; bookbinding and blank-book making; brass castings; clothing, men's; cordage and twine; iron railings, wrought; kaolin and ground earths; lasts; leather, curried; leather, dressed skins; leather, tanned; lock- and gun-smithing; mattresses and spring beds; mineral and soda waters; plumbing and gasfitting; sash, doors, and blinds; saws; soap and candles; stencils and brands; stone- and earthen-ware; tobacco, cigars and cigarettes; trunks and valises; upholstering; watch and clock repairing; wood, turned and carved; wooden ware; and woolen goods.

CITY OF SAN ANTONIO, TEX.

[Statistics collected under the direction of MAX NEUENDORFF, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	71	$310, 050	300	13	48	$137, 781	$328, 476	$642, 412
Blacksmithing	10	15, 450	29	3	10	10, 850	9, 440	28, 750
Boots and shoes, including custom work and repairing	7	8, 600	20	....	....	5, 750	7, 800	31, 300
Carpentering	3	3, 500	23	....	....	10, 200	16, 000	33, 300
Carriages and wagons	3	12, 000	12	....	3	6, 064	7, 000	20, 980
Flouring- and grist-mill products	3	40, 000	19	....	....	10, 100	162, 600	205, 000
Mineral and soda waters	4	7, 600	2	3	....	1, 860	1, 850	6, 400
Painting and paperhanging	4	4, 200	24	....	....	6, 875	3, 900	14, 000
Printing and publishing	4	27, 700	46	2	26	29, 520	16, 500	71, 000
Saddlery and harness	6	30, 300	26	....	4	11, 650	19, 800	44, 700
Tinware, copperware, and sheet-iron ware	3	4, 400	10	....	1	2, 100	3, 500	7, 250
All other industries (*a*)	24	156, 300	89	5	4	42, 812	80, 086	179, 732

a Embracing brick and tile; cement; confectionery; cooperage; foundery and machine-shop products; ice, artificial; jewelry; leather, curried; leather, tanned; lime; liquors, malt; lumber, sawed; soap and candles; stone- and earthen-ware; tobacco, cigars and cigarettes; and wheelwrighting.

CITY OF SAN FRANCISCO, CAL.

[Statistics collected under the direction of HENRY G. LANGLEY, Chief Special Agent. See note on page 379.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	2, 971	$35, 368, 139	23, 662	3, 588	1, 192	$14, 928, 534	$47, 978, 072	$77, 824, 299
Artificial feathers and flowers (see also Millinery and lace goods)	4	2, 550	2	1	....	962	2, 700	5, 850
Awnings and tents	4	26, 100	5	7	3	6, 675	15, 850	29, 602
Bags, other than paper	3	275, 000	55	50	14	51, 300	1, 410, 000	1, 565, 000
Baking and yeast powders (see also Drugs and chemicals)	4	48, 000	24	3	....	16, 575	97, 490	142, 345
Baskets, rattan and willow ware	8	8, 575	20	5	3	6, 560	4, 165	19, 400
Belting and hose, leather	4	85, 000	31	....	....	18, 565	73, 100	117, 780
Billiard tables and materials	5	102, 000	39	....	....	24, 632	45, 618	98, 360
Blacking	3	3, 500	3	....	....	1, 809	2, 250	7, 400
Blacksmithing (see also Wheelwrighting)	106	59, 973	155	....	7	104, 653	102, 410	364, 886
Bookbinding and blank-book making	13	108, 300	118	55	32	110, 766	172, 890	382, 440
Boot and shoe findings	4	10, 700	11	1	....	8, 080	30, 800	44, 750
Boot and shoe uppers	5	6, 700	9	1	....	5, 536	15, 030	31, 980
Boots and shoes, including custom work and repairing	310	1, 090, 772	2, 464	184	96	1, 199, 730	2, 187, 811	4, 141, 547
Boxes, cigar	6	130, 635	149	35	10	72, 940	75, 165	206, 200
Boxes, fancy and paper	4	24, 500	18	42	9	20, 165	20, 450	50, 550
Boxes, wooden, packing	7	154, 750	232	30	30	108, 400	216, 300	460, 500
Brass castings	8	142, 200	184	2	6	117, 940	232, 570	374, 350
Bread and other bakery products	119	428, 860	431	14	45	315, 082	1, 403, 001	2, 070, 884
Brick and tile	3	8, 800	79	....	....	22, 050	12, 025	46, 700
Bridges	8	99, 000	344	....	....	172, 970	374, 000	694, 000
Brooms and brushes	15	70, 800	96	....	3	37, 049	69, 600	132, 200
Carpentering	181	431, 690	1, 190	1	1	907, 331	1, 690, 833	3, 121, 851
Carriages and wagons (see also Wheelwrighting)	52	338, 071	373	....	1	230, 849	284, 814	714, 098
Clothing, men's	110	1, 126, 164	1, 087	610	18	908, 559	2, 204, 148	3, 782, 963
Clothing, women's	27	424, 250	31	632	7	220, 658	659, 152	1, 150, 207

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF SAN FRANCISCO, CAL.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Coffee and spices, roasted and ground	20	$445, 450	160	6	10	$99, 132	$1, 057, 628	$1, 336, 718
Coffins, burial cases, and undertakers' goods	13	72, 150	46			33, 753	54, 125	142, 060
Confectionery	29	166, 150	88	29	14	54, 622	345, 826	507, 026
Cooperage	28	424, 350	254		5	181, 811	304, 620	605, 704
Cordage and twine	3	500, 700	145		18	57, 215	402, 115	545, 230
Cordials and sirups	9	72, 200	44			28, 610	134, 590	208, 000
Corsets	4	4, 300		9	1	3, 000	3, 550	12, 200
Cutlery and edge tools (see also Tools)	11	104, 500	54		1	39, 623	37, 150	119, 339
Dentistry, mechanical	28	10, 480	15			7, 320	9, 010	39, 525
Drugs and chemicals (see also Baking and yeast powders; Patent medicines and compounds).	27	357, 925	118	2	3	76, 809	273, 801	571, 691
Dyeing and cleaning	9	27, 225	21	9	1	16, 331	14, 269	46, 466
Electroplating	10	21, 500	11	3	1	6, 542	13, 523	34, 375
Engraving and die-sinking	13	4, 320	5			3, 288	2, 430	20, 340
Engraving, wood	8	995	2			425	3, 340	17, 100
Fertilizers	3	145, 000	35			21, 588	66, 600	106, 160
Flags and banners	3	16, 000	5	11	2	7, 000	13, 200	35, 600
Flavoring extracts	6	17, 500	13	6	1	7, 164	36, 100	54, 500
Flouring- and grist-mill products	9	635, 600	142			103, 992	1, 991, 609	2, 275, 360
Food preparations (see page 39)	7	53, 400	35	1	4	22, 348	80, 892	164, 025
Foundery and machine-shop products	58	2, 391, 739	1, 888		33	1, 243, 234	2, 017, 267	3, 889, 503
Fruits and vegetables, canned and preserved	6	926, 000	226	340	80	207, 000	609, 000	978, 000
Furnishing goods, men's	12	362, 350	121	189		126, 265	509, 540	744, 245
Furniture (see also Mattresses and spring beds; Upholstering)	41	918, 975	556	20	12	352, 583	683, 895	1, 280, 210
Furniture, chairs	3	2, 300	10			5, 820	3, 750	13, 300
Furs, dressed	6	102, 250	17	101		31, 429	158, 600	224, 400
Glass, cut, stained, and ornamented	5	77, 450	36			22, 100	66, 900	103, 000
Gloves and mittens	6	74, 500	49	137		49, 700	161, 805	191, 520
Glue	3	21, 200	23		2	11, 800	21, 940	49, 800
Hairwork	11	14, 550	10	19		12, 167	16, 000	46, 284
Hand-stamps	5	13, 000	16			14, 830	13, 532	51, 430
Hats and caps, not including wool hats	16	35, 925	20	39		29, 032	38, 717	83, 678
High explosives	6	934, 000	172			76, 786	680, 416	1, 565, 868
Ink	3	61, 000	15			9, 450	59, 000	97, 500
Instruments, professional and scientific	8	18, 050	17		1	9, 948	17, 088	44, 712
Iron forgings	4	42, 000	40		1	27, 702	47, 081	91, 310
Jewelry	12	283, 500	128		11	100, 597	159, 753	315, 115
Lapidary work	7	4, 425	9	1	3	11, 035	16, 670	39, 120
Leather, curried	41	225, 700	111		2	72, 256	941, 120	1, 102, 475
Leather, tanned	47	1, 161, 800	261		7	166, 754	1, 530, 298	2, 014, 345
Liquors, distilled	5	199, 000	36		1	20, 250	170, 075	258, 200
Liquors, malt	38	1, 666, 520	813			404, 830	1, 507, 284	2, 722, 270
Liquors, vinous (see also Liquors, distilled)	6	120, 000	49			16, 236	51, 445	83, 521
Lithographing (see also Printing and publishing)	7	122, 000	84		9	63, 391	77, 200	193, 712
Lock- and gun-smithing	30	24, 750	20			13, 234	14, 546	57, 163
Looking-glass and picture frames	21	229, 600	78	2	11	58, 406	135, 975	281, 900
Marble and stone work	32	229, 150	219			155, 767	223, 554	469, 646
Masonry, brick, and stone	24	75, 650	191		1	135, 827	182, 683	391, 734
Matches	3	30, 600	53		5	21, 500	156, 800	198, 600
Mattresses and spring beds (see also Furniture)	8	123, 200	59	2	2	35, 142	94, 215	159, 737
Millinery and lace goods (see also Artificial feathers and flowers)	19	137, 600	13	198	2	78, 932	305, 900	456, 300
Mineral and soda waters	8	40, 300	27		1	18, 365	31, 160	80, 175
Models and patterns	7	8, 900	15		1	9, 532	3, 856	23, 966
Musical instruments and materials (not specified)	4	2, 550	7			3, 660	1, 150	8, 400
Musical instruments, pianos and materials	5	49, 500	27			18, 425	41, 250	87, 700
Paints	3	318, 000	89	1		40, 720	298, 552	402, 670
Painting and paperhanging	117	87, 485	409	1	16	260, 907	197, 839	639, 503
Patent medicines and compounds (see also Drugs and chemicals)	15	52, 800	45	6		16, 732	71, 820	156, 000
Perfumery and cosmetics	3	13, 000	11	11	16	12, 400	27, 300	61, 900
Photographing	33	127, 950	105	27	3	100, 900	80, 833	298, 960
Pickles, preserves, and sauces	3	5, 000	3		2	1, 324	6, 475	13, 200
Plumbing and gasfitting	94	175, 050	265	1	23	179, 565	332, 244	671, 735
Printing and publishing (see also Lithographing)	152	1, 744, 755	1, 326	98	103	1, 217, 349	1, 015, 305	2, 987, 576
Roofing and roofing materials	16	69, 450	150			91, 021	120, 920	271, 875
Saddlery and harness	58	285, 650	234	12	17	121, 977	198, 199	400, 715
Safes, doors, and vaults, fire-proof	3	36, 500	14			8, 590	13, 808	32, 835
Sash, doors, and blinds (see also Wood, turned and carved)	16	555, 000	431		30	272, 213	360, 081	769, 030
Saws	6	87, 185	29		4	22, 348	40, 390	83, 026
Shipbuilding	56	1, 681, 523	349			393, 283	463, 069	1, 087, 843
Shirts	25	88, 100	181	173	1	85, 188	153, 940	303, 050
Show-cases	6	4, 320	8			5, 088	10, 875	23, 800
Silk and silk goods	4	159, 300	19	104	25	40, 700	78, 625	155, 705
Silverware	3	116, 000	24		6	20, 550	37, 500	87, 000
Slaughtering and meat-packing, not including retail butchering	24	1, 586, 200	295		14	239, 868	4, 511, 721	6, 013, 602
Soap and candles	19	458, 650	150	14	5	86, 855	676, 489	886, 293
Stencils and brands	5	6, 125	10	1		5, 894	2, 860	16, 792
Straw goods	8	33, 500	33	72	3	38, 600	26, 450	85, 200
Surgical appliances	5	4, 925	2			1, 976	2, 400	11, 672
Tinware, copperware, and sheet-iron ware	69	428, 975	341		64	226, 978	542, 041	949, 499
Tobacco, cigars and cigarettes	147	1, 687, 603	3, 110	110	198	911, 988	1, 929, 357	3, 720, 813
Tools (see also Cutlery and edge tools)	4	13, 100	11			9, 365	17, 308	38, 150

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF SAN FRANCISCO, CAL.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Trunks and valises	7	$106, 631	43	....	4	$29, 312	$84, 500	$166, 508
Umbrellas and canes	4	20, 850	5	11	....	9, 616	26, 600	53, 950
Upholstering (see also Furniture)	50	164, 350	108	7	1	72, 297	208, 032	360, 332
Upholstering materials	4	47, 250	28	10	4	10, 885	32, 550	62, 050
Watch and clock repairing	98	91, 235	75	2	4	62, 013	54, 119	223, 215
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	20	20, 875	34	....	1	23, 142	23, 350	74, 712
Windmills	4	11, 500	8	....	....	7, 100	13, 200	27, 500
Window blinds and shades	10	92, 100	43	2	....	23, 909	74, 200	141, 840
Wirework	6	273, 308	70	....	7	40, 665	176, 910	273, 776
Wood, turned and carved (see also Sash, doors, and blinds)	16	15, 125	30	....	3	21, 006	28, 390	72, 776
All other industries (*a*)	88	5, 682, 100	1, 815	128	107	1, 121, 786	9, 103, 563	11, 206, 095

a Embracing agricultural implements; axle-grease; babbitt metal and solder; bags, paper; bells; boot and shoe cut stock; calcium lights; cement; drain and sewer pipe; electric lights; electrical apparatus; explosives and fireworks; fancy articles; files; foundery supplies; galvanizing; glass; gold and silver, reduced and refined; grease and tallow; housefurnishing goods; iron and steel; iron bolts, nuts, washers, and rivets; iron pipe, wrought; iron railing, wrought; ivory and bone work; jewelry and instrument cases; kindling wood; lamps and reflectors; lasts; lead, bar, pipe, sheet, and shot; leather, dressed skins; lumber, planed; malt; mantels, slate, marble, and marbleized; millstones; mirrors; mixed textiles; musical instruments, organs and materials; oil, essential; oil, linseed; photographic apparatus; pipes, tobacco; pumps; regalia and society banners and emblems; rubber and elastic goods; salt, ground; spectacles and eyeglasses; springs, steel, car, and carriage; stamped ware; stationery goods; steam fittings and heating apparatus; stereotyping and electrotyping; stone- and earthen-ware; sugar and molasses, refined; taxidermy; tobacco, chewing, smoking, and snuff; toys and games; type founding; varnish; vinegar; whips; wooden ware; woolen goods; and zinc.

CITY OF SAVANNAH, GA.

[Statistics collected under the direction of B. FRANK GRAY, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	120	$1, 102, 970	996	68	66	$447, 640	$2, 457, 606	$3, 396, 297
Boots and shoes, including custom work and repairing	7	1, 920	10	....	....	4, 738	4, 071	12, 110
Bread and other bakery products	15	71, 250	103	....	15	30, 342	208, 240	272, 124
Brick and tile	3	59, 500	62	1	2	13, 900	11, 587	33, 900
Carpentering	9	12, 875	57	....	....	28, 335	60, 044	107, 389
Carriages and wagons (see also Wheelwrighting)	3	6, 300	17	....	....	7, 417	7, 000	10, 535
Flouring- and grist-mill products	5	121, 000	57	....	....	25, 096	338, 225	405, 520
Foundery and machine-shop products	7	64, 000	84	3	6	50, 197	68, 683	176, 954
Lumber, sawed	4	43, 000	78	....	5	16, 904	100, 000	135, 292
Mineral and soda waters	3	6, 300	15	....	....	5, 854	4, 304	19, 248
Painting and paperhanging	8	36, 775	54	....	....	31, 003	25, 343	80, 850
Plumbing and gasfitting	6	7, 900	20	....	....	8, 571	13, 874	31, 100
Printing and publishing	4	104, 800	109	2	14	66, 603	52, 600	140, 500
Saddlery and harness	3	30, 500	8	....	....	4, 434	4, 600	13, 050
Tinware, copperware, and sheet-iron ware	6	44, 000	19	....	....	9, 861	22, 700	46, 000
Tobacco, cigars and cigarettes	11	8, 000	32	1	7	12, 311	14, 255	34, 452
Wheelwrighting (see also Carriages and wagons)	11	22, 950	58	....	3	25, 156	22, 530	65, 901
All other industries (*a*)	15	461, 900	213	61	14	106, 938	1, 499, 550	1, 801, 372

a Embracing blacksmithing; coffins, burial cases, and undertakers' goods; confectionery; cooperage; cotton goods; lumber, planed; marble and stone work; paper; rice cleaning and polishing; stencils and brands; and tar and turpentine.

CITY OF SCRANTON, PA.

[Statistics collected under the direction of C. G. BOLAND, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	216	$4, 470, 631	2, 908	456	185	$1, 313, 287	$6, 671, 479	$8, 561, 850
Blacksmithing (see also Wheelwrighting)	19	16, 200	21	....	....	8, 035	9, 334	31, 335
Boots and shoes, including custom work and repairing	39	16, 925	43	....	1	15, 276	28, 190	66, 674
Bread and other bakery products	11	91, 200	33	4	5	19, 633	52, 608	96, 394
Brick and tile	3	6, 500	33	....	....	9, 190	2, 275	14, 000
Carpentering	16	40, 935	94	....	....	39, 971	75, 240	138, 223
Carriages and wagons (see also Wheelwrighting)	5	25, 000	36	....	....	16, 300	14, 700	39, 360
Flouring- and grist-mill products	5	185, 000	18	....	....	13, 681	255, 528	291, 287
Foundery and machine-shop products	4	902, 000	504	....	5	203, 486	312, 921	630, 190
Furniture	9	21, 700	29	1	3	13, 890	22, 040	52, 350
Grease and tallow	3	3, 200	4	....	....	1, 285	17, 140	24, 000
Iron and steel	4	2, 294, 000	1, 534	....	62	605, 953	4, 792, 978	5, 400, 085
Liquors, malt	3	170, 000	32	....	....	13, 300	73, 755	133, 125
Lumber, planed	3	71, 500	36	....	3	16, 838	28, 520	50, 550
Marble and stone work	5	12, 900	24	....	....	9, 296	16, 761	33, 095
Painting and paperhanging	14	2, 345	29	....	....	13, 168	11, 850	34, 907
Plumbing and gasfitting	3	16, 375	19	....	....	9, 500	35, 725	52, 775
Printing and publishing	12	81, 100	91	3	34	51, 176	44, 658	117, 017
Saddlery and harness	7	19, 700	18	....	....	5, 424	19, 447	35, 636
Tinware, copperware, and sheet-iron ware	13	91, 725	47	....	3	20, 934	45, 275	93, 785
Tobacco, cigars and cigarettes	9	25, 950	70	15	....	26, 390	45, 750	87, 950
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	4	2, 600	3	....	....	1, 150	1, 850	5, 760
All other industries (*a*)	25	373, 776	190	433	69	199, 411	764, 904	1, 133, 352

a Embracing agricultural implements; bookbinding and blank-book making; boxes, fancy and paper; brass castings; bridges; clothing, women's; coffee and spices, roasted and ground; confectionery; cutlery and edge tools; files; gas machines and meters; hairwork; looking-glass and picture frames; lumber, sawed; scales and balances; silk and silk goods; slaughtering and meat-packing; tobacco, chewing, smoking, and snuff; upholstering; and wirework.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF SOMERVILLE, MASS.

[Statistics collected under the direction of JOHN E. ASHLEY, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	100	$1, 682, 795	1, 191	84	21	$564, 508	$4, 608, 192	$5, 852, 535
Blacksmithing (see also Wheelwrighting)	7	8, 350	11	....	....	4, 700	4, 250	16, 300
Boots and shoes, including custom work and repairing	9	1, 305	5	....	....	2, 000	4, 245	11, 300
Bread and other bakery products	4	15, 000	20	4	2	14, 600	42, 000	66, 000
Carpentering	12	24, 700	44	....	....	24, 250	42, 387	83, 500
Flouring- and grist-mill products	3	29, 200	7	1	....	2, 600	98, 390	111, 400
Masonry, brick and stone	4	5, 800	14	....	....	6, 800	13, 200	27, 500
Painting and paperhanging	12	6, 300	25	....	....	10, 525	8, 500	28, 600
Plumbing and gasfitting	3	6, 050	6	....	....	3, 800	15, 100	22, 400
Saddlery and harness	3	500	1	....	....	225	2, 000	4, 300
Slaughtering and meat-packing, not including retail butchering	3	760, 840	263	....	....	122, 889	3, 368, 396	3, 702, 601
Tinware, copperware, and sheet-iron ware	4	8, 050	6	....	....	3, 800	6, 000	20, 719
Wheelwrighting (see also Blacksmithing)	4	3, 950	5	....	....	3, 150	3, 800	21, 700
All other industries (*a*)	32	812, 750	784	79	19	365, 169	999, 924	1, 736, 215

a Embracing boot and shoe cut stock; brass and copper, rolled; brass castings; carriages and wagons; cordage and twine; cooperage; drugs and chemicals; dyeing and finishing textiles; fertilizers; foundery and machine-shop products; fruits and vegetables, canned and preserved; glass; hats and caps, not including wool hats; iron nails and spikes, cut and wrought; leather, curried; mattresses and spring beds; mats and matting; models and patterns; pickles, preserves, and sauces; printing and publishing; sash, doors, and blinds; soap and candles; stone- and earthen-ware; tobacco, cigars and cigarettes; tools; upholstering; and vinegar.

CITY OF SPRINGFIELD, ILL.

[Statistics collected under the direction of J. O. HUMPHREY, Special Agent.]

All industries	116	$1, 709, 775	1, 391	75	232	$656, 253	$3, 156, 279	$4, 123, 883
Blacksmithing	6	4, 400	10	....	....	5, 800	4, 540	17, 340
Boots and shoes, including custom work and repairing	13	7, 930	12	....	1	5, 400	6, 177	17, 688
Bread and other bakery products	8	16, 700	15	4	3	7, 140	23, 800	39, 000
Carriages and wagons	4	67, 500	52	....	....	27, 200	37, 000	93, 000
Confectionery	3	14, 500	12	3	6	7, 000	24, 500	38, 000
Flouring- and grist-mill products	5	140, 000	40	....	....	16, 800	268, 550	356, 495
Foundery and machine-shop products	6	107, 500	121	....	3	62, 665	131, 297	240, 626
Furniture (see also Upholstering)	3	1, 600	7	....	....	4, 200	3, 300	8, 700
Printing and publishing	6	50, 300	123	3	44	49, 050	22, 150	105, 300
Saddlery and harness	8	19, 300	35	2	....	13, 764	26, 400	61, 106
Tinware, copperware, and sheet-iron ware	5	12, 000	18	....	1	9, 540	17, 400	34, 090
Tobacco, cigars and cigarettes	9	17, 400	30	....	11	10, 216	13, 808	36, 650
Upholstering (see also Furniture)	3	3, 200	6	....	2	2, 660	4, 300	8, 700
All other industries (*a*)	37	1, 247, 445	910	63	161	434, 818	2, 573, 057	3, 067, 188

a Embracing agricultural implements; bags, paper; baking and yeast powders; bookbinding and blank-book making; brooms and brushes; clothing, men's; coffee and spices, roasted and ground; coffins, burial cases, and undertakers' goods; cooperage; files; iron and steel; liquors, malt; lock- and gun-smithing; looking-glass and picture frames; lumber, planed; marble and stone work; mineral and soda waters; paper; patent medicines and compounds; roofing and roofing materials; sash, doors, and blinds; shoddy; slaughtering and meat-packing; stereotyping and electrotyping; trunks and valises; wheelwrighting; wirework; wood, turned and carved; and woolen goods.

CITY OF SPRINGFIELD, MASS.

[Statistics collected under the direction of RODERICK BURT, Special Agent.]

All industries	434	$9, 177, 250	4, 881	2, 138	341	$2, 906, 130	$7, 726, 119	$12, 891, 826
Blacksmithing (see also Wheelwrighting)	20	13, 875	50	....	....	21, 575	17, 621	57, 225
Boots and shoes, including custom work and repairing	27	7, 125	15	....	....	6, 100	10, 442	33, 588
Boxes, fancy and paper	6	24, 500	35	154	....	46, 709	80, 900	145, 267
Brass castings	3	52, 300	65	....	10	23, 950	32, 400	81, 000
Bread and other bakery products	10	48, 250	49	11	1	30, 389	105, 465	199, 254
Brick and tile	7	91, 000	150	....	....	34, 950	21, 965	82, 000
Buttons	3	133, 000	81	316	35	114, 316	92, 620	274, 229
Cardboard	3	73, 000	58	12	....	36, 132	150, 827	224, 204
Carpentering	43	148, 700	272	....	....	127, 030	310, 275	545, 582
Carriages and wagons (see also Wheelwrighting)	5	32, 500	47	....	....	27, 550	26, 800	70, 580
Cars, railroad, street, and repairs	3	493, 000	458	10	....	204, 113	719, 078	995, 677
Clothing, men's	10	42, 200	52	81	....	61, 990	90, 300	178, 250
Collars and cuffs, paper	4	190, 000	30	28	....	30, 533	333, 238	408, 451
Confectionery	5	87, 300	49	8	....	31, 250	161, 500	225, 900
Cotton goods	3	1, 517, 250	355	477	141	235, 336	658, 236	1, 167, 564
Dentistry, mechanical	3	2, 325	....	....	....	....	1, 100	5, 900
Dyeing and cleaning	4	8, 200	15	6	....	8, 700	4, 100	18, 750
Electroplating	5	8, 500	18	....	1	7, 925	18, 400	60, 950
Envelopes	4	500, 000	93	525	10	154, 750	1, 121, 450	1, 445, 570
Fancy articles	3	84, 500	15	10	....	8, 425	7, 900	21, 500
Fire-arms	3	2, 975, 455	614	....	....	416, 147	221, 260	711, 093
Flouring- and grist-mill products	3	47, 000	4	....	....	1, 650	56, 395	71, 315
Foundery and machine-shop products	13	377, 700	265	....	....	124, 468	254, 653	458, 585
Furniture (see also Mattresses and spring beds)	10	96, 950	68	3	....	32, 923	108, 810	175, 520
Hand-stamps	3	15, 700	19	1	....	10, 600	20, 750	38, 500
Jewelry	4	13, 900	8	15	....	10, 185	29, 450	51, 000
Kindling wood	5	1, 750	10	....	....	3, 495	3, 880	9, 150
Liquors, malt	3	65, 000	32	....	....	14, 739	78, 890	135, 250
Looking-glass and picture frames	3	8, 800	5	....	....	3, 600	13, 900	21, 100
Marble and stone work	7	54, 380	79	....	1	44, 250	40, 000	111, 000
Masonry, brick and stone	3	7, 500	12	....	....	6, 690	7, 500	20, 500
Mattresses and spring beds (see also Furniture)	4	19, 065	16	5	....	10, 271	26, 322	51, 951
Painting and paperhanging	32	21, 410	74	....	....	43, 100	41, 055	114, 355
Photographing	10	22, 800	11	1	....	7, 200	9, 210	41, 150
Plumbing and gasfitting	3	4, 500	6	....	....	4, 400	13, 680	22, 530

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF SPRINGFIELD, MASS.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Printing and publishing	10	$158,700	203	76	8	$156,842	$182,396	$391,072
Saddlery and harness	9	61,850	163	1	....	31,775	128,250	189,804
Sash, doors, and blinds	3	18,000	47	....	....	20,652	36,764	66,141
Sewing machines and attachments	3	51,200	53	....	....	17,450	31,500	94,400
Slaughtering and meat-packing, not including retail butchering	4	149,000	32	....	....	20,080	840,615	940,730
Soap and candles	4	124,750	31	2	....	13,778	203,450	229,254
Tinware, copperware, and sheet-iron ware	13	129,200	97	6	2	44,255	124,850	204,840
Tobacco, cigars and cigarettes	19	125,590	149	59	4	102,742	227,466	395,560
Watch and clock repairing	14	7,375	14	....	....	8,200	7,225	24,800
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	8	8,250	8	....	....	4,065	3,930	14,700
All other industries (*a*)	70	1,053,900	954	331	128	540,850	1,040,301	2,066,085

a Embracing artificial limbs; awnings and tents; bags, paper; bells; billiard tables and materials; blacking; bookbinding and blank-book making; boxes, cigar; boxes, wooden, packing; bridges; carriages and sleds, children's; clothing, women's; coffee and spices, roasted and ground; coffins, burial cases, and undertakers' goods; drain and sewer pipe; drugs and chemicals; dyeing and finishing textiles; gas machines and meters; glue; gold and silver leaf and foil; hairwork; hardware; ink; iron forgings; iron work, architectural and ornamental; leather, dressed skins; lithographing; lock- and gun-smithing; lumber, planed; mantels, slate, marble, and marbleized; mineral and soda waters; models and patterns; musical instruments, organs and materials; needles and pins; pens, gold; pumps; roofing and roofing materials; rubber and elastic goods; shirts; show-cases; silk and silk goods; spectacles and eyeglasses; stencils and brands; stereotyping and electrotyping; tools; toys and games; upholstering; varnish; watches; wire; wirework; wood pulp; woolen goods; and worsted goods.

CITY OF SPRINGFIELD, OHIO.

[Statistics collected under the direction of J. MILTON BENSON, Special Agent.]

All industries	170	$7,255,953	3,741	47	182	$1,637,212	$4,550,569	$8,462,443
Agricultural implements	13	5,773,000	2,284	....	95	1,050,725	3,083,490	5,738,382
Blacksmithing (see also Wheelwrighting)	13	9,485	30	....	....	11,789	8,906	29,410
Boots and shoes, including custom work and repairing	8	14,300	26	2	1	14,000	10,937	33,850
Bread and other bakery products	9	24,250	38	5	1	17,268	48,453	84,100
Brick and tile	7	87,200	135	....	17	28,021	12,027	65,445
Carpentering	22	22,800	106	....	....	49,369	105,574	177,957
Clothing, men's	7	33,500	38	26	....	29,000	57,488	110,000
Flouring- and grist-mill products	9	171,000	33	....	....	13,762	331,894	368,662
Foundery and machine-shop products	8	173,100	251	....	20	77,616	155,376	431,730
Lime	5	75,500	62	....	....	22,935	24,225	70,180
Marble and stone work	3	9,000	7	....	....	5,300	5,900	14,000
Painting and paperhanging	6	6,000	21	....	....	9,760	11,690	30,381
Photographing	6	6,400	12	2	....	6,400	3,200	13,710
Printing and publishing	5	137,200	79	6	3	43,800	77,400	106,852
Pumps, not including steam pumps	3	1,600	6	....	....	2,950	3,000	8,500
Saddlery and harness	3	7,400	17	....	1	8,100	11,200	26,500
Tinware, copperware, and sheet-iron ware	7	18,500	19	....	1	8,510	23,731	44,100
Wheelwrighting (see also Blacksmithing)	6	21,950	31	....	7	12,980	10,090	27,383
All other industries (*a*)	30	664,768	546	6	36	224,927	565,988	1,021,301

a Embracing baking and yeast powders; bookbinding and blank-book making; carriages and wagons; coffins, burial cases, and undertakers' goods; cooperage; drain and sewer pipe; electroplating; files; furniture; leather, tanned; liquors, distilled; liquors, malt; lumber, planed; lumber, sawed; masonry, brick and stone; mattresses and spring beds; oil, linseed; paper; sash, doors, and blinds; sewing machines and attachments; stencils and brands; and washing-machines and clothes-wringers.

CITY OF SYRACUSE, N. Y.

[Statistics collected under the direction of GEORGE W. FERNALD, Chief Special Agent.]

All industries	724	$8,186,818	7,513	2,871	582	$3,042,135	$8,544,436	$14,695,674
Baking and yeast powders	4	14,000	11	4	2	4,550	31,000	43,000
Baskets, rattan and willowware	5	15,560	303	100	51	17,718	9,180	33,762
Blacksmithing (see also Wheelwrighting)	21	15,950	39	....	....	19,135	14,391	51,760
Boots and shoes, including custom work and repairing	26	96,775	227	140	31	93,118	329,103	495,782
Bread and other bakery products	26	61,494	69	10	9	21,517	168,819	231,507
Brick and tile (see also Drain and sewer pipe)	3	61,000	53	....	3	18,000	9,726	38,830
Carpentering	38	77,200	426	....	2	179,011	259,855	515,750
Carriages and wagons (see also Wheelwrighting)	18	125,600	206	....	18	86,591	163,705	328,574
Clothing, men's	27	918,300	829	1,852	86	457,271	1,581,888	2,512,433
Clothing, women's	5	26,200	5	101	3	17,931	79,930	166,409
Confectionery	8	54,500	36	6	2	15,698	95,632	123,842
Cooperage	26	66,200	218	....	3	54,642	148,289	234,302
Cutlery and edge tools	3	504,300	236	....	1	76,446	201,050	295,085
Dentistry, mechanical	17	26,780	7	....	....	3,100	8,900	47,569
Drain and sewer pipe (see also Brick and tile)	3	8,400	13	....	....	5,902	25,400	40,200
Dyeing and cleaning	5	4,600	10	12	1	4,462	2,002	13,949
Flouring- and grist-mill products	4	149,000	38	....	....	16,652	566,525	647,665
Foundery and machine-shop products	13	603,300	351	....	6	150,927	409,237	656,831
Furniture (see also Upholstering)	27	206,425	205	1	18	82,855	205,310	260,633
Hairwork	3	11,200	3	5	....	2,650	7,200	11,890
Kindling wood	8	10,400	14	....	2	3,910	16,950	25,235
Liquors, malt	8	539,497	134	1	....	64,594	327,996	583,195
Lock- and gun-smithing	4	7,000	8	....	1	4,200	6,050	14,200
Looking-glass and picture frames	5	95,731	128	....	26	41,383	77,000	161,414
Lumber, planed (see also Wood, turned and carved)	6	118,000	92	....	4	24,311	53,200	93,300
Marble and stone work	11	78,800	102	....	....	58,016	42,220	124,418
Masonry, brick and stone	19	39,000	228	....	5	75,610	125,450	231,310
Millinery and lace goods	6	21,800	6	51	....	17,456	65,120	107,960
Mineral and soda waters	3	17,000	7	....	....	3,154	8,000	17,070
Musical instruments, organs and materials	4	15,600	57	....	....	11,391	19,083	36,654
Painting and paperhanging	21	27,900	100	....	....	34,060	32,950	91,020
Patent medicines and compounds	7	42,200	11	7	1	4,682	25,865	48,534
Photographing	12	30,750	29	9	....	12,732	10,756	41,570
Plumbing and gasfitting	10	51,600	57	....	3	20,647	71,978	114,933
Printing and publishing	13	287,000	197	19	28	115,038	83,792	246,152

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF SYRACUSE, N. Y.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Roofing and roofing materials	12	$17, 525	36	....	3	$16, 950	$34, 700	$65, 000
Saddlery and harness	13	22, 000	39	....	3	15, 042	39, 807	73, 785
Salt	41	1, 106, 581	530	11	23	140, 310	308, 9. 1	626, 187
Salt, ground	4	229, 200	130	38	....	31, 897	218, 943	266, 906
Shirts	7	26, 950	24	153	11	43, 877	44, 366	150, 586
Slaughtering and meat-packing, not including retail butchering	8	221, 000	64	....	....	22, 126	518, 590	620, 918
Soap and candles	4	94, 000	21	....	2	8, 700	70, 979	101, 540
Tinware, copperware, and sheet-iron ware	22	64, 850	112	1	5	37, 521	87, 600	156, 519
Tobacco, cigars and cigarettes	55	256, 830	532	77	77	248, 542	407, 843	847, 093
Upholstering (see also Furniture)	6	21, 250	20	5	3	11, 376	33, 080	58, 100
Vinegar	3	27, 000	13	....	....	3, 300	11, 800	24, 300
Watch and clock repairing	16	8, 050	23	....	....	14, 128	4, 075	30, 650
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	13	11, 800	26	1	1	9, 906	11, 140	30, 317
Wood, turned and carved (see also Lumber, planed)	6	22, 650	41	....	2	12, 573	17, 148	37, 081
All other industries (*a*)	95	1, 628, 070	1, 447	267	146	576, 527	1, 457, 822	2, 847, 443

a Embracing agricultural implements; awnings and tents; belting and hose, leather; billiard tables and materials; bookbinding and blank-book making; boxes, cigar; boxes, fancy and paper; brass castings; brooms and brushes; carriage and wagon materials; celluloid and celluloid goods; cheese and butter (factory); coffee, roasted and ground; coffins, burial cases, and undertakers' goods; coppersmithing; dentists' materials; electroplating; engraving, steel; engraving, wood; fertilizers; files; fire-arms; fruits and vegetables, canned and preserved; furnishing goods, men's; furs, dressed; glass; glue; gunpowder; hand-knit goods; hand-stamps; hardware; hardware, saddlery; hats and caps; hones and whetstones; iron and steel; iron bolts, nuts, washers, and rivets; instruments, professional and scientific; jewelry; lasts; lead, bar, pipe, sheet, and shot; leather, curried; leather, tanned; lime; lithographing; lumber, sawed; matches; mattresses and spring beds; models and patterns; musical instruments and materials (not specified); musical instruments, pianos and materials; paints; paving materials; pens, gold; pickles, preserves, and sauces; pipes, tobacco; pumps; refrigerators; sash, doors, and blinds; saws; scales and balances; shipbuilding; silverware; stamped ware; stencils and brands; stone- and earthen-ware; tobacco, chewing, smoking, and snuff; umbrellas and canes; whips; wirework; and wooden ware.

CITY OF TAUNTON, MASS.

[Statistics collected under the direction of DANIEL L. MITCHELL, Special Agent.]

All industries	148	$4, 086, 134	3, 585	898	671	$2, 083, 185	$4, 272, 451	$7, 618, 953
Blacksmithing (see also Wheelwrighting)	16	11, 650	15	....	....	4, 734	7, 540	23, 019
Boots and shoes, including custom work and repairing	7	2, 350	9	....	....	4, 200	4, 325	12, 350
Brick and tile	10	207, 100	184	....	1	57, 949	27, 737	145, 792
Bread and other bakery products	3	6, 000	16	3	2	7, 500	27, 000	43, 500
Carpentering	5	6, 600	26	....	....	9, 766	17, 960	37, 400
Clothing, men's	4	22, 500	7	26	....	10, 750	27, 200	44, 500
Cotton goods	8	690, 000	459	514	518	391, 190	995, 200	1, 856, 881
Flouring- and grist-mill products	3	23, 500	9	....	....	3, 803	140, 635	161, 922
Foundery and machine-shop products	16	1, 099, 300	1, 231	3	....	690, 107	870, 778	1, 725, 826
Iron nails and spikes, cut and wrought	5	560, 000	277	158	98	208, 770	649, 577	938, 375
Lumber, sawed	4	34, 000	48	....	3	16, 900	22, 100	51, 500
Marble and stone work	3	5, 884	12	....	....	5, 942	3, 941	14, 598
Painting and paperhanging	4	6, 700	19	....	....	8, 500	3, 200	15, 500
Plumbing and gasfitting	3	5, 100	7	....	....	3, 600	6, 150	13, 000
Saddlery and harness	5	5, 600	7	....	....	2, 650	4, 950	11, 850
Tinware, copperware, and sheet-iron ware	5	26, 000	13	....	1	6, 380	8, 800	20, 400
Wheelwrighting (see also Blacksmithing)	9	9, 300	11	....	....	3, 625	6, 500	19, 250
All other industries (*a*)	38	1, 364, 550	1, 235	194	48	646, 819	1, 448, 858	2, 483, 290

a Embracing agricultural implements; baskets, rattan and willow ware; blacking; brass castings; brass and copper, rolled; buttons; carriages and wagons; coffins, burial cases, and undertakers' goods; crucibles; cutlery and edge tools; drugs and chemicals; enameled goods; files; housefurnishing goods; iron and steel; masonry, brick and stone; mattresses and spring beds; mineral and soda waters; models and patterns; patent medicines and compounds; plated and britannia ware; printing and publishing; sash, doors, and blinds; slaughtering and meat-packing; stencils and brands; stone- and earthen-ware; tobacco, cigars and cigarettes; upholstering; and wood, turned and carved.

CITY OF TERRE HAUTE, IND.

[Statistics collected under the direction of JOSEPH B. GADDES, Special Agent.]

All industries	224	$2, 566, 750	3, 090	144	142	$1, 406, 352	$6, 743, 719	$9, 185, 246
Blacksmithing (see also Wheelwrighting)	10	9, 900	30	....	1	9, 110	13, 183	35, 805
Boots and shoes, including custom work and repairing	30	17, 725	41	....	1	13, 675	23, 045	59, 127
Brick and tile	9	35, 200	116	....	6	21, 100	21, 125	51, 975
Carpentering	25	45, 000	132	....	1	52, 245	133, 005	235, 400
Carriages and wagons (see also Wheelwrighting)	4	40, 000	65	....	1	30, 250	58, 500	105, 000
Confectionery	3	14, 000	26	....	6	9, 400	36, 950	52, 700
Cooperage	8	35, 800	195	....	....	65, 760	146, 150	230, 000
Flouring- and grist-mill products	9	583, 500	172	....	....	70, 152	2, 708, 395	2, 908, 557
Foundery and machine-shop products	6	122, 000	141	....	14	66, 863	109, 100	210, 500
Iron and steel	3	355, 000	495	....	50	337, 925	788, 390	1, 221, 968
Lumber, sawed	5	181, 000	146	....	13	50, 500	187, 800	290, 320
Marble and stone work	6	19, 500	42	....	....	12, 584	21, 775	52, 570
Masonry, brick and stone	5	4, 800	56	....	....	19, 040	29, 700	56, 550
Painting and paperhanging	9	4, 025	41	....	....	9, 370	15, 500	35, 658
Plumbing and gasfitting	4	13, 600	[illegible]	....	....	4, 450	9, 500	23, 020
Printing and publishing	8	37, 000	75	6	21	42, 380	23, 620	86, 700
Pumps, not including steam pumps	4	7, 200	16	....	1	5, 000	6, 880	18, 500
Saddlery and harness	8	30, 900	40	....	1	17, 052	40, 541	69, 340
Tinware, copperware, and sheet-iron ware	10	66, 100	65	....	....	24, 300	108, 000	171, 700
Tobacco, cigars and cigarettes	14	29, 000	103	....	5	40, 500	38, 640	106, 397
Watch and clock repairing	5	12, 700	13	....	1	6, 200	3, 900	19, 000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	3	400	....	....	....	....	615	2, 065
All other industries (*a*)	36	902, 400	1, 074	138	20	498, 496	2, 219, 405	3, 142, 394

a Embracing boxes, cigar; brass castings; brooms and brushes; carpets, rag; carriage and wagon materials; cars, railroad, street, and repairs; clothing, men's; coffee and spices, roasted and ground; coppersmithing; files; furniture; hones and whetstones; iron nails and spikes, cut and wrought; liquors, distilled; liquors, malt; lock- and gun-smithing; looking-glass and picture frames; lumber, planed; mattresses and spring beds; mineral and soda waters; musical instruments and materials (not specified); scales and balances; shirts; slaughtering and meat-packing; stencils and brands; and woolen goods.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF TOLEDO, OHIO.

[Statistics collected under the direction of JOHN W. HIETT, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	440	$5, 534, 285	5, 028	1, 020	690	$2, 260, 456	$6, 355, 399	$10, 600, 074
Blacksmithing (see also Wheelwrighting)	30	33, 565	65	....	....	30, 875	24, 295	69, 045
Boots and shoes, including custom work and repairing	26	44, 750	103	20	1	57, 203	94, 672	181, 488
Bread and other bakery products	19	100, 300	96	19	14	43, 980	182, 274	277, 960
Brick and tile	3	39, 000	95	....	17	24, 000	12, 950	47, 000
Brooms and brushes	3	26, 100	34	70	102	14, 050	14, 740	36, 000
Carpentering	32	90, 800	243	10	10	90, 005	227, 520	356, 770
Clothing, men's	16	205, 200	156	210	1	99, 260	248, 690	409, 580
Clothing, women's	3	51, 000	19	240	40	49, 150	143, 000	225, 000
Coffee and spices, roasted and ground	3	69, 000	33	9	....	17, 475	201, 000	240, 000
Cooperage	8	72, 700	93	....	49	42, 045	65, 695	139, 731
Drugs and chemicals	4	43, 000	26	....	6	7, 550	71, 925	101, 069
Flouring- and grist-mill products	6	129, 500	50	....	....	23, 000	562, 500	619, 720
Foundery and machine-shop products	13	267, 000	257	....	15	104, 667	227, 036	447, 750
Furniture (see also Upholstering)	9	158, 020	141	6	....	45, 490	77, 450	152, 100
Hats and caps, not including wool hats	3	17, 000	7	117	....	14, 920	11, 006	33, 740
Liquors, malt	4	450, 000	245	....	....	107, 351	463, 200	827, 164
Looking-glass and picture frames	6	104, 900	88	....	22	34, 419	82, 143	138, 189
Lumber, planed (see also Sash, doors, and blinds)	3	18, 500	20	....	....	7, 295	16, 550	32, 500
Lumber, sawed	5	428, 000	229	....	20	83, 900	457, 000	622, 150
Marble and stone work	9	52, 750	67	....	....	26, 920	38, 300	86, 500
Masonry, brick and stone	9	26, 600	66	....	....	20, 500	26, 500	55, 160
Mineral and soda waters	4	30, 000	34	....	3	8, 334	15, 010	34, 800
Painting and paperhanging	17	17, 200	80	....	2	31, 635	27, 470	72, 375
Photographing	8	14, 100	24	7	1	11, 373	5, 780	29, 810
Plumbing and gasfitting	5	24, 800	37	....	1	16, 014	40, 350	66, 325
Printing and publishing	16	353, 700	241	39	50	141, 322	180, 169	401, 616
Roofing and roofing materials	4	9, 000	19	....	....	7, 725	9, 300	20, 000
Saddlery and harness	11	25, 250	51	....	....	23, 055	42, 375	77, 275
Sash, doors, and blinds (see also Lumber, planed)	7	336, 300	439	....	100	178, 549	344, 000	621, 519
Shipbuilding	6	53, 050	79	....	....	43, 850	46, 450	100, 300
Slaughtering and meat-packing, not including retail butchering	3	86, 000	46	....	....	17, 200	278, 393	333, 600
Tinware, copperware, and sheet-iron ware	20	58, 400	75	6	38	40, 255	95, 780	171, 270
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	3	240, 000	51	114	86	118, 942	384, 383	751, 000
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	22	41, 950	128	24	24	59, 417	61, 195	196, 223
Upholstering (see also Furniture)	4	8, 200	17	2	4	7, 450	28, 400	41, 141
Watch and clock repairing	8	6, 200	18	....	....	8, 975	5, 650	20, 700
Wheelwrighting (see also Blacksmithing)	7	14, 600	26	....	1	10, 300	7, 650	22, 050
Wirework	3	7, 600	23	1	1	8, 200	10, 000	22, 200
All other industries (*a*)	78	1, 780, 250	1, 507	126	82	583, 805	1, 524, 598	2, 519, 254

a Embracing agricultural implements; awnings and tents; bookbinding and blank-book making; boxes, cigar; boxes, fancy and paper; boxes, wooden, packing; brass castings; bridges; carpets, rag; carpets, wood; carriage and wagon materials; carriages and sleds, children's; carriages and wagons; corsets; cutlery and edge tools; dentistry, mechanical; dentists' materials; electroplating; fertilizers; fruits and vegetables, canned and preserved; furnishing goods, men's; hairwork; housefurnishing goods; instruments, professional and scientific; iron and steel; iron railing, wrought; iron work, architectural and ornamental; kindling wood; leather, curried; leather, tanned; lime; models and patterns; oil, castor; oil, linseed; paints; perfumery and cosmetics; pumps; refrigerators; saws; sewing machines and attachments; show-cases; soap and candles; stencils and brands; stereotyping and electrotyping; stone- and earthen-ware; surgical appliances; trunks and valises; umbrellas and canes; varnish; vinegar; wheelbarrows; window blinds and shades; wooden ware; and woolen goods.

CITY OF TRENTON, N. J.

[Statistics collected under the direction of THOMAS F. FITZGERALD, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	404	$6, 966, 830	6, 691	1, 084	1, 127	$3, 150, 119	$7, 421, 399	$12, 712, 762
Bags, paper	4	13, 550	15	22	....	7, 679	26, 050	46, 825
Blacksmithing (see also Wheelwrighting)	16	3, 570	20	....	....	8, 003	6, 362	28, 540
Boots and shoes, including custom work and repairing	39	119, 710	500	15	1	100, 550	406, 745	570, 007
Boxes, wooden, packing	5	2, 500	9	....	1	3, 170	2, 550	9, 000
Bread and other bakery products	29	113, 800	86	1	64	55, 509	231, 574	379, 138
Brick and tile	3	145, 000	129	....	16	33, 500	33, 475	109, 000
Brooms and brushes	4	600	4	....	....	1, 166	1, 887	5, 400
Carpentering	18	69, 850	175	....	2	71, 654	227, 800	348, 550
Carpet, rag	5	1, 325	6	....	....	1, 514	5, 000	9, 600
Carriages and wagons (see also Wheelwrighting)	5	47, 500	54	....	2	23, 400	38, 800	80, 100
Clothing, men's	16	80, 000	81	108	2	60, 360	140, 200	252, 100
Coffins, burial cases, and undertakers' goods	3	8, 300	7	1	....	3, 784	6, 200	14, 100
Confectionery	8	11, 750	15	7	7	7, 908	31, 017	47, 225
Cooperage	3	4, 700	12	....	....	4, 050	8, 800	17, 800
Drugs and chemicals	3	12, 700	11	....	....	4, 568	17, 300	32, 000
Dyeing and cleaning	3	1, 450	2	2	1	2, 100	2, 600	7, 500
Flouring- and grist-mill products	5	64, 000	18	....	....	7, 769	130, 445	153, 532
Foundery and machine-shop products	8	51, 200	250	....	1	99, 761	163, 408	291, 789
Furniture (see also Upholstering)	[illegible]	25, 300	28	....	5	16, 012	12, 700	39, 500
Iron and steel	3	1, 945, 550	1, 361	....	30	518, 325	1, 371, 245	2, 340, 381
Iron forgings	3	102, 741	129	....	27	51, 666	85, 068	164, 302
Iron railing, wrought	3	950	2	....	1	625	1, 700	3, 750
Lumber, planed	3	28, 000	15	....	7	7, 050	15, 900	33, 000
Marble and stone work	12	70, 925	56	....	3	35, 559	37, 208	99, 690
Masonry, brick and stone	12	25, 750	182	....	....	61, 280	89, 900	190, 750
Painting and paperhanging	25	11, 225	48	....	1	19, 252	17, 281	60, 800
Photographing	6	5, 900	7	3	....	4, 528	3, 900	17, 800
Plumbing and gasfitting	7	12, 375	19	....	....	8, 663	18, 000	33, 400
Printing and publishing	6	142, 000	132	6	20	80, 744	83, 618	220, 594
Roofing and roofing materials	4	2, 800	14	....	....	4, 600	13, 900	27, 800

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF TRENTON, N. J.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Saddlery and harness	6	$11,000	12	....	....	$6,256	$17,422	$34,696
Slaughtering and meat-packing, not including retail butchering	3	261,000	54	....	....	13,156	533,458	590,197
Stone- and earthen-ware	29	1,902,500	1,792	441	634	983,177	950,243	2,341,337
Tinware, copperware, and sheet-iron ware	9	13,250	29	....	....	13,244	19,920	44,950
Tobacco, cigars and cigarettes	21	12,900	42	1	4	17,669	20,514	56,909
Upholstering (see also Furniture)	3	8,500	9	5	2	4,950	19,500	29,000
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	12	3,100	3	....	2	1,165	3,750	12,860
Woolen goods	3	526,000	216	227	115	171,400	574,610	854,297
All other industries (*a*)	49	1,103,559	1,147	245	179	634,353	2,051,349	3,114,543

a Embracing agricultural implements; belting and hose, leather; bookbinding and blank-book making; boot and shoe findings; boxes, cigar; boxes, fancy and paper; brass castings; bridges; carriage and wagon materials; coffee and spices, roasted and ground; cotton goods; cutlery and edge tools; engraving and die-sinking; fertilizers; fruits and vegetables, canned and preserved; glue; grease and tallow; hardware; jewelry; kaolin and ground earths; kindling wood; lime; liquors, malt; lock- and gun-smithing; looking-glass and picture frames; lumber, sawed; mineral and soda waters; musical instruments and materials (not specified); patent medicines and compounds; pumps; rubber and elastic goods; sash, doors, and blinds; shipbuilding; shirts; soap and candles; wire; and wood, turned and carved.

CITY OF TROY, N. Y.

[Statistics collected under the direction of F. E. WADHAMS, Chief Special Agent.]

All industries	514	$13,418,853	10,337	11,115	982	$6,745,874	$13,443,284	$26,497,163
Blacksmithing (see also Wheelwrighting)	19	12,200	35	....	....	17,615	12,496	47,050
Boots and shoes, including custom work and repairing	24	112,350	118	2	....	46,421	68,375	153,916
Boxes, fancy and paper	5	41,100	37	151	2	57,033	96,742	176,739
Bread and other bakery products	23	79,200	111	4	1	58,646	233,515	358,013
Brick and tile	6	139,500	157	....	11	53,077	70,948	172,000
Brooms and brushes	3	11,500	30	1	11	11,793	25,500	44,022
Carpentering	23	48,300	203	....	1	105,524	152,031	307,533
Carriages and wagons (see also Wheelwrighting)	3	8,500	32	....	....	16,262	20,000	41,350
Clothing, men's	29	210,550	241	145	....	185,785	354,415	685,436
Clothing, women's	5	26,000	10	119	....	17,740	66,300	95,596
Coffee and spices, roasted and ground	3	60,000	26	....	....	14,444	88,820	130,764
Coffins, burial cases, and undertakers' goods	7	22,300	20	....	....	10,214	23,450	45,150
Confectionery	8	28,300	32	15	....	21,343	80,688	136,266
Dentistry, mechanical	5	3,650	2	....	....	1,322	3,487	14,559
Electroplating	3	27,000	76	1	4	22,726	18,500	56,719
Flouring- and grist-mill products	4	133,200	30	....	1	18,402	326,774	367,855
Foundery and machine-shop products	32	2,428,700	2,297	....	97	1,244,550	1,189,373	3,228,848
Furnishing goods, men's	18	830,000	384	4,036	100	918,932	1,123,147	2,636,614
Furniture (see also Upholstering)	3	18,700	42	3	....	21,000	26,400	65,900
Hosiery and knit goods	5	144,000	114	217	35	89,800	181,883	391,330
Iron and steel	4	4,550,000	3,857	....	495	1,657,396	4,618,862	8,702,189
Kindling wood	10	11,800	21	....	1	7,456	14,320	29,270
Liquors, malt	10	809,750	202	....	....	99,419	500,349	895,883
Looking-glass and picture frames	4	18,600	20	....	1	11,062	34,891	57,310
Marble and stone work	9	46,900	55	....	....	26,153	27,478	69,455
Masonry, brick and stone	10	23,500	149	....	....	45,260	83,200	183,159
Mineral and soda waters	4	59,500	39	....	1	19,959	53,414	80,726
Models and patterns	8	68,971	90	1	....	42,989	17,114	99,200
Painting and paperhanging	18	33,554	109	....	....	53,253	32,307	112,600
Paper	4	535,465	110	51	10	57,989	373,033	546,823
Photographing	6	17,600	11	3	....	5,644	7,200	25,978
Plumbing and gasfitting	8	58,500	74	....	8	43,247	85,700	155,200
Printing and publishing	14	245,838	218	3	9	123,928	103,697	310,700
Saddlery and harness	12	22,400	38	....	3	15,804	25,871	65,702
Shirts	16	874,000	255	6,217	31	992,084	1,379,319	2,919,591
Slaughtering and meat-packing, not including retail butchering	6	98,000	42	....	3	17,580	192,383	259,161
Tinware, copperware, and sheet-iron ware	17	88,400	82	....	5	33,733	62,750	124,600
Tobacco, cigars and cigarettes	32	165,025	240	....	53	132,586	200,842	406,661
Upholstering (see also Furniture)	5	14,000	20	2	....	11,628	21,000	43,050
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	13	18,200	28	....	1	13,605	13,827	42,526
Wood, turned and carved	7	13,200	15	....	2	7,159	4,293	19,967
All other industries (*a*)	69	1,260,600	665	144	96	395,311	1,428,590	2,191,752

a Embracing awnings and tents; babbitt metal and solder; baking and yeast powders; bells; belting and hose, leather; bookbinding and blank-book making; boxes, cigar; boxes, wooden, packing; brass castings; carriage and wagon materials; collars and cuffs, paper; cooperage; cordage and twine; corsets; cotton goods; cutlery and edge tools; drain and sewer pipe; drugs and chemicals; dyeing and cleaning; engraving and die-sinking; files; grease and tallow; hairwork; hand-stamps; hardware; hardware, saddlery; hats and caps; instruments, professional and scientific; iron forgings; iron railing, wrought; iron work, architectural and ornamental; japanning; leather, curried; lime; lock- and gun-smithing; lumber, planed; malt; mantels, slate, marble, and marbleized; millstones; mixed textiles; paints; refrigerators; regalia and society banners and emblems; roofing and roofing materials; sash, doors, and blinds; silk and silk goods; springs, steel, car, and carriage; stencils and brands; varnish; vinegar; watch and clock repairing; wire; and wirework.

CITY OF UTICA, N. Y.

[Statistics collected under the direction of A. B. NORTHUP, Special Agent.]

All industries	317	$5,905,635	3,752	2,620	338	$1,917,657	$5,180,598	$8,873,306
Blacksmithing (see also Wheelwrighting)	13	6,975	13	....	....	4,950	8,775	21,700
Bookbinding and blank-book making	4	13,000	14	8	1	7,690	5,225	18,707
Boots and shoes, including custom work and repairing	29	587,600	437	308	51	257,489	710,582	1,125,724
Bread and other bakery products	9	61,100	46	7	11	18,722	81,380	113,494
Carpentering	27	29,550	107	....	....	48,684	76,150	151,425
Carriages and wagons (see also Wheelwrighting)	3	38,000	38	....	....	15,220	18,500	47,000
Clothing, men's	20	931,300	941	1,537	....	453,625	1,391,297	2,256,375
Clothing, women's	4	15,500	2	38	....	5,947	25,700	42,500
Confectionery	4	14,000	12	4	3	6,200	25,400	44,400
Cooperage	3	1,800	3	....	....	900	1,750	3,900
Flouring- and grist-mill products	3	35,000	8	....	....	2,475	104,140	113,132
Foundery and machine-shop products	9	589,300	445	3	5	180,681	247,300	537,721
Furniture (see also Upholstering)	7	82,000	60	2	4	28,280	53,000	107,000
Liquors, malt	6	160,660	50	....	....	23,655	120,550	219,000
Looking-glass and picture frames	5	14,500	12	....	....	5,174	22,300	38,000

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF UTICA, N. Y.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Marble and stone work	9	$38, 500	55			$21, 209	$38, 800	$77, 600
Masonry, brick and stone	9	15, 950	155			54, 780	49, 150	121, 200
Painting and paperhanging	13	11, 300	44		2	24, 000	30, 400	71, 900
Plumbing and gasfitting	4	37, 000	37		1	11, 925	68, 000	113, 000
Printing and publishing	8	216, 500	142			76, 065	55, 378	197, 007
Saddlery and harness	6	12, 200	13			5, 625	13, 100	26, 800
Sash, doors, and blinds	4	136, 000	153			61, 111	187, 496	305, 078
Shirts	7	5, 300	2	28		8, 600	10, 900	27, 400
Soap and candles	3	24, 000	8			3, 408	35, 292	46, 424
Tinware, copperware, and sheet-iron ware	18	60, 550	54		2	23, 312	65, 175	117, 100
Tobacco, chewing, smoking, and snuff (see also Tobacco, cigars and cigarettes).	3	315, 000	46	7	33	23, 600	140, 900	196, 315
Tobacco, cigars and cigarettes (see also Tobacco, chewing, smoking, and snuff).	12	67, 500	63	4	9	30, 530	54, 550	104, 750
Upholstering (see also Furniture)	3	6, 100	5			1, 820	6, 800	11, 750
Watch and clock repairing	10	23, 600	19			9, 275	13, 100	33, 300
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	10	16, 400	18			6, 668	10, 025	26, 400
All other industries (*a*)	52	2, 339, 450	749	673	216	496, 046	1, 509, 483	2, 557, 204

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a Embracing awnings and tents; belting and hose, leather; boxes, cigar; boxes, wooden, packing; brass castings; brick and tile; brooms and brushes; cement; coffee and spices, roasted and ground; cordage and twine; cotton goods; drain and sewer pipe; drugs and chemicals; electroplating; engraving, wood; files; furs, dressed; glass cut, stained, and ornamented; gloves and mittens; hairwork; hosiery and knit goods; iron work, architectural and ornamental; lamps and reflectors; lime; liquors, distilled; lock- and gun-smithing; matches; mattresses and spring beds; mineral and soda waters; musical instruments, organs and materials; oilcloth, floor; perfumery and cosmetics; pumps; saws; shipbuilding; silverware; slaughtering and meat-packing; steam fittings and heating apparatus; telegraph and telephone apparatus; wood, turned and carved; wooden ware; and woolen goods.

CITY OF WASHINGTON, D. C.

[Statistics collected under the direction of WILLIAM H. BOYD, Chief Special Agent. See note on page 379.]

All industries	971	$5, 552, 526	5, 496	1, 389	261	$3, 924, 612	$5, 365, 400	$11, 882, 316
Awnings and tents	3	2, 050	4	6		3, 581	4, 643	13, 924
Blacksmithing (see also Wheelwrighting)	77	31, 165	113		1	45, 408	39, 474	146, 219
Bookbinding and blank-book making	4	4, 200	9	1	2	4, 332	2, 280	10, 731
Boots and shoes, including custom work and repairing	73	49, 220	66	1	2	31, 111	42, 225	127, 107
Brass castings	3	132, 038	61			22, 087	67, 152	96, 769
Bread and other bakery products	63	120, 340	164	7	8	73, 148	400, 608	606, 236
Brick and tile	16	330, 600	576		120	123, 161	62, 575	314, 298
Carpentering	58	48, 145	245		8	135, 626	247, 006	486, 702
Carriages and wagons (see also Wheelwrighting)	25	173, 792	149		5	69, 496	53, 277	183, 205
Clothing, men's	35	104, 550	157	68	2	98, 778	178, 302	376, 065
Coffee and spices, roasted and ground	3	17, 600	14			6, 356	84, 680	100, 020
Coffins, burial cases, and undertakers' goods	14	61, 425	32			19, 631	41, 440	92, 640
Confectionery	27	85, 575	80	24	2	40, 131	122, 263	221, 902
Cooperage	3	6, 700	28			11, 300	10, 770	25, 770
Dentistry, mechanical	6	4, 975	6			2, 632	5, 600	19, 200
Drugs and chemicals (see also Patent medicines and compounds)	5	54, 000	25		1	10, 190	31, 836	63, 025
Engraving and die-sinking	3	3, 900	5		1	1, 965	3, 900	12, 375
Fertilizers	3	95, 000	87			29, 600	156, 250	207, 250
Flouring- and grist-mill products	9	230, 400	40			21, 508	1, 071, 600	1, 172, 375
Foundery and machine-shop products	10	236, 000	198		9	75, 102	155, 098	358, 166
Furniture (see also Mattresses and spring beds; Upholstering)	19	46, 125	72			39, 385	39, 005	113, 375
Grease and tallow	3	25, 000	7			3, 422	47, 918	69, 400
Hairwork	12	6, 600		27		3, 276	6, 500	14, 800
Instruments, professional and scientific	5	36, 100	14	2	1	13, 724	7, 750	37, 561
Iron railing, wrought	5	3, 275	11			3, 912	4, 685	13, 403
Jewelry	11	19, 600	21		2	12, 444	11, 310	37, 533
Kindling wood	6	18, 465	28		7	11, 114	21, 969	40, 650
Lime	5	19, 100	24			11, 959	17, 424	51, 648
Liquors, malt	10	208, 300	60		4	30, 186	162, 739	275, 232
Lithographing (see also Printing and publishing)	5	33, 200	40		3	23, 164	16, 860	52, 334
Lock- and gun-smithing	6	11, 700	10			5, 595	3, 745	13, 546
Looking-glass and picture frames	10	15, 000	32			16, 308	28, 706	65, 227
Lumber, planed	10	96, 200	86		5	40, 920	124, 925	192, 792
Marble and stone work	25	113, 745	137		1	60, 490	91, 806	198, 699
Masonry, brick and stone	31	10, 500	190			68, 750	90, 050	200, 970
Mattresses and spring beds (see also Furniture)	3	8, 250	6	2		2, 000	12, 640	17, 440
Mineral and soda waters	3	19, 200	24		8	13, 432	10, 100	33, 700
Models and patterns	7	7, 200	12			6, 838	2, 605	16, 440
Painting and paperhanging	37	16, 600	101		2	50, 044	49, 387	143, 471
Patent medicines and compounds (see also Drugs and chemicals)	5	5, 600	9			7, 098	7, 200	20, 454
Paving materials	5	56, 000	259			99, 500	171, 250	316, 500
Photographing	16	34, 750	34	5		16, 291	10, 515	55, 551
Plumbing and gasfitting	31	47, 750	129		6	66, 194	102, 799	225, 193
Printing and publishing (see also Lithographing)	28	971, 800	1, 026	688	28	1, 478, 880	827, 519	2, 896, 312
Saddlery and harness	26	30, 400	45			19, 471	33, 157	80, 349
Soap and candles	5	60, 966	22		1	7, 735	41, 678	66, 563
Tinware, copperware, and sheet-iron ware	42	66, 965	7		3	44, 857	96, 472	192, 081
Tobacco, cigars and cigarettes	43	25, 950	81		8	31, 628	45, 692	118, 318
Umbrellas and canes	5	1, 150	3	3	1	785	2, 070	6, 218
Upholstering (see also Furniture)	10	18, 550	25	5	1	12, 341	27, 016	56, 191
Watch and clock repairing	32	17, 460	40		5	24, 361	6, 315	42, 360
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	10	6, 565	7		1	2, 252	3, 230	11, 323
All other industries (*a*)	60	1, 702, 785	795	550	13	871, 113	459, 354	1, 572, 703

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a Embracing artificial limbs; bags, paper; baskets, rattan and willow ware; bluing; boxes, cigar; boxes, fancy and paper; brooms and brushes; carpets, rag; cars, railroad, street, and repairs; cheese and butter; clothing, women's; cordage and twine; dyeing and cleaning; electroplating; engraving, steel, engraving, wood; files; fruits and vegetables, canned and preserved; furniture, chairs; glass; glass, cut, stained, and ornamented; gloves and mittens; ink, iron and steel; iron work, architectural and ornamental; leather, curried; leather, dressed skins; leather, tanned; lumber, sawed; mantels, slate, marble, and marbleized; musical instruments and materials (not specified); oil, neat's-foot; paints; paper; perfumery and cosmetics; shirts; spectacles and eyeglasses; stationery goods; stereotyping and electrotyping; stone- and earthen-ware; taxidermy; terra-cotta ware; type founding; vinegar; wirework; and wood, turned and carved.

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF WHEELING, W. VA.

[Statistics collected under the direction of DANA L. HUBBARD, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
All industries	227	$4, 868, 288	4, 658	196	658	$2, 192, 255	$5, 203, 931	$9, 259, 844
Baskets, rattan and willow ware	3	2, 200	3			1, 580	1, 100	4, 700
Blacksmithing	7	15, 200	14			5, 820	5, 575	18, 721
Brick and tile	7	32, 000	77		18	11, 149	2, 664	24, 560
Carpentering	4	27, 000	25			16, 450	46, 648	85, 700
Carriages and wagons	4	172, 000	78		1	36, 234	54, 000	145, 000
Clothing, men's	27	85, 000	160	10	15	47, 500	108, 000	220, 684
Confectionery	5	9, 050	18	2		6, 002	51, 300	64, 964
Cooperage	5	25, 800	63		32	42, 608	38, 339	89, 900
Foundery and machine-shop products	6	221, 500	198		1	89, 339	69, 471	228, 762
Furniture	3	48, 000	103		2	40, 616	31, 342	98, 827
Glass	3	500, 522	525	87	206	296, 450	192, 564	714, 000
Iron and steel	7	2, 214, 425	2, 327		246	1, 098, 296	2, 472, 053	4, 306, 567
Leather, curried	4	123, 200	58			34, 800	377, 258	447, 972
Leather, tanned	4	166, 000	61	1		21, 422	334, 740	378, 152
Liquors, malt	5	203, 017	85			33, 329	153, 982	256, 588
Lumber, planed	4	148, 000	83		2	38, 990	173, 500	237, 400
Marble and stone work	3	14, 750	30			12, 860	9, 600	33, 334
Masonry, brick and stone	3	2, 000	30			11, 940	5, 869	22, 700
Painting and paperhanging	3	1, 500	9			4, 066	6, 167	12, 850
Plumbing and gasfitting	6	54, 015	45			23, 288	58, 113	99, 453
Printing and publishing	7	122, 500	127	15	35	67, 392	41, 864	165, 356
Roofing and roofing materials	3	1, 200	6		1	1, 400	6, 000	11, 100
Saddlery and harness	6	16, 100	18			9, 572	23, 750	43, 450
Shipbuilding	3	7, 500	9			6, 850	16, 800	27, 550
Shirts	4	1, 200		40		9, 200	20, 240	33, 890
Slaughtering and meat-packing, not including retail butchering	4	97, 361	25			11, 350	243, 440	270, 500
Tinware, copperware, and sheet-iron ware	11	40, 373	49		5	23, 393	49, 461	94, 405
Tobacco, cigars and cigarettes	45	124, 965	232	3	19	86, 294	217, 521	366, 984
All other industries (*a*)	31	391, 910	200	38	75	104, 065	392, 570	755, 775

a Embracing agricultural implements; baking and yeast powders; boots and shoes; boxes, fancy and paper; brass castings; bread and other bakery products; brooms and brushes; carriage and wagon materials; coffee and spices, roasted and ground; coke; dyeing and finishing textiles; files; flouring- and grist-mill products; food preparations; gloves and mittens; hardware; iron nails and spikes, cut and wrought; lamps and reflectors; lock- and gun-smithing; lumber, sawed; patent medicines and compounds; sash, doors, and blinds; soap and candles; stencils and brands; vinegar; wirework; and wheelwrighting.

CITY OF WILKESBARRE, PA.

[Statistics collected under the direction of D. G. ALLEN, Special Agent.]

All industries	89	$1, 146, 500	613	17	15	$223, 399	$660, 649	$1, 133, 344
Blacksmithing	8	3, 450	15		1	4, 966	4, 760	16, 750
Bread and other bakery products	11	16, 050	41	7	2	12, 075	79, 092	121, 298
Carriages and wagons	5	19, 500	39			12, 237	13, 000	37, 600
Flouring- and grist-mill products	3	34, 000	14			4, 480	65, 850	77, 200
Foundery and machine-shop products	6	321, 950	226			85, 851	153, 434	297, 660
Lumber, planed	3	44, 000	15			5, 100	13, 600	24, 600
Mineral and soda waters	3	15, 200	9			3, 575	10, 500	20, 625
Plumbing and gasfitting	3	77, 000	34		1	11, 600	20, 000	40, 500
Saddlery and harness	7	22, 300	18			6, 750	12, 020	27, 200
Tinware, copperware, and sheet-iron ware	7	12, 500	20			6, 228	12, 950	25, 300
Tobacco, cigars and cigarettes	5	9, 700	26		6	9, 254	17, 246	33, 298
All other industries (*a*)	28	570, 850	156	10	5	61, 283	258, 197	411, 313

a Embracing awnings and tents; bookbinding and blank-book making; boots and shoes; boxes, fancy and paper; brick and tile; brooms and brushes; carpentering; confectionery; liquors, malt; lock- and gun-smithing; looking-glass and picture frames; musical instruments, organs and materials; paints; printing and publishing; pumps; soap and candles; stone- and earthen-ware; tools; wheelwrighting, wire; wirework; and wood, turned and carved.

CITY OF WILMINGTON, DEL.

[Statistics collected under the direction of JAMES B. HENRY, Special Agent.]

All industries	258	$10, 744, 389	6, 871	459	522	$3, 174, 821	$7, 884, 847	$13, 205, 370
Blacksmithing (see also Wheelwrighting)	16	28, 400	51		2	23, 075	14, 780	56, 150
Boots and shoes, including custom work and repairing	6	16, 300	19			6, 400	7, 000	17, 500
Bread and other bakery products	14	109, 700	44	12	15	25, 130	97, 455	158, 200
Brick and tile	3	85, 000	166		68	43, 416	22, 173	89, 600
Carpentering	13	42, 500	105			41, 000	109, 900	202, 200
Carriage and wagon materials	6	108, 000	98		8	43, 750	47, 500	126, 000
Carriages and wagons (see also Wheelwrighting)	12	415, 270	373	1	10	128, 056	263, 098	479, 067
Clothing, men's	6	70, 500	52	30	1	25, 100	44, 600	86, 600
Coffins, burial cases, and undertakers' goods	7	19, 000	10			5, 250	10, 750	24, 600
Confectionery	3	49, 000	16	2		5, 600	18, 000	35, 000
Cotton goods	4	385, 000	154	232	83	125, 892	350, 762	545, 460
Foundery and machine-shop products	12	755, 800	730		49	260, 168	323, 472	671, 125
Furniture	3	36, 200	20	2	1	8, 000	7, 700	31, 800
Iron and steel	4	1, 109, 469	584		26	276, 346	1, 010, 979	2, 004, 570
Iron forgings	8	51, 000	53			16, 350	57, 043	83, 782
Kindling wood	4	6, 800	15			3, 975	4, 150	12, 500
Leather, dressed skins	14	861, 500	791	52	71	364, 914	1, 300, 860	1, 801, 597
Looking-glass and picture frames	3	1, 900	2		1	1, 850	2, 400	6, 500
Marble and stone work	3	27, 500	23			8, 400	10, 000	22, 400
Masonry, brick and stone	7	21, 000	75		2	22, 500	103, 500	170, 000

TABLE VI.—MANUFACTURES OF 100 PRINCIPAL CITIES, BY SPECIFIED INDUSTRIES: 1880.

CITY OF WILMINGTON, DEL.—Continued.

Mechanical and manufacturing industries.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	Value of materials.	Value of products.
			Males above 16 years.	Females above 15 years.	Children and youths.			
Paper	3	$2,448,000	163	61	6	$102,817	$548,999	$682,905
Roofing and roofing materials	3	10,500	16			8,344	11,500	29,500
Saddlery and harness	10	23,700	31		1	12,500	28,300	57,500
Shipbuilding	8	905,500	1,454			850,248	836,608	1,974,203
Soap and candles	3	14,800	12		1	5,180	13,400	22,070
Tinware, copperware, and sheet-iron ware	14	110,600	61		9	31,108	81,963	159,027
Tobacco, cigars and cigarettes	23	32,300	50	13	14	24,420	34,840	78,453
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	7	24,150	52		6	23,450	10,600	45,700
All other industries (*a*)	44	2,975,000	1,651	54	148	681,552	2,512,515	3,532,361

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a Embracing bags, paper; baskets, rattan and willow ware; belting and hose, leather; bookbinding and blank-book making; boot and shoe cut stock; boot and shoe uppers; brooms and brushes; cars, railroad, street, and repairs; coffee and spices, roasted and ground; cooperage; coppersmithing; dentists' materials; flouring- and grist-mill products; grease and tallow; gunpowder; iron bolts, nuts, washers, and rivets; jute and jute goods; leather, curried; liquors, malt; lumber, planed; matches; mineral and soda waters; mats and matting; painting and paperhanging; paints; pumps; rubber, vulcanized; saws; slaughtering and meat-packing; sporting goods; springs, steel, car, and carriage; stone- and earthen-ware; tools; upholstering; and wooden ware.

CITY OF WORCESTER, MASS.

[Statistics collected under the direction of A. R. MARSHALL, Special Agent.]

Mechanical and manufacturing industries.	No. of establishments.	Capital.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Value of materials.	Value of products.
All industries	644	$11,378,604	13,685	2,480	394	$6,910,817	$16,582,750	$27,292,793
Blacksmithing (see also Wheelwrighting)	24	25,225	45			21,375	20,188	61,329
Bookbinding and blank-book making	5	29,200	25	9		12,904	28,382	52,750
Boot and shoe cut stock	9	58,450	74	208	39	52,175	87,800	158,727
Boot and shoe findings	4	6,800	9	8	5	6,250	6,000	19,350
Boots and shoes, including custom work and repairing	45	1,680,258	1,599	360	112	1,087,507	2,909,277	4,513,128
Brass castings	3	6,200	15			5,960	18,390	28,844
Bread and other bakery products	9	31,200	57	8	5	33,812	138,417	217,254
Brick and tile	4	22,000	54			14,450	9,011	30,600
Carpentering	30	101,450	269	1		125,193	331,950	519,739
Carriage and wagon materials	4	17,800	12			7,180	18,326	35,170
Carriages and wagons (see also Wheelwrighting)	4	30,500	39			18,691	12,150	39,380
Clothing, men's	12	81,900	205	126		83,672	173,500	327,500
Confectionery	5	15,400	16	6		5,225	22,215	35,720
Cotton goods (see also Mixed textiles)	3	39,500	14	35	1	10,271	24,350	42,150
Cutlery and edge tools (see also Tools)	6	51,650	54	1	2	28,851	18,056	66,530
Dentistry, mechanical	24	19,075	10			7,020	12,720	60,338
Dyeing and cleaning	6	13,500	36	26		17,214	16,120	45,358
Engraving, wood	3	2,100	5			1,525	475	5,975
Files (see also Saws)	3	10,800	21			9,450	3,425	19,100
Fire-arms	4	124,000	306		22	136,091	61,300	247,828
Flouring- and grist-mill products	4	72,500	11			3,100	63,721	71,080
Furniture (see also Mattresses and spring beds; Upholstering)	7	144,500	98	5	4	58,769	193,561	311,406
Foundery and machine-shop products	68	1,871,700	2,284	25	76	1,068,834	1,525,865	3,166,193
Grease and tallow	5	15,500	21			7,750	29,820	51,700
Iron and steel	3	1,750,000	2,354	15	10	984,001	1,688,285	2,701,993
Instruments, professional and scientific	3	14,800	21	1	2	11,352	6,850	29,300
Leather, curried	5	69,000	37			16,975	301,265	340,180
Looking-glass and picture frames	6	6,100	39			9,587	22,125	41,675
Marble and stone work	13	71,200	128			66,961	65,903	171,175
Masonry, brick and stone	14	61,400	305			160,520	306,530	506,850
Mattresses and spring beds (see also Furniture)	4	5,000	8	3		3,800	4,575	15,950
Models and patterns	5	5,900	10			4,239	2,425	13,708
Mixed textiles (see also Cotton goods; Woolen goods)	7	141,500	197	139	10	131,435	333,431	630,700
Musical instruments, organs and materials	8	255,700	397	14		188,662	282,530	557,325
Needles and pins	3	3,200	11		2	3,317	1,010	9,322
Painting and paperhanging	25	20,575	94			37,990	35,037	100,530
Patent medicines and compounds	3	15,000	5	4		3,452	7,100	19,000
Photographing	12	10,450	12	9		7,431	5,848	27,685
Plumbing and gasfitting	12	16,400	31			14,435	32,445	63,030
Printing and publishing	11	121,634	128	10	8	86,952	60,334	199,497
Roofing and roofing materials	4	8,400	19			10,425	27,430	46,875
Saddlery and harness	14	30,550	30	4		17,075	23,079	64,700
Sash, doors, and blinds (see also Wood, turned and carved)	4	133,700	163			80,612	149,627	261,533
Saws	3	7,000	6			2,600	2,543	9,316
Screws	3	63,500	99		7	34,837	45,192	98,273
Slaughtering and meat-packing, not including retail butchering	5	113,000	60			30,299	1,030,487	1,124,888
Soap and candles	8	21,150	17	1		7,778	11,942	30,433
Tinware, copperware, and sheet-iron ware	20	58,500	99	17		41,750	58,481	126,874
Tobacco, cigars and cigarettes	11	29,500	45	14	1	23,772	62,434	111,258
Tools (see also Cutlery and edge tools)	11	468,977	279		3	146,006	134,123	364,992
Upholstering (see also Furniture)	4	1,975	6	3		2,850	6,100	12,600
Watch and clock repairing	17	7,875	10			5,875	5,375	24,200
Wheelwrighting (see also Blacksmithing; Carriages and wagons)	14	28,600	46			23,073	27,357	72,690
Wirework	3	150,600	101	98		68,771	268,472	380,598
Wood, turned and carved (see also Sash, doors, and blinds)	6	19,500	18			7,205	7,960	21,430
Woolen goods (see also Mixed textiles)	6	156,500	314	203	34	193,496	629,330	982,175
All other industries (*a*)	86	3,010,210	3,317	1,127	51	1,659,985	5,212,128	8,004,889

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a Embracing agricultural implements; awnings and tents; baking and yeast powders; bells; belting and hose, leather; blacking; bluing; boot and shoe uppers; boxes, cigar; boxes, fancy and paper; boxes, wooden, packing; brooms and brushes; carpets, other than rag; cars, railroad, street, and repairs; clothing, women's; coffee and spices, roasted and ground; coffins, burial cases, and undertakers' goods; cooperage; corsets; drugs and chemicals; dyestuffs and extracts; electroplating; engraving and die-sinking; envelopes; felt goods; fruits and vegetables, canned and preserved; gas machines and meters; gloves and mittens; hardware; hairwork; hats and caps; hones and whetstones; iron bolts, nuts, washers, and rivets; iron pipe, wrought; iron railing, wrought; iron work, architectural and ornamental; japanning; jewelry; lasts; leather, tanned; lumber, planed; liquors, malt; mineral and soda waters; musical instruments and materials (not specified); paints; paving materials; photographing materials; refrigerators; shipbuilding; shirts; shoddy; silk and silk goods; spectacles and eyeglasses; stationery goods; steam fittings and heating apparatus; stencils and brands; stone- and earthen-ware; straw goods; surgical appliances; trunks and valises; umbrellas and canes; whips; wire; and worsted goods.

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

1.—AGRICULTURAL IMPLEMENTS.

	States and Territories.	No. of stablishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	MATERIALS.			
				Males above 16 years.	Females above 15 years.	Child'n and youths.		Value of lumber.	Value of iron and steel.	Value of all other materials.	Total value of all materials.
	The United States	1, 943	Dollars. 62, 109, 668	38, 313	73	1, 194	Dollars. 15, 359, 610	Dollars. 5, 669, 516	Dollars. 18, 083, 502	Dollars. 7, 778, 152	Dollars. 31, 531, 170
1	Alabama	20	13, 075	35		1	7, 510	1, 750	5, 118	1, 938	8, 806
2	Arkansas	11	9, 985	24			5, 541	1, 690	4, 155	2, 569	8, 414
3	California	21	389, 500	286		9	149, 995	137, 325	126, 550	70, 160	334, 035
4	Connecticut	21	832, 500	552	2	11	218, 514	100, 041	163, 466	54, 13[illegible]	317, 644
5	Delaware	12	67, 400	66			20, 524	7, 036	8, 230	4, 355	19, 621
6	Georgia	20	200, 124	230		44	77, 585	40, 320	218, 693	78, 833	337, 846
7	Illinois	220	11, 306, 955	6, 989	27	284	3, 186, 999	1, 332, 201	3, 499, 414	1, 891, 315	6, 722, 930
8	Indiana	96	3, 231, 818	2, 357	1	113	1, 610, 644	340, 855	1, 294, 773	546, 509	2, 182, 137
9	Iowa	58	1, 185, 530	785	1	23	243, 635	130, 663	338, 605	131, 828	601, 096
10	Kansas	14	72, 450	102		1	27, 962	6, 737	14, 511	3, 815	25, 063
11	Kentucky	86	2, 296, 037	999	10	24	364, 385	91, 922	474, 055	257, 415	823, 392
12	Louisiana	1	3, 000	5			600	100	500	50	650
13	Maine	28	726, 300	440	1	7	174, 075	19, 730	232, 105	77, 840	329, 675
14	Maryland	36	395, 400	338		18	117, 791	56, 495	140, 150	30, 545	227, 190
15	Massachusetts	29	910, 000	956	1	16	365, 896	133, 850	449, 076	51, 826	634, 752
16	Michigan	143	2, 488, 287	1, 958	3	43	650, 192	252, 336	584, 101	501, 508	1, 337, 945
17	Minnesota	32	2, 315, 222	1, 196	1		507, 085	256, 762	451, 101	268, 027	975, 890
18	Mississippi	12	31, 900	61			16, 025	6, 203	21, 367	4, 550	32, 120
19	Missouri	74	645, 772	713		13	276, 536	311, 235	250, 268	37, 512	599, 015
20	Nebraska	13	37, 550	54			15, 050	9, 580	18, 950	1, 500	30, 030
21	New Hampshire	17	196, 700	178			75, 068	10, 186	60, 194	21, 096	91, 476
22	New Jersey	40	208, 300	204		2	61, 972	20, 925	50, 300	24, 212	95, 437
23	New York	265	9, 580, 009	6, 335		127	2, 513, 875	757, 041	2, 775, 550	1, 047, 419	4, 580, 010
24	North Carolina	34	132, 800	199		3	48, 550	11, 420	37, 078	13, 882	62, 380
25	Ohio	156	16, 111, 576	7, 281	13	242	2, 981, 065	778, 003	4, 680, 585	1, 784, 738	7, 243, 326
26	Oregon	4	35, 000	17		1	9, 100	2, 200	3, 623	1, 250	7, 073
27	Pennsylvania	220	3, 452, 923	2, 540		77	898, 608	433, 881	1, 024, 453	330, 086	1, 788, 420
28	Rhode Island	4	18, 500	16			5, 219	1, 875	3, 725	1, 110	6, 710
29	South Carolina	7	18, 150	33	10	45	7, 050	1, 650	2, 300	1, 300	5, 250
30	Tennessee	33	161, 030	172	1	5	43, 277	13, 750	34, 300	11, 230	59, 280
31	Texas	13	33, 800	133		6	46, 750	10, 300	25, 900	10, 500	46, 700
32	Utah	1	5, 000	16			11, 232	400	2, 687	672	3, 759
33	Vermont	35	640, 900	462	2		165, 894	96, 038	153, 449	108, 152	357, 639
34	Virginia	51	536, 030	519		11	162, 634	51, 976	158, 047	34, 354	244, 377
35	West Virginia	8	73, 050	63			18, 105	2, 004	12, 091	3, 440	17, 535
36	Wisconsin	108	3, 747, 095	1, 999		68	874, 667	241, 036	764, 032	368, 479	1, 373, 547

PRODUCTS—continued.

Harvesting implements.

	States and Territories.	Fruit-gatherers.	Grain-cradles.	Harvesters.	Hand-rakes.	Hay-forks.	Hay-loaders.	Hay-tedders.	Horse-rakes.	Lawn-mowers.	Mowers.	Potato-diggers.	Reapers.	Reapers and mowers combined.	Scythes.	Scythe-snaths.	Sickles.
	The United States	No. 315	No. 167, 492	No. 25, 737	Dozen. 308, 732	Dozen. 206, 727	No. 8, 957	No. 2, 334	No. 95, 625	No. 47, 661	No. 72, 090	No. 33, 453	No. 35, 327	No. 54, 920	No. 1, 244, 264	No. 437, 178	No. 95, 613
1	Alabama		33		[illegible]				3					1			
2	Arkansas																
3	California			65				150	716					36			
4	Connecticut				3, 310	3, 396		50	342	7, 500		9, 760			292, 000	1, 200	9, 600
5	Delaware		12						30					12		10	
6	Georgia		17		19	1			2		2	3				20	4
7	Illinois		632	11, 806	179	4, 866	227	200	10, 662	6	9, 537	220	1, 747	3, 310			
8	Indiana	300	46, 035		281			62	634		310	30	1, 500	1, 806	1, 110	37, 867	
9	Iowa		13, 416	200	[illegible], 054	10, 962	1		1, 326		250	35		150	1, 428	60, 531	
10	Kansas							2	50								
11	Kentucky		127		37	29			23			9			305	610	
12	Louisiana																
13	Maine				3, 417	1, 050			253		20	1, 200			448, 800	20, 400	24, 000
14	Maryland		625	5	10				878			20	35			600	
15	Massachusetts		2, 000		10, 923	630		700	2, 340	200	1, 567	10		2		15, 000	
16	Michigan	15	37, 713		26, 085	30, 855	8		15, 417		55	12, 224				56, 590	
17	Minnesota		111	1, 720	6	2			600		1, 200		300	3, 500	112	2, 212	
18	Mississippi		30		10												
19	Missouri		106		4	2			1, 230		15			10			
20	Nebraska												63				
21	New Hampshire				3, 750						200			10	204, 800		
22	New Jersey		135		300	157			61		50		15	35	7	2	3
23	New York		36, 056	7, 766	220, 519	20, 796	3, 650	1, 007	11, 401	9, 592	27, 410	669	16, 028	8, 663	201, 452	32, 300	1, 000
24	North Carolina																
25	Ohio		18, 928	3, 440	18, 882	27, 261	1		44, 159	13, 000	29, 267	8, 274	14, 179	36, 346		51, 850	61, 000
26	Oregon																
27	Pennsylvania		6, 591	1	4, 818	62, 218	5, 036	28	4, 414	17, 363	1, 550	604	268	255	19, 732	7, 542	
28	Rhode Island		600		175				25		30					300	
29	South Carolina		100	1	20	1					1				6	4	6
30	Tennessee		363		1	1			1								
31	Texas								1								
32	Utah																
33	Vermont		2, 400		8, 880	44, 500			450			370			74, 400	150, 000	
34	Virginia		152		44				60				4				
35	West Virginia		1, 150	225					6		375		45	420			
36	Wisconsin		160	508	3, 600		34	135	541		251	25	1, 143	364	112	140	

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

1.—AGRICULTURAL IMPLEMENTS.

PRODUCTS.

Seeders and planters.							Implements of cultivation.								
Corn-planters.	Cotton-planters.	Fertilizer distributers.	Grain-drills.	Grain-sowers.	Seed-sowers.	Transplanters.	Clod-crushers.	Cotton-choppers.	Cultivators.	Harrows.	Hoes.	Plows.	Shovels.	Rollers.	
Number. 68,691	*Number.* 19,288	*Number.* 8,155	*Number.* 43,222	*Number.* 15,563	*Number.* 20,289	*Number.* 4,245	*Number.* 684	*Number.* 138	*Number.* 318,057	*Number.* 127,997	*Dozen.* 299,338	*Number.* 1,326,123	*Dozen.* 212,147	*Number.* 3,002	
7	60	218					12	4	82	204	17	2,753	34	30	1
	185								118	286	80	603			2
				12	850		9		265	1,399	1,803	6,107		4	3
					252		55		5,358	2,091	20,760	52,175	170	211	4
			20						980	547	33	855	10	26	5
	1,662	64	50		6		3		33,612	216	10,047	70,462	1,713	3	6
43,180	150	1	4,132	2,480	550		348		132,513	37,732	164	269,313	182	283	7
1,584		150	14,065		2		45		6,092	3,618	2,342	177,980	677	32	8
13			20		25		2		8,543	3,636	9,289	36,613	57	51	9
									549	1,028	540	2,197		3	10
567	500		500				37	12	21,462	13,993	97,410	130,791	2,346	81	11
												200			12
					25				1,396	376	2,061	4,504	2,475		13
161		855	405		930		25		2,218	501	61	20,809		86	14
195					956				1,917	3,375	20,160	34,134	120,000	100	15
930		49	250	200	151		10		27,908	26,362	18,390	40,684	20	394	16
1,200				200	21				454	510	101	17,782	83	17	17
28	356	300					12	22	140	200	52	8,490	46		18
318	50				200	4,240	7		271	1,628	1,660	9,611	6,762	61	19
							2	100	154	1,833		2,160		5	20
									480	418		1,360	6	1	21
12		15	10		1		5		6,074	1,700	47	2,973	8	138	22
172		1,373	2,276	108	241		8		15,665	10,118	67,889	97,815	3,084	816	23
	1,394	2					25		727	453	15	15,619	585		24
14,736	13,101	3,224	19,252	5,120	14,050		41		16,248	3,207	29,954	63,962	7,008	198	25
									13	51		176			26
967	1,600	1,822	1,286	118	20		22		7,684	1,367	8,918	84,898	66,054	226	27
									300	125		500		20	28
15	18	21				5	2		4	11	2	680	25	1	29
1	106	40			9		1		1,099	557	14	24,007	18		30
43	93		40						12,049	48	275	17,655	415		31
												400			32
400									661	435	6,700	2,595	200	49	33
362	13	20	16				13		1,136	930	121	78,843	133	12	34
										22	23	195	35		35
3,800		1	900	7,325	2,000				11,885	9,020	410	46,192	1	154	36

PRODUCTS—continued.

Seed separators.						Miscellaneous.												
Clover-hullers.	Corn-huskers.	Corn-shellers.	Fanning-mills.	Separators.	Thrashers.	Cane-mills.	Cider- and wine-mills.	Feed steamers and boilers.	Hay- and straw-cutters.	Hay-presses.	Horse-powers.	Stalk-pullers.	Stone-gatherers.	Stump-pullers.	Sirup-evaporators.	Value of all other products, not specified.	Total value of all products.	
No. 1,412	*No.* 44,370	*No.* 59,157	*No.* 45,412	*No.* 9,103	*No.* 10,424	*No.* 2,356	*No.* 10,202	*No.* 1,482	*No.* 33,883	*No.* 791	*No.* 11,161	*No.* 93	*No.* 9,068	*No.* 703	*No.* 1,460	*Dollars.* 10,493,432	*Dollars.* 68,640,486	
					7										1	7,890	29,014	1
						50				20						8,906	23,860	2
			1,500		139					22	74		200			132,865	586,338	3
	25	11,687	92		8		1,902		2,993		50		333			80,278	719,627	4
		75		11	11					3	7					25,347	57,776	5
		100				100		50	2						10	117,525	601,935	6
	44,136	11,935	858	612	703	6	591		581	580	1,507	45		1	14	1,390,761	13,498,575	7
532		30	2,331	873	176	250		150	301	3	143		70	126	204	694,107	4,460,408	8
		85	378	800	70	11		173	1,230		111	12	6,379			262,259	1,271,872	9
			180										932			24,506	73,477	10
	24	1,500	327	15	50	435	409	25	3,846	3	276				233	457,402	1,647,116	11
						6									5	1,400	2,000	12
		29		46	32		95		195		71			10		79,596	661,445	13
300		603	210	91	147	3	200	650	1,905		139			1		68,855	574,672	14
		2,105	160		69		200		5,350		20		50	80		33,475	1,670,242	15
		225	12,325	1,256	156		8	33	3,167		680		290	125	70	639,558	3,102,638	16
			1,399		1,650			50	1		1,000		400			25,978	2,340,288	17
		200									100					13,305	68,640	18
		3,125	675		125	634	1,800		452		250	12		18	306	293,795	1,141,822	19
									5							9,085	77,032	20
									600							4,250	212,850	21
25		140	46	146	114		46	75	76		205					62,411	242,984	22
79	52	4,616	1,512	732	1,668	401	557	22	4,766	15	807		97	34	40	1,288,873	10,707,766	23
		125			7	65	5		200	100	62				37	49,710	178,449	24
436		20,300	2,865	1,488	2,253	11	3,660	1	2,990		1,861			5		3,069,574	15,479,825	25
				100	5						25					10,800	24,450	26
40	129	1,567	2,743	810	979	1	386	163	1,857		1,407			81		707,593	3,086,212	27
																1,750	15,068	28
	1	1	1				1		1	1						2,715	17,475	29
	3	100	60	23	40	150			206	1	40	24			100	24,800	182,116	30
						30										52,811	143,700	31
									12		2					12,000	16,591	32
			200	250	250		24		135		281		65		350	156,605	718,455	33
		408	132	180	50	108	318		2,590	43	169		12	1	15	162,732	602,959	34
																11,000	60,340	35
		201	17,418	1,670	1,715	95		90	422		1,834		240	221	75	508,915	3,742,069	36

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

2.—BOOTS AND SHOES (FACTORY INDUSTRY). (a)

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.				Total amount paid in wages during the year.
			Total.	Males above 16 years.	Females above 15 years.	Children and youths.	
		Dollars.					*Dollars.*
The United States	1, 959	42, 994, 028	111, 052	82, 547	25, 122	3, 483	43, 001, 438
California	81	1, 001, 183	2, 499	2, 246	165	88	1, 064, 938
Colorado	1	60, 000	75	75			17, 500
Connecticut	26	631, 000	1, 412	1, 012	383	17	529, 058
Georgia	4	41, 800	38	35	1	2	11, 445
Idaho	1	4, 000	10	8	1	1	3, 750
Illinois	33	1, 729, 200	2, 060	1, 718	242	100	755, 769
Indiana	12	226, 500	341	304	33	4	111, 465
Iowa	3	61, 040	139	135	4		32, 950
Kansas	3	16, 000	67	62		5	13, 800
Kentucky	15	197, 100	472	315	129	28	159, 587
Louisiana	4	17, 000	115	115			53, 618
Maine	52	1, 369, 000	3, 919	2, 634	1, 180	105	1, 335, 168
Maryland	34	590, 600	1, 796	1, 271	450	75	595, 603
Massachusetts	982	21, 098, 133	61, 651	46, 988	13, 374	1, 289	24, 875, 106
Michigan	10	343, 500	783	690	67	26	340, 172
Minnesota	5	463, 000	402	357	24	21	207, 218
Mississippi	2	14, 500	32	27	4	1	6, 715
Missouri	26	642, 800	1, 282	864	225	193	447, 663
New Hampshire	59	1, 696, 200	4, 434	3, 390	985	59	1, 792, 832
New Jersey	89	964, 245	3, 318	2, 392	809	117	1, 278, 269
New York	272	6, 227, 537	13, 414	9, 072	3, 711	631	4, 902, 132
North Carolina	5	34, 000	108	97	1	10	23, 900
Ohio	51	1, 154, 200	3, 204	2, 255	671	278	1, 089, 116
Oregon	1	10, 000	15	15			10, 000
Pennsylvania	145	3, 627, 840	7, 845	5, 085	2, 442	318	2, 820, 976
Tennessee	3	6, 000	26	23		3	9, 905
Utah	8	60, 050	186	117	33	36	55, 220
Vermont	6	88, 000	101	93	8		41, 950
Virginia	5	60, 800	221	172	42	7	30, 381
West Virginia	1	10, 000	10	10			3, 500
Wisconsin	20	548, 800	1, 177	970	138	69	381, 732

States and Territories.	MATERIALS.					PRODUCTS.					
	Sides sole leather.	Sides upper leather. (b)	Other leather.	Value of all other materials.	Total value of all materials.	Boots. (c)	Value.	Shoes.	Value.	Value of unspecified products.	Total value of all products.
	Number.	*Number.*	*Pounds.*	*Dollars.*	*Dollars.*	*Pairs.*	*Dollars.*	*Pairs.*	*Dollars.*	*Dollars.*	*Dollars.*
The United States	6, 831, 661	21, 147, 656	32, 960, 614	20,939,969	102,442,442	30, 590, 896	53,223,265	94, 887, 615	112,109,343	717, 746	166,050,354
California	151, 637	285, 209	134, 700	607, 152	2, 022, 487	247, 119	1, 006, 993	1, 603, 186	2, 627, 941	14, 617	3, 649, 551
Colorado	5, 000	9, 000		16, 100	78, 100	25, 000	100, 000	12, 500	25, 000		125, 000
Connecticut	83, 797	274, 600	360, 535	177, 813	1, 335, 397	209, 500	479, 300	1, 119, 400	1, 722, 775	9, 310	2, 211, 385
Georgia	7, 250	10, 582	3, 400	2, 933	64, 241	400	2, 000	65, 930	87, 325	400	89, 725
Idaho	200	500	200	250	2, 100	1, 000	5, 000	2, 000	4, 000	1, 500	10, 500
Illinois	126, 132	290, 752	319, 187	221, 395	1, 834, 999	526, 523	1, 783, 619	933, 088	1, 385, 471	13, 936	3, 183, 026
Indiana	20, 472	58, 039	76, 700	39, 692	296, 448	99, 167	270, 834	115, 543	205, 811	200	476, 845
Iowa	10, 580	28, 710	22, 000	20, 220	166, 090	77, 648	207, 040	23, 600	35, 000	1, 000	243, 040
Kansas	3, 299	5, 570	6, 000	3, 560	34, 350	11, 600	28, 000	22, 607	27, 314	500	55, 814
Kentucky	48, 355	141, 842	19, 300	48, 046	339, 433	13, 916	65, 000	277, 592	512, 232	1, 500	578, 732
Louisiana	5, 375	8, 900	1, 540	19, 618	85, 000	1, 156	8, 760	51, 180	152, 480	2, 850	164, 090
Maine	288, 761	804, 252	1, 332, 900	620, 571	3, 880, 446	1, 758, 681	2, 411, 590	3, 917, 173	3, 356, 091	55, 860	5, 823, 541
Maryland	75, 363	128, 188	416, 913	274, 666	1, 216, 118	46, 192	236, 231	1, 088, 630	1 922, 295	54, 437	2, 212, 963
Massachusetts	3, 852, 455	11, 754, 766	22, 632, 639	14, 128, 760	59, 906, 773	23, 018, 813	36, 317, 193	55, 493, 381	59, 278, 934	304, 383	95, 900, 510
Michigan	62, 002	167, 172	57, 645	132, 210	736, 184	153, 696	421, 900	596, 344	782, 395	11, 960	1, 216, 255
Minnesota	42, 313	99, 621	62, 534	46, 511	571, 644	268, 112	735, 220	128, 279	190, 472	4, 500	930, 192
Mississippi	1, 080	1, 905	6, 000	1, 200	12, 162	700	3, 500	11, 500	16, 950	1, 325	21, 775
Missouri	89, 836	239, 220	181, 133	196, 486	1, 224, 796	292, 674	841, 435	736, 380	1, 140, 308	1, 250	1, 982, 993
New Hampshire	487, 437	1, 412, 113	1, 124 121	391, 747	4, 751, 968	1, 443, 267	1, 634, 964	5, 966, 004	5, 536, 393	59, 447	7, 230, 804
New Jersey	203, 209	811, 575	577, 683	293, 530	2, 837, 861	43, 253	143, 574	4, 102, 969	4, 528, 337	17, 375	4, 689, 286
New York	678, 588	2, 404, 208	3, 865, 521	2, 177, 328	11, 502, 251	1, 394, 459	3, 828, 662	9, 716, 272	15, 098, 977	51, 620	18, 979, 259
North Carolina	6, 300	10, 000	46, 100	5, 050	65, 000	700	3, 000	78, 200	102, 600	2, 000	107, 600
Ohio	144, 655	464, 610	422, 575	352, 770	2, 498, 178	228, 788	746, 319	2, 048, 817	3, 410, 930	10, 227	4, 167, 476
Oregon	1, 500	4, 000		8, 000	27, 500	9, 000	45, 000				45, 000
Pennsylvania	3[illegible], 435	1, 440, 970	1, 023, 085	937, 828	5, 425, 844	300, 932	858, 598	5, 860, 615	8, 667, 102	64, 302	9, 590, 002
Tennessee	1, 087	2, 226	3, 397	683	17, 191	2, 290	13, 510	9, 040	20, 530	1, 786	35, 826
Utah	6, 066	19, 004	14, 230	18, 171	108, 160	16, 349	58, 175	91, 749	124, 310	7, 184	189, 669
Vermont	10, 200	24, 200	16, 800	9, 923	126, 688	66, 640	157, 700	18, 300	38, 500	2, 000	198, 200
Virginia	12, 979	16, 572	6, 500	10, 352	116, 893	1, 087	3, 640	135, 842	176, 871	7, 009	187, 520
West Virginia	646	2, 267		1, 457	11, 000	4, 534	17, 002				17, 002
Wisconsin	84, 661	227, 083	227, 276	175, 947	1, 147, 140	327, 700	789, 506	638, 494	931, 999	15, 268	1, 736, 773

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a This table includes the products of boot and shoe factories only. In addition, there were returned in the census 16,013 custom and repair shops. The aggregate of all production of boots and shoes appears in Table II.

b Including morocco, calf, and other skins used in the manufacture of uppers.

c Including ladies', misses', and children's lace boots.

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

3.—BRICK AND TILE.

States and Territories.	Number of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	MATERIALS. Wood.	Value of all other materials.	Total value of all materials.	PRODUCTS. Common brick.	Fire-brick.	Pressed brick.	Value of tile.	Value of drain pipe.	Value of all other products.	Total value of all products.
		Dollars.				*Dollars.*	*Cords.*	*Dollars.*	*Dollars.*	*Number.*	*Number.*	*Number.*	*Dollars.*	*Dollars.*	*Dolls.*	*Dollars.*
The United States	5, 631	27, 673, 616	59, 032	268	7, 055	13, 443, 532	1, 157, 522	5, 750, 303	9, 774, 834	3, 822, 362, 000	163, 184, 000	210, 815, 000	2, 944, 239	1, 765, 428	729, 926	32, 833, 587
Alabama	38	78, 525	428	....	139	68, 397	12, 300	9, 055	53, 225	24, 695, 000	1, 250, 000	650, 000	3, 500	12, 100	....	159, 952
Arizona	1	2, 500	10	....	.....	4, 500	300	750	2, 250	1, 200, 000	....	....	....	....	....	9, 600
Arkansas	32	38, 700	339	....	36	53, 775	7, 841	7, 345	36, 000	14, 303, 000	78, 000	2, 515, 000	5, 250	1, 000	....	117, 370
California	50	378, 650	838	....	1	210, 035	15, 207	88, 597	157, 625	63, 427, 000	510, 000	630, 000	60, 210	1, 000	800	516, 261
Colorado	46	362, 600	797	....	33	267, 410	13, 612	135, 272	194, 003	65, 628, 000	4, 040, 000	13, 725, 000	1, 500	....	....	605, 028
Connecticut	48	328, 350	511	9	21	132, 476	9, 620	54, 244	91, 022	40, 131, 000	225, 000	701, 000	19, 900	9, 140	17, 200	299, 194
Dakota	14	25, 600	108	....	.....	33, 622	3, 561	4, 526	16, 366	7, 680, 000	....	1, 165, 000	....	....	....	66, 685
Delaware	15	102, 400	230	...	77	55, 216	1, 514	26, 908	33, 683	11, 903, 000	35, 000	1, 100, 000	6, 500	....	8, 150	125, 610
District of Columbia	16	330, 600	576	....	120	123, 161	4, 327	48, 540	62, 575	50, 715, 000	....	1, 689, 000	....	....	....	314, 298
Florida	9	7, 850	104	....	3	12, 458	2, 940	2, 175	9, 750	4, 845, 000	430, 000	....	....	....	....	28, 100
Georgia	76	212, 660	1, 022	14	192	188, 883	32, 750	17, 199	115, 747	56, 865, 000	1, 470, 000	3, 582, 000	1, 250	5, 225	500	409, 025
Idaho	2	2, 500	11	....	.....	3, 340	255	750	1, 850	595, 000	....	....	....	....	....	6, 990
Illinois	616	2, 397, 023	5, 319	13	571	1, 288, 604	99, 950	572, 734	955, 584	370, 450, 000	2, 962, 000	2, 778, 000	737, 822	189, 708	15, 815	3, 065, 302
Indiana	735	1, 408, 264	3, 908	4	328	716, 254	136, 257	251, 475	694, 226	204, 737, 000	1, 470, 000	14, 248, 000	643, 570	74, 622	15, 647	1, 927, 858
Iowa	280	478, 614	2, 063	13	175	426, 120	44, 205	108, 958	270, 963	123, 250, 000	2, 613, 000	4, 709, 000	51, 681	6, 640	2, 350	944, 497
Kansas	103	125, 825	948	19	79	174, 111	20, 202	17, 816	90, 935	54, 838, 000	255, 000	602, 000	260	100	....	355, 668
Kentucky	115	302, 175	1, 162	1	216	233, 702	30, 975	51, 342	145, 503	84, 678, 000	210, 000	6, 490, 000	6, 200	....	1, 000	506, 705
Louisiana	31	87, 425	305	13	40	68, 626	9, 540	5, 770	30, 067	17, 933, 000	....	1, 010, 0 0	403	....	....	133, 265
Maine	96	280, 549	621	...	16	106, 538	18, 377	66, 731	122, 887	39, 135, 000	157, 000	520, 000	1, 470	75, 000	30, 000	310, 958
Maryland	79	1, 168, 158	2, 049	....	202	478, 189	5, 406	218, 311	243, 284	96, 264, 000	6, 050, 000	10, 025, 000	20, 038	19, 967	10, 450	933, 988
Massachusetts	114	1, 668, 200	2, 370	9	22	465, 589	66, 392	186, 092	521, 875	183, 185, 000	280, 000	4, 933, 000	19, 338	31, 420	124, 692	1, 322, 628
Michigan	179	710, 259	1, 730	45	158	346, 845	66, 053	86, 562	236, 878	130, 212, 000	560, 000	14, 891, 000	95, 401	58, 501	4, 880	822, 475
Minnesota	87	281, 705	928	5	77	200, 208	33, 721	27, 660	114, 610	78, 270, 000	440, 000	1, 768, 000	900	300	500	502, 975
Mississippi	54	106, 125	593	4	112	89, 053	11, 804	11, 770	42, 970	26, 597, 000	....	85, 000	25	....	110	194, 870
Missouri	230	989, 415	2, 271	8	458	705, 975	43, 768	241, 594	388, 364	219, 834, 000	10, 017, 000	11, 886, 000	79, 280	31, 020	7, 755	1, 602, 522
Montana	5	17, 500	68	....	.....	21, 400	1, 845	1, 450	11, 400	3, 650, 000	....	200, 000	....	....	....	43, 150
Nebraska	87	130, 740	585	3	74	150, 189	16, 186	39, 259	102, 078	44, 081, 000	677, 000	2, 260, 000	900	....	....	349, 478
Nevada	2	1, 200	13	...	.....	3, 974	400	545	1, 245	1, 055, 000	150, 000	....	....	....	....	8, 355
New Hampshire	67	120, 845	642	..	.....	118, 408	23, 729	15, 910	90, 251	48, 040, 000	475, 000	619, 000	4, 500	....	....	282, 725
New Jersey	107	1, 731, 300	2, 575	26	148	665, 482	14, 683	503, 315	559, 037	138, 887, 000	17, 513, 000	4, 610, 000	129, 454	142, 800	124, 250	1, 672, 533
New Mexico	1	800	8	....	.....	600	83	125	500	250, 000	....	....	....	....	....	1, 500
New York	321	3, 923, 405	6, 715	29	619	1, 613, 766	105, 785	681, 351	1, 196, 925	575, 906, 000	12, 861, 000	25, 542, 000	146, 891	163, 981	130, 812	4, 108, 464
North Carolina	66	54, 390	433	3	178	49, 928	12, 171	5, 893	34, 657	20, 079, 000	1, 495, 000	2, 482, 000	2, 625	....	1, 100	150, 874
Ohio	825	2, 723, 528	5, 527	17	583	1, 114, 133	122, 937	831, 972	1, 185, 794	296, 224, 000	19, 878, 000	10, 365, 000	676, 405	834, 918	44, 611	3, 481, 291
Oregon	23	55, 496	184	1	2	43, 814	6, 614	3, 407	19, 197	14, 628, 000	....	3, 000	1, 150	15, 000	3, 000	104, 240
Pennsylvania	521	5, 028, 524	7, 135	6	1, 285	2, 077, 168	24, 570	1, 224, 156	1, 332, 758	383, 222, 000	61, 907, 000	40, 320, 000	164, 112	75, 476	111, 993	4, 813, 153
Rhode Island	1	100, 000	193	....	.....	32, 000	3, 000	10, 000	24, 000	15, 000, 000	....	....	....	....	....	75, 000
South Carolina	29	31, 100	269	2	96	35, 903	6, 563	3, 225	17, 208	11, 575, 000	835, 000	30, 000	7, 325	....	....	80, 819
Tennessee	90	343, 354	1, 224	7	322	247, 227	25, 199	58, 913	139, 568	69, 200, 000	1, 148, 000	9, 006, 000	15, 422	50	43, 891	523, 113
Texas	113	183, 530	1, 042	8	135	204, 499	31, 290	16, 567	105, 074	52, 431, 000	657, 000	9, 530, 000	4, 070	3, 000	6, 400	448, 418
Utah	28	121, 575	147	...	41	34, 890	1, 539	12, 935	19, 825	6, 855, 000	400, 000	780, 000	2, 050	40	500	85, 592
Vermont	25	133, 250	216	....	8	38, 610	5, 270	6, 080	18, 735	13, 760, 000	30, 000	....	2, 2[illegible]0	7, 500	100	83, 650
Virginia	84	290, 085	1, 180	....	245	188, 072	16, 815	37, 275	80, 420	51, 111, 000	821, 000	2, 973, 000	5, [illegible]	4, 170	2, 700	358, 789
Washington	2	3, 000	16	...	.....	[illegible]	[illegible]	300	1, 15[illegible]	600, 000	....	....	....	....	....	6, 000
West Virginia	47	242, 950	384	1	61	111, 301	[illegible]	16, 776	39, [illegible]	13, 497, 000	10, 960, 000	236, 000	18, 725	1, 5[illegible]	10, 2[illegible]0	21[illegible], 710
Wisconsin	119	560, 872	1, 265	8	182	231, 551	38, 552	38, 483	161, 400	89, 851, 000	325, 000	2, 157, 000	8, 092	1, 259	1, 400	607, [illegible]
Wyoming	2	1, 500	28	....	.....	5, 300	250	300	1, 400	1, 000, 000	....	....	....	....	....	8, 500

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

CARPETS, OTHER THAN RAG.

(See Report by Special Agent G. W. Bond, *post.*)

4.—CHEESE AND BUTTER.(a)

States and Territories.	ALL FACTORIES.							CHEESE FACTORIES.			BUTTER FACTORIES.			
			AVERAGE NUMBER OF HANDS EMPLOYED.											
	No. of establishments.	Capital (real and personal) invested in the business.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Total quantity of milk used at the factory during the year.	Cheese made.	Total value of materials.	Total value of products.	Butter made.	Value of buttermilk and skimmed milk sold.	Total value of materials.	Total value of products.
		Dollars.				*Dollars.*	*Pounds.*	*Pounds.*	*Dollars.*	*Dollars.*	*Pounds.*	*Dollars.*	*Dollars.*	*Dollars.*
The United States	3, 932	9, 604, 803	6, 419	1, 330	154	1, 546, 495	2, 747, 427, 449	171, 750, 495	10, 063, 670	13, 991, 221	16, 471, 163	41, 393	2, 732, 333	3, 868, 235
Arizona	2	2, 100	4	2	......	600	184, 000	17, 700	2, 640	6, 195	400	......	120	206
California	216	1, 039, 365	357	20	14	70, 434	57, 471, 634	1, 154, 121	70, 567	122, 967	2, 074, 344	5, 990	269, 367	467, 467
Colorado	2	11, 000	[illegible]	......	......	1, 050	667, 000	64, 500	5, 400	8, 385	2, 100	......	502	840
Connecticut	16	36, 775	29	4	......	11, 360	10, 621, 660	201, 820	12, 479	19, 762	93, 365	1, 140	17, 962	28, 127
Dakota	4	10, 200	3	......	......	210	125, 200	700	70	140	5, 800	......	932	2, 120
Delaware	3	18, 200	4	3	1	610	620, 000	......	......	......	25, 800	......	4, 620	7, 710
District of Columbia	1	10, 000	8	......	......	3, 300	1, 825, 000	......	......	......	......	......	......	......
Idaho	6	15, 250	8	5	......	2, 100	1, 098, 000	97, 000	6, 010	12, 535	3, 600	......	580	704
Illinois	285	933, 586	631	56	11	233, 974	316, 636, 778	4, 977, 286	336, 278	462, 178	2, 414, 668	2, 300	439, 609	591, 604
Indiana	49	82, 345	104	16	2	20, 587	20, 826, 012	1, 153, 714	75, 192	111, 060	281, 232	2, 567	64, 125	87, 059
Iowa	244	657, 508	670	91	34	139, 813	181, 635, 746	2, 302, 936	138, 400	215, 729	5, 458, 595	8, 245	965, 304	1, 304, 763
Kansas	48	81, 765	70	12	6	10, 420	7, 983, 102	791, 384	42, 308	70, 247	11, 482	25	1, 551	2, 536
Kentucky	8	20, 100	11	2	1	1, 200	1, 276, 900	......	......	......	49, 100	......	7, 854	14, 178
Maine	41	82, 512	48	9	1	8, 213	7, 637, 901	777, 365	46, 852	73, 942	6, 000	150	840	1, 650
Maryland	14	22, 9[illegible]0	18	......	......	3, 471	5, 821, 000	......	......	......	190, 525	4, 741	47, 710	69, 616
Massachusetts	22	97, 550	46	5	1	14, 277	16, 671, 069	1, 093, 943	65, 117	99, 297	52, 150	8, 200	18, 142	28, 737
Michigan	74	129, 925	88	23	3	21, 103	35, 161, 812	3, 291, 738	200, 152	292, 971	9, 850	......	1, 114	1, 994
Minnesota	27	71, 149	31	5	2	7, 680	6, 424, 923	452, 191	25, 062	41, 618	62, 450	......	9, 735	14, 426
Missouri	30	123, 990	38	12	7	8, 464	9, 185, 585	550, 265	38, 934	54, 219	126, 884	275	23, 020	32, 989
Montana	3	10, 250	6	......	......	470	470, 000	24, 500	2, 450	4, 660	9, 000	......	2, 250	3, 240
Nebraska	21	81, 165	28	7	2	5, 921	4, 443, 801	273, 506	15, 332	26, 077	20, 672	......	2, 782	4, 456
Nevada	2	3, 200	3	......	......	130	87, 500	......	......	......	3, 500	25	875	1, 587
New Hampshire	2	10, 400	1	3	......	780	2, 539, 868	......	......	......	99, 968	2, 700	20, 683	27, 887
New Jersey	11	42, 170	30	1	1	8, 395	9, 683, 992	36, 400	3, 276	10, 920	15, 600	......	3, 510	3, 900
New York	1, 652	3, 576, 214	2, 526	808	34	623, 391	1, 385, 333, 504	108, 722, 852	6, 375, 556	8, 720, 490	4, 197, 424	......	626, 669	870, 383
North Carolina	2	900	......	......	......	......	19, 000	......	......	......	1, 000	......	152	250
Ohio	452	948, 702	701	104	14	162, 985	325, 527, 447	17, 808, 191	1, 013, 663	1, 361, 124	235, 341	......	30, 138	39, 933
Oregon	24	192, 650	32	[illegible]	1	6, 170	3, 467, 942	146, 534	9, 869	18, 548	84, 500	45	10, 364	24, 668
Pennsylvania	146	395, 020	253	43	8	51, 943	98, 218, 237	6, 087, 805	340, 001	487, 629	453, 020	1, 855	82, 728	110, 563
Tennessee	2	1, 800	4	......	1	300	198, 000	9, 000	540	900	3, 600	......	648	1, 080
Utah	11	22, 402	14	......	6	2, 035	1, 645, 985	140, 022	10, 059	18, 974	12, 020	515	2, 036	2, 954
Vermont	85	202, 300	126	28	2	22, 535	48, 440, 401	4, 575, 341	282, 535	389, 956	5, 000	100	600	1, 100
Virginia	4	33, 700	8	......	......	950	964, 500	26, 000	1, 690	2, 600	29, 100	......	5, 096	8, 021
Washington	2	16, 467	[illegible]	......	......	1, 600	1, 684, 860	70, 000	4, 480	7, 000	47, 963	......	7, 314	11, 820
West Virginia	7	7, 550	8	3	......	1, 104	987, 929	96, 687	6, 378	10, 238	......	......	......	......
Wisconsin	414	613, 643	497	62	2	98, 920	181, 841, 161	16, 806, 994	932, 380	1, 340, 860	386, 010	2, 520	63, 401	99, 673

States and Territories.	COMBINED BUTTER AND SKIM CHEESE FACTORIES.					CONDENSED MILK FACTORIES.			ALL FACTORIES.	
	Butter made.	Cheese made.	Value of buttermilk and skimmed milk sold.	Total value of materals.	Total value of products.	Value of materials.	Condensed milk produced.	Value of condensed milk produced.	Total value of all materials.	Total value of all products.
	Pounds.	*Pounds.*	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*	*Pounds.*	*Dollars.*	*Dollars.*	*Dollars.*
The United States.	12, 950, 621	44, 134, 866	32, 060	4, 540, 718	6, 335, 466	1, 026, 858	13, 033, 267	1, 547, 588	18, 363, 579	25, 742, 510
Arizona	......	......	......	......	......	......	......	......	2, 760	6, 395
California	......	......	......	......	......	......	......	......	339, 934	590, 434
Colorado	......	......	......	......	......	......	......	......	5, 902	9, 225
Connecticut	126, 546	23, 662	19, 203	32, 456	57, 684	24, 923	453, 156	28, 867	87, 820	134, 440
Dakota	......	......	......	......	......	......	......	......	1, 002	2, 260
Delaware	......	......	......	......	......	......	......	......	4, 620	7, 710
District of Columbia	67, 600	155, 460	2, 535	36, 500	44, 920	......	......	......	36, 500	44, 920
Idaho	......	......	......	......	......	......	......	......	6, 590	13, 239
Illinois	4, 136, 361	15, 240, 839	5, 802	1, 803, 606	2, 374, 562	260, 834	3, 645, 408	447, 741	2, 840, 327	3, 876, 085
Indiana	53, 287	155, 550	......	18, 289	26, 930	......	......	......	157, 606	225, 049
Iowa	724, 518	473, 877	375	157, 612	215, 908	......	......	......	1, 261, 316	1, 736, 400
Kansas	......	......	......	......	......	......	......	......	43, 859	72, 783
Kentucky	......	......	......	......	......	......	......	......	7, 854	14, 178
Maine	......	......	......	......	......	......	......	......	47, 692	75, 592
Maryland	38, 800	62, 000	......	12, 480	18, 340	......	......	......	60, 190	87, 956
Massachusetts	92, 067	277, 922	......	34, [illegible]96	47, 487	10, 990	108, 371	18, 589	128, 845	194, 110
Michigan	33, 366	221, 307	......	17, 213	22, 912	......	......	......	218, 479	317, 877
Minnesota	21, 000	10, 000	......	3, 465	6, 050	......	......	......	38, 262	62, 094
Missouri	13, 980	39, 800	75	3, 996	8, 920	......	......	......	65, 950	96, 128
Montana	......	......	......	......	......	......	......	......	4, 700	7, 900
Nebraska	45, 100	50, 447	......	9, 677	15, 789	......	......	......	27, 791	46, 322
Nevada	......	......	......	......	......	......	......	......	875	1, 587
New Hampshire	......	......	......	......	......	......	......	......	20, 683	27, 887
New Jersey	342, 802	466, 818	3, 314	78, 705	108, 243	......	......	......	85, 491	123, 063
New York	4, 758, 354	12, 078, 272	......	1, 116, 372	1, 652, 089	730, 111	8, 826, 332	1, 052, 391	8, 848, 708	12, 295, 353
North Carolina	......	......	......	......	......	......	......	......	152	250
Ohio	1, 852, 902	12, 553, 247	......	941, 249	1, 355, 736	......	......	......	1, 985, 050	2, 756, 793
Oregon	......	......	......	......	......	......	......	......	20, 233	43, 216
Pennsylvania	533, 820	1, 870, 246	120	232, 639	317, 276	......	......	......	655, 368	915, 468
Tennessee	......	......	......	......	......	......	......	......	1, 188	1, 980
Utah	......	......	......	......	......	......	......	......	12, 095	21, 928
Vermont	6, 837	8, 500	......	1, 287	2, 066	......	......	......	284, 422	393, 122
Virginia	......	......	......	......	......	......	......	......	6, 786	10, 621
Washington	......	......	......	......	......	......	......	......	11, 794	18, 820
West Virginia	......	......	......	......	......	......	......	......	6, 378	10, 238
Wisconsin	103, 281	446, 919	636	4[illegible], 576	60, 554	......	......	......	1, 036, 357	1, 501, 087

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a Not including farm products.

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

CHEMICAL PRODUCTS.

(See Report by Special Agent William L. Rowland, *post.*)

COKE.

(See Report by Special Agent Joseph D. Weeks, *post.*)

COTTON MANUFACTURES.

(See Report by Special Agent Edward Atkinson, *post.*)

5.—DYEING AND FINISHING TEXTILES.

[See Introductory Notes, page 1.]

States.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	VALUE OF MATERIALS. Dyestuffs, chemicals, and oils.	Fuel.	All other materials.	Total value of all materials.	Value added, *i. e.*, total value of work done.
The United States	191	$26, 223, 981	12, 788	2, 038	1, 872	$6, 474, 364	$10, 254, 018	$1, 904, 551	$1, 505, 726	$13, 664, 295	$32, 297, 420
Connecticut	2	230, 000	242	34	26	120, 270	308, 998	25, 245	30, 247	364, 490	464, 800
Georgia	1	3, 000	4	1	....	1, 400	500	24	200	724	3, 500
Illinois	11	69, 850	72	13	7	46, 519	36, 380	8, 360	825	45, 565	135, 521
Indiana	5	4, 400	15	24	....	12, 100	6, 700	1, 850	1, 300	9, 850	32, 000
Kentucky	2	5, 000	3	3	....	1, 716	400	180	720	1, 300	6, 420
Maine	4	593, 500	594	45	41	166, 619	213, 735	56, 855	51, 399	321, 989	1, 107, 616
Massachusetts	28	8, 613, 500	3, 953	562	430	1, 815, 431	3, 423, 330	683, 007	459, 837	4, 566, 174	9, 482, 939
Missouri	3	16, 000	14	5	4	7, 500	3, 000	900	1, 600	5, 500	22, 200
New Hampshire	4	2, 987, 085	637	111	106	372, 873	590, 255	118, 490	86, 808	795, 553	1, 568, 100
New Jersey	18	1, 473, 000	1, 788	249	161	925, 612	1, 195, 697	175, 159	272, 077	1, 642, 933	3, 365, 769
New York	29	2, 343, 000	1, 359	300	270	842, 387	730, 495	149, 024	196, 040	1, 075, 559	2, 776, 154
Ohio	7	58, 300	27	13	3	20, 401	58, 950	11, 650	7, 800	78, 400	144, 295
Pennsylvania	60	3, 884, 846	1, 926	248	424	1, 041, 309	1, 929, 685	307, 395	161, 316	2, 398, 396	6, 259, 852
Rhode Island	16	5, 912, 500	2, 146	430	400	1, 093, 727	1, 727, 093	358, 912	229, 057	2, 315, 062	6, 874, 254
West Virginia	1	30, 000	8	....	....	6, 500	28, 800	7, 500	6, 500	42, 800	54, 000

6.—FLOURING- AND GRIST-MILL PRODUCTS.

States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Runs of stone.	Daily capacity.	MATERIALS. Wheat. Bushels.	Wheat. Value.	Other grain. Bushels.	Other grain. Value.	Value of mill supplies.	Total value of all materials.	PRODUCTS. Total value of all products.
		Dollars.				*Dollars.*	*No.*	*Bushels.*		*Dollars.*		*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*
The United States	24, 338	177, 361, 878	58, 239	42	126	17, 422, 316	59, 612	4, 730, 106	304, 775, 737	315, 394, 386	234, 907, 220	112, 372, 071	13, 778, 768	441, 545, 225	505, 185, 712
Alabama	807	1, 803, 514	1, 337	4	25	211, 243	1, 188	78, 902	1, 112, 122	1, 212, 248	3, 654, 487	2, 505, 322	70, 141	3, 787, 711	4, 315, 174
Arizona	8	94, 000	27	......	......	9, 615	13	1, 120	108, 532	130, 900	4, 407	3, 740	6, 463	141, 103	165, 357
Arkansas	350	810, 915	740	......	4	97, 614	529	52, 453	1, 128, 369	1, 088, 017	1, 602, 956	842, 711	48, 589	1, 979, 317	2, 249, 289
California	150	4, 363, 285	877	4	7	514, 602	455	58, 671	8, 208, 105	8, 371, 776	3, 469, 142	2, 088, 858	607, 213	11, 067, 847	12, 701, 477
Colorado	34	496, 500	193	......	......	94, 351	116	11, 982	1, 744, 364	1, 945, 912	169, 499	142, 300	38, 310	2, 126, 522	2, 534, 644
Connecticut	234	1, 092, 824	361	......	......	117, 722	483	43, 037	163, 035	208, 821	4, 109, 482	2, 292, 408	39, 679	2, 540, 908	2, 964, 134
Dakota	30	301, 665	86	......	......	37, 372	79	7, 482	876, 608	721, 050	281, 344	93, 725	27, 523	842, 298	1, 040, 958
Delaware	81	761, 015	219	......	1	72, 231	221	11, 963	546, 080	645, 582	936, 458	480, 564	38, 957	1, 165, 103	1, 341, 026
District of Columbia	9	230, 400	40	......	......	21, 508	45	4, 650	799, 150	950, 825	185, 500	93, 175	27, 600	1, 071, 600	1, 172, 375
Florida	94	224, 655	140	2	......	22, 257	102	8, 860	300	300	382, 922	278, 877	8, 782	287, 959	337, 780
Georgia	1, 132	3, 576, 301	1, 823	4	18	327, 602	1, 993	118, 067	3, 528, 215	4, 122, 954	5, 971, 300	4, 301, 620	194, 518	8, 619, 092	9, 793, 898
Idaho	16	287, 000	46	2	......	16, 155	34	5, 895	296, 020	259, 480	201, 450	153, 150	10, 000	422, 630	520, 986
Illinois	1, 024	13, 579, 680	4, 950	7	3	1, 868, 124	3, 192	358, 858	34, 287, 427	34, 614, 746	15, 721, 729	5, 109, 933	1, 762, 077	41, 486, 756	47, 471, 558
Indiana	996	9, 484, 023	3, 146	......	13	989, 087	2, 916	222, 827	21, 682, 123	22, 308, 309	7, 570, 206	2, 906, 588	889, 740	26, 104, 637	29, 591, 397
Iowa	713	7, 890, 859	2, 146	......	1	748, 045	2, 121	194, 914	14, 604, 382	12, 607, 080	11, 509, 181	3, 436, 929	444, 471	16, 488, 480	19, 089, 401
Kansas	320	3, 935, 828	1, 329	......	3	520, 300	900	99, 907	9, 891, 531	8, 590, 065	5, 373, 765	1, 319, 813	376, 243	10, 286, 121	11, 858, 022
Kentucky	652	3, 685, 759	1, 478	......	7	336, 419	1, 386	127, 171	6, 356, 514	6, 269, 600	4, 206, 974	1, 834, 724	302, 108	8, 406, 432	9, 604, 147
Louisiana	84	176, 380	107	......	......	22, 245	100	11, 042	215, 600	212, 150	204, 391	153, 434	31, 856	397, 440	489, 848
Maine	261	993, 500	385	......	......	109, 882	643	59, 342	669, 617	870, 838	4, 387, 538	2, 664, 907	25, 181	3, 560, 926	3, 966, 023
Maryland	546	3, 145, 520	898	......	......	219, 705	1, 407	68, 878	4, 255, 921	5, 198, 379	2, 945, 673	1, 513, 604	253, 315	6, 965, 298	7, 954, 004
Massachusetts	350	2, 880, 365	683	2	1	290, 070	649	103, 526	618, 333	786, 944	12, 355, 730	6, 896, 911	130, 728	7, 814, 583	8, 774, 049
Michigan	706	7, 704, 464	2, 254	......	1	720, 289	2, 002	204, 450	15, 442, 842	16, 382, 293	8, 985, 989	3, 761, 843	524, 479	20, 668, 615	23, 546, 875
Minnesota	436	10, 510, 362	2, 634	......	......	1, 371, 646	1, 924	206, 496	35, 264, 005	34, 550, 237	2, 040, 064	668, 067	1, 937, 125	37, 155, 429	41, 519, 004
Mississippi	525	889, 950	848	......	......	96, 423	643	64, 208	145, 923	178, 863	2, 044, 260	1, 312, 233	44, 506	1, 535, 602	1, 762, 523
Missouri	872	7, 883, 675	3, 375	......	1	1, 200, 493	2, 183	242, 276	24, 402, 229	24, 038, 938	9, 471, 767	3, 070, 259	1, 093, 535	28, 202, 782	32, 438, 831
Montana	15	159, 500	52	......	......	25, 765	31	2, 945	414, 395	325, 450	14, 800	11, 613	20, 302	357, 365	475, 467
Nebraska	170	1, 615, 070	506	......	......	165, 085	457	41, 751	3, 583, 005	2, 811, 399	2, 439, 180	599, 388	122, 155	3, 532, 942	4, 193, 086
Nevada	7	163, 000	31	......	......	9, 975	15	1, 315	146, 105	210, 861	192, 085	146, 483	11, 773	369, 117	405, 089
New Hampshire	181	712, 555	253	......	......	78, 284	400	41, 818	334, 034	459, 342	3, 184, 836	1, 771, 163	29, 213	2, 259, 718	2, 542, 784
New Jersey	481	3, 879, 083	934	......	2	285, 626	1, 332	80, 046	2, 564, 869	3, 225, 191	7, 309, 175	3, 955, 026	123, 027	7, 303, 244	8, 451, 944
New Mexico	51	249, 250	134	......	......	35, 416	87	5, 019	344, 689	363, 159	64, 161	61, 960	10, 331	435, 450	529, 171
New York	1, 768	19, 545, 994	4, 284	10	10	1, 587, 899	5, 299	536, 762	19, 904, 896	24, 364, 319	34, 814, 643	18, 000, 051	861, 824	43, 226, 194	49, 331, 984
North Carolina	1, 313	3, 218, 053	1, 844	......	......	237, 777	2, 421	104, 110	2, 348, 065	2, 653, 587	4, 750, 362	2, 972, 533	96, 453	5, 722, 603	6, 462, 806
Ohio	1, 380	12, 328, 847	3, 874	......	1	1, 221, 494	4, 142	292, 672	26, 691, 762	28, 538, 412	11, 409, 117	4, 583, 455	1, 035, 157	34, 157, 024	38, 950, 264
Oregon	106	1, 286, 200	307	......	......	139, 882	263	31, 505	3, 180, 565	2, 696, 040	380, 241	201, 518	81, 156	2, 978, 714	3, 475, 531
Pennsylvania	2, 873	20, 238, 601	4, 422	1	11	1, 105, 939	8, 294	376, 717	19, 081, 580	22, 564, 046	25, 860, 256	13, 054, 853	673, 034	36, 291, 933	41, 522, 662
Rhode Island	48	579, 600	105	......	......	46, 870	76	11, 706	9, 054	13, 783	1, 595, 465	933, 691	34, 587	981, 861	1, 137, 990
South Carolina	720	1, 339, 269	1, 048	1	3	139, 352	1, 119	58, 616	771, 841	1, 045, 317	2, 040, 971	2, 151, 638	68, 530	3, 265, 485	3, 779, 470
Tennessee	990	3, 595, 585	1, 847	......	2	376, 399	1, 924	138, 426	5, 948, 104	6, 095, 972	6, 061, 841	2, 768, 391	206, 058	9, 070, 421	10, 784, 804
Texas	921	3, 082, 952	2, 602	1	6	368, 683	1, 417	146, 629	3, 427, 102	3, 392, 281	4, 244, 691	2, 722, 797	256, 528	6, 371, 606	7, 617, 177
Utah	85	595, 950	157	......	......	56, 557	158	9, 622	1, 189, 879	1, 029, 639	119, 344	90, 570	15, 967	1, 136, 176	1, 364, 619
Vermont	227	1, 152, 451	331	......	......	81, 589	587	60, 618	373, 563	500, 867	4, 012, 316	2, 066, 572	35, 202	2, 602, 641	3, 058, 688
Virginia	1, 385	5, 791, 137	2, 200	3	2	409, 639	2, 969	144, 780	6, 158, 490	6, 866, 313	6, 360, 783	3, 402, 738	305, 160	10, 574, 211	12, 210, 272
Washington	9	42, 300	23	......	......	7, 125	15	1, 005	57, 168	57, 465	44, 468	27, 040	3, 305	87, 810	114, 086
West Virginia	472	1, 777, 297	742	1	1	140, 508	989	51, 512	2, 279, 319	2, 374, 582	1, 923, 985	945, 411	61, 804	3, 384, 797	3, 942, 818
Wisconsin	705	9, 199, 735	2, 418	......	3	861, 302	2, 292	225, 405	19, 616, 905	19, 536, 604	9, 698, 086	3, 979, 315	791, 063	24, 306, 982	27, 639, 430
Wyoming	1	7, 000	3	......	......	150	1	150	3, 000	3, 600	200	140	....	3, 740	4, 790

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

GLASS.

(See Report by Special Agent Joseph D. Weeks, *post.*)

HOSIERY AND KNIT GOODS.

(See Report by Special Agent George W. Bond, *post.*)

IRON AND STEEL.

(See Report by Special Agent James M. Swank, *post.*)

7.—LEATHER, TANNED.

States and Territories.	Number of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	MATERIALS.						PRODUCTS.		
			Males above 16 years.	Females above 15 years.	Children and youths.		Hemlock bark.	Oak bark.	Value of sumac and other materials.	Hides.	Skins.	Total value of all materials.	Sides of leather.	Skins.	Total value of products.
		Dollars.				*Dollars.*	*Tons.*	*Tons.*	*Dollars.*	*Number.*	*Number.*	*Dollars.*	*Number.*	*Number.*	*Dollars.*
The United States	3, 105	50, 222, 054	23, 287	188	337	9, 204, 243	1, 101, 526	353, 245	707, 465	11, 773, 171	19, 936, 658	85, 949, 207	23, 546, 342	19, 917, 653	113, 348, 336
Alabama	82	86, 876	129	......	7	24, 658	11	3, 591	....	44, 308	15, 073	127, 742	88, 616	15, 073	212, 545
Arkansas	6	7, 683	8	......	......	2, 097	....	222	....	2, 450	330	5, 797	4, 900	330	12, 300
California	77	1, 746, 750	615	1	11	344, 017	103	22, 066	....	254, 624	1, 314, 215	2, 746, 263	509, 248	1, 314, 215	3, 738, 723
Colorado	3	16, 700	13	1	......	9, 000	....	....	6, 050	4, 100	15, 100	38, 300	8, 200	15, 100	55, 800
Connecticut	11	50, 600	49	......	......	16, 062	472	919	....	11, 950	24, 625	107, 005	23, 900	24, 625	146, 750
Delaware	3	2, 800	4	......	......	650	....	130	....	1, 400	195	4, 700	2, 800	190	7, 000
District of Columbia	1	9, 500	2	......	......	400	....	30	....	115	1, 561	3, 365	230	1, 561	4, 284
Georgia	94	143, 441	150	......	2	32, 244	14	6, 034	....	74, 649	21, 325	197, 943	149, 298	21, 325	323, 807
Idaho	2	1, 850	1	......	......	500	35	....	....	400	475	1, 816	800	475	2, 612
Illinois	34	2, 220, 114	1, 113	99	29	599, 028	50, 762	137	4, 700	395, 030	1, 486, 570	4, 160, 113	790, 060	1, 483, 570	5, 402, 070
Indiana	105	653, 349	296	......	7	108, 761	1, 856	18, 633	....	152, 375	57, 602	971, 201	304, 750	57, 602	1, 266, 653
Iowa	10	14, 575	12	1	2	4, 327	....	108	2, 375	2, 470	12, 025	24, 099	4, 940	12, 025	43, 974
Kansas	2	1, 167	3	......	......	1, 126	20	70	....	980	150	5, 175	1, 960	150	7, 452
Kentucky	63	1, 741, 430	516	1	11	204, 345	....	31, 107	....	211, 097	213, 840	1, 799, 047	422, 194	213, 840	2, 511, 960
Louisiana	10	9, 300	13	......	2	2, 941	....	270	....	3, 412	13, 280	14, 984	6, 824	13, 280	28, 470
Maine	83	2, 459, 700	1, 387	......	6	464, 904	93, 406	180	15, 735	879, 160	2, 202, 158	5, 535, 427	1, 758, 820	2, 202, 158	7, 100, 967
Maryland	63	802, 343	378	9	5	127, 164	75	24, 733	9, 191	137, 667	286, 250	1, 039, 586	275, 334	286, 250	1, 468, 591
Massachusetts	133	2, 712, 130	2, 408	......	32	1, 093, 973	107, 324	74	408, 956	1, 625, 344	5, 724, 897	11, 320, 288	3, 250, 688	5, 724, 897	13, 556, 721
Michigan	66	1, 081, 489	458	3	......	222, 228	21, 139	1, 205	1, 474	184, 011	341, 793	1, 450, 559	368, 022	331, 793	2, 029, 653
Minnesota	6	32, 450	26	......	......	13, 910	1, 724	....	460	16, 716	7, 046	86, 853	33, 432	7, 046	111, 000
Mississippi	34	37, 690	54	......	1	12, 688	22	1, 650	595	21, 020	9, 225	66, 995	42, 040	9, 225	106, 260
Missouri	26	137, 850	107	3	8	43, 817	1, 639	3, 190	14, 705	41, 419	152, 313	321, 805	82, 838	150, 313	435, 072
New Hampshire	53	603, 450	445	18	......	199, 146	34, 968	....	1, 600	281, 490	404, 341	1, 732, 564	562, 980	404, 341	2, 315, 616
New Jersey	55	1, 810, 050	1, 227	4	69	716, 599	11, 332	14, 675	60, 923	369, 667	1, 783, 647	5, 262, 747	739, 334	1, 783, 647	6, 748, 094
New York	386	11, 710, 415	4, 991	34	65	1, 819, 742	334, 084	6, 624	157, 901	2, 503, 855	4, 171, 290	18, 014, 683	5, 007, 710	4, 169, 690	23, 652, 366
North Carolina	133	183, 659	219	......	1	37, 846	29	6, 154	600	82, 661	20, 750	222, 068	167, 322	20, 750	367, 920
Ohio	302	2, 022, 990	912	1	14	373, 595	5, 775	42, 274	8, 050	456, 015	434, 732	3, 247, 592	912, 030	432, 707	4, 357, 273
Oregon	16	36, 465	16	......	3	9, 212	573	240	....	8, 961	5, 916	38, 694	17, 922	5, 916	65, 767
Pennsylvania	642	15, 608, 635	5, 541	12	39	1, 967, 946	379, 069	122, 550	8, 500	2, 970, 680	635, 280	19, 716, 236	5, 941, 360	635, 155	27, 042, 068
Rhode Island	4	368, 600	113	......	......	55, 694	7, 375	....	....	106, 777	....	509, 370	213, 554	....	638, 000
South Carolina	28	42, 675	61	......	......	9, 120	....	1, 605	75	20, 967	4, 705	47, 225	41, 934	4, 705	73, 597
Tennessee	147	470, 075	333	......	12	86, 988	15	15, 085	....	159, 524	66, 909	1, 041, 605	319, 048	66, 909	1, 504, 660
Texas	28	31, 850	38	......	1	7, 411	....	825	1, 260	10, 920	6, 016	39, 030	21, 840	5, 791	63, 750
Utah	13	43, 200	22	......	4	9, 768	322	81	50	5, 046	4, 952	27, 331	10, 092	4, 952	47, 267
Vermont	53	433, 300	184	......	1	62, 461	12, 264	....	120	125, 232	176, 250	838, 426	250, 464	176, 250	1, 084, 503
Virginia	163	658, 973	328	......	1	80, 251	69	11, 662	750	125, 438	30, 628	706, 333	250, 876	30, 603	1, 011, 830
Washington	2	14, 250	4	......	......	3, 075	210	....	....	2, 400	900	19, 260	4, 800	900	27, 000
West Virginia	93	515, 855	296	1	4	99, 338	33	16, 987	3, 000	150, 317	50, 713	1, 089, 620	300, 634	50, 713	1, 451, 528
Wisconsin	73	1, 697, 825	815	......	......	337, 211	36, 806	134	395	327, 524	239, 581	3, 367, 360	655, 048	239, 581	4, 324, 433

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

8.—LEATHER, CURRIED.

States and Territories.	Number of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	MATERIALS.				PRODUCTS.		
			Males above 16 years.	Females above 15 years.	Children and youths.		Sides of leather.	Skins.	Oil.	Total value of all materials.	Sides of leather.	Skins.	Total value of products.
		Dollars.				*Dollars.*	*Number.*	*Number.*	*Gallons.*	*Dollars.*	*Number.*	*Number.*	*Dollars.*
The United States.	2, 319	16, 878, 520	10, 808	77	168	4, 845, 413	12, 464, 299	10, 655, 606	3, 385, 719	59, 306, 509	12, 464, 299	10, 655, 606	71, 351, 29
Alabama	63	32, 354	48	......	2	8, 291	33, 146	12, 307	4, 742	88, 033	33, 146	12, 307	130, 12
Arkansas	4	2, 417	3	......	......	942	1, 900	350	220	5, 470	1, 900	350	7, 650
California	63	427, 350	229	......	2	132, 629	266, 054	466, 450	70, 013	1, 683, 021	266, 054	466, 450	2, 001, 850
Colorado	3	16, 700	13	1	.....	8, 500	7, 100	15, 100	4, 425	53, 250	7, 100	15, 100	90, 550
Connecticut	8	29, 300	16	......	......	6, 863	10, 100	11, 825	3, 333	70, 170	10, 100	11, 825	86, 950
Delaware	4	14, 800	12	......	......	3, 981	11, 400	190	2, 260	57, 125	11, 400	190	67, 300
District of Columbia	1	500	1	......	......	25	100	60	40	645	100	60	880
Georgia	79	60, 009	89	......	2	18, 040	83, 871	14, 830	10, 743	190, 753	83, 871	14, 830	296, 150
Idaho	2	1, 850	1	......	1	500	800	475	120	2, 687	800	475	3, 949
Illinois	18	534, 786	247	......	1	141, 096	251, 660	431, 920	81, 526	1, 967, 255	251, 660	431, 920	2, 391, 380
Indiana	93	381, 552	181	......	1	66, 080	276, 760	37, 181	59, 628	1, 192, 434	276, 760	37, 181	1, 462, 776
Iowa	10	12, 455	12	......	1	3, 417	6, 340	7, 002	1, 735	47, 020	6, 340	7, 002	61, 611
Kansas	1	333	1	......	......	200	200	50	30	1, 361	200	50	1, 813
Kentucky	46	169, 400	112	......	......	33, 263	131, 461	14, 185	31, 339	554, 247	131, 461	14, 185	687, 883
Louisiana	4	3, 050	3	......	......	1, 028	2, 440	13, 075	424	16, 342	2, 440	13, 075	20, 366
Maine	34	510, 900	262	10	2	99, 094	518, 850	232, 558	105, 961	2, 290, 310	518, 850	232, 558	2, 612, 350
Maryland	48	169, 127	103	......	2	36, 596	78, 220	59, 372	18, 394	388, 608	78, 220	59, 372	508, 458
Massachusetts	194	4, 308, 169	4, 209	10	32	1, 939, 122	4, 951, 562	5, 178, 609	1, 316, 491	19, 547, 978	4, 951, 562	5, 178, 609	23, 282, 775
Michigan	44	256, 311	113	3	......	51, 950	161, 308	63, 351	33, 226	812, 065	161, 308	63, 351	996, 932
Minnesota	6	25, 650	23	......	.....	12, 160	33, 432	7, 046	7, 975	116, 925	33, 432	7, 046	141, 685
Mississippi	26	26, 300	29	......	1	6, 860	27, 515	7, 770	4, 500	74, 103	27, 515	7, 770	102, 436
Missouri	15	72, 500	66	......	......	22, 804	64, 428	13, 794	15, 616	276, 034	64, 428	13, 794	336, 623
New Hampshire	37	351, 850	260	17	......	114, 709	435, 450	339, 466	162, 699	1, 824, 797	435, 450	339, 466	2, 161, 734
New Jersey	56	1, 983, 746	1, 283	27	78	762, 697	818, 804	1, 703, 316	262, 863	7, 090, 270	818, 804	1, 703, 316	8, 727, 128
New York	185	1, 720, 356	884	......	16	366, 426	1, 048, 581	639, 772	304, 087	5, 210, 852	1, 048, 581	639, 772	6, 192, 002
North Carolina	97	66, 731	85	......	4	13, 590	64, 078	12, 606	9, 854	132, 817	64, 078	12, 606	196, 302
Ohio	251	1, 089, 075	563	5	4	234, 209	632, 615	256, 054	183, 724	3, 141, 024	632, 615	256, 054	3, 886, 627
Oregon	11	19, 135	12	......	......	5, 638	17, 372	4, 616	3, 025	61, 815	17, 372	4, 616	89, 577
Pennsylvania	455	2, 570, 969	827	4	15	334, 950	1, 272, 931	404, 874	319, 067	6, 639, 432	1, 272, 931	404, 874	7, 852, 177
Rhode Island	[illegible]	71, 400	29	......	......	15, 476	66, 154	16, 200	12, 440	186, 250	66, 154	16, 200	227, 125
South Carolina	22	8, 400	21	......	......	2, 452	17, 809	3, 245	2, 340	32, 602	17, 809	3, 245	43, 520
Tennessee	113	154, 185	118	......	2	27, 700	119, 311	17, 271	21, 434	452, 774	119, 311	17, 271	546, 427
Texas	21	22, 150	14	......	1	3, 924	14, 344	4, 301	2, 355	46, 017	14, 344	4, 301	62, 535
Utah	12	26, 300	14	......	......	5, 556	7, 118	4, 352	1, 886	40, 171	7, 118	4, 352	59, 088
Vermont	24	113, 950	63	......	......	22, 245	129, 425	13, 890	44, 127	457, 632	129, 425	13, 890	530, 337
Virginia	123	89, 750	91	......	......	13, 893	59, 420	15, 797	10, 497	173, 051	59, 420	15, 797	232, 989
Washington	2	5, 750	2	......	......	1, 225	4, 100	900	1, 400	24, 500	4, 100	900	29, 500
West Virginia	80	229, 535	112	......	......	45, 810	103, 340	48, 995	21, 198	586, 755	103, 340	48, 995	725, 010
Wisconsin	61	1, 209, 425	657	......	1	281, 412	734, 800	582, 451	249, 982	3, 769, 914	734, 800	582, 451	4, 496, 729

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

9.—LUMBER, SAWED.

	States and Territories.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Wages paid during the year.	MATERIALS.		
				Males above 16 years.	Females above 15 years.	Children and youths.		Value of logs.	Value of mill supplies.	Total value of all materials.
	The United States	25, 708	*Dollars.* 181, 186, 122	141, 564	425	5, 967	*Dollars.* 31, 845, 974	*Dollars.* 139, 836, 869	*Dollars.* 6, 318, 516	*Dollars.* 146, 155, 385
1	Alabama	354	1, 545, 655	1, 611	....	36	424, 156	1, 517, 986	90, 649	1, 608. 635
2	Arizona	13	102, 450	77	....	2	33, 375	126, 486	5, 300	131, 786
3	Arkansas	319	1, 067, 840	1, 690	....	54	237, 394	1, 009, 954	60, 441	1, 070, 395
4	California	251	6, 454, 718	3, 423	....	11	1, 095, 736	2, 055, 635	186, 868	2, 242, 503
5	Colorado	96	481, 200	870	....	7	112, 931	654, 500	45, 794	700, 294
6	Connecticut	300	657, 300	699	....	8	178, 336	609, 024	32, 545	641, 569
7	Dakota	39	113, 750	286	....	4	54, 974	269, 235	12, 640	281, 875
8	Delaware	86	259, 250	378	....	13	40, 694	229, 763	13, 612	243, 375
9	District of Columbia	1	25, 000	25	....	....	6, 000	32, 000	2, 000	34, 000
10	Florida	135	2, 219, 550	1, 945	....	85	562, 249	1, 763, 617	103, 596	1, 867, 213
11	Georgia	655	3, 101, 452	3, 298	....	94	554, 085	3, 049, 435	147, 720	3, 197, 155
12	Idaho	48	192, 460	169	....	4	33, 367	213, 691	16, 875	230, 566
13	Illinois	640	3, 295, 483	3, 652	....	199	787, 867	2, 959, 537	185, 368	3, 144, 905
14	Indiana	2, 022	7, 048, 088	9, 926	....	413	1, 571, 740	9, 290, 428	336, 669	9, 627, 097
15	Iowa	328	4, 946, 390	2, 526	....	463	825, 244	4, 023, 661	118, 224	4, 141, 885
16	Kansas	146	262, 975	507	....	9	66, 757	421, 738	25, 711	447, 449
17	Kentucky	670	2, 290, 558	2, 506	1	94	671, 939	2, 238, 888	171, 855	2, 410, 743
18	Louisiana	175	903, 950	943	....	33	200, 063	1, 106, 280	80, 779	1, 187, 059
19	Maine	848	6, 339, 396	6, 480	....	183	1, 161, 142	4, 754, 613	197, 344	4, 951, 957
20	Maryland	369	1, 237, 694	1, 216	....	23	223, 786	1, 041, 836	64, 959	1, 106, 795
21	Massachusetts	606	2, 480, 340	1, 940	....	30	431, 612	1, 827, 497	76, 608	1, 904, 105
22	Michigan	1, 649	39, 260, 428	22, 732	143	1, 360	6, 967, 905	30, 819, 003	1, 432, 369	32, 251, 372
23	Minnesota	234	6, 771, 145	2, 732	22	100	924, 473	4, 408, 468	120, 587	4, 529, 055
24	Mississippi	295	922, 595	1, 123	....	47	197, 867	1, 190, 902	28, 214	1, 219, 116
25	Missouri	881	2, 867, 970	3, 408	....	95	669, 644	3, 113, 049	102, 243	3, 215, 292
26	Montana	36	208, 200	142	....	....	47, 945	257, 320	20, 778	278, 098
27	Nebraska	38	93, 375	136	....	4	29, 313	153, 823	11, 055	164, 878
28	Nevada	9	132, 000	35	....	....	9, 892	151, 790	11, 020	162, 810
29	New Hampshire	680	3, 745, 790	3, 056	....	48	548, 556	2, 159, 461	113, 530	2, 272, 991
30	New Jersey	284	1, 657, 395	760	....	8	179, 693	942, 752	47, 227	989, 979
31	New Mexico	26	74, 675	172	....	....	24, 240	100, 145	16, 910	117, 055
32	New York	2, 822	13, 230, 934	11, 056	....	389	2, 162, 972	8, 628, 874	490, 389	9, 119, 263
33	North Carolina	776	1, 743, 217	2, 938	....	91	447, 431	1, 490, 616	86, 523	1, 577, 139
34	Ohio	2, 352	7, 944, 412	8, 769	....	548	1, 708, 300	8, 603, 127	292, 979	8, 896, 106
35	Oregon	228	1, 577, 875	566	....	13	242, 154	1, 294, 703	36, 639	1, 331, 342
36	Pennsylvania	2, 827	21, 418, 588	14, 443	8	463	2, 918, 459	13, 378, 589	576, 841	13, 955, 430
37	Rhode Island	49	144, 250	139	....	13	33, 143	116, 085	4, 803	120, 888
38	South Carolina	420	1, 056, 265	1, 431	....	37	221, 963	1, 170, 088	67, 273	1, 237, 361
39	Tennessee	755	2, 004, 503	3, 577	....	141	549, 222	2, 006, 124	136, 761	2, 142, 885
40	Texas	324	1, 660, 952	3, 136	1	49	732, 914	1, 909, 794	186, 981	2, 096, 775
41	Utah	107	272, 750	375	....	10	65, 175	216, 619	21, 655	238, 274
42	Vermont	688	3, 274, 250	2, 411	....	100	426, 953	1, 939, 775	82, 093	2, 021, 868
43	Virginia	907	2, 122, 925	3, 922	....	89	540, 231	1, 864, 288	119, 489	1, 983, 777
44	Washington	37	2, 456, 450	495	....	4	200, 539	1, 174, 005	14, 070	1, 188, 075
45	West Virginia	472	1, 668, 920	2, 057	....	126	459, 945	1, 307, 843	67, 529	1, 375, 372
46	Wisconsin	704	19, 824, 059	7, 748	250	467	2, 257, 218	12, 219, 097	252, 376	12, 471, 473
47	Wyoming	7	26, 700	38	....	....	6, 380	24, 725	2, 625	27, 350

10.—MIXED TEXTILES.

	States.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.
				Males above 16 years.	Females above 15 years.	Children and youths.	
	The United States	470	*Dollars.* 37, 996, 057	17, 471	20, 520	5, 382	*Dollars.* 13, 316, 753
1	California	2	9, 500	11	14	10	9, 700
2	Connecticut	43	3, 203, 234	1, 721	952	275	988, 848
3	Delaware	2	20, 000	27	11	4	12, 476
4	Illinois	3	57, 000	36	122	17	39, 650
5	Indiana	5	685, 000	208	215	134	209, 327
6	Kentucky	5	615, 000	137	210	161	135, 948
7	Maine	15	1, 290, 380	487	451	133	357, 595
8	Maryland	3	4, 900	6	11	5	4, 000
9	Massachusetts	69	7, 166, 800	3, 668	3, 345	485	2, 528, 476
10	New Hampshire	20	1, 321, 400	653	581	284	494, 945
11	New Jersey	10	1, 577, 870	521	906	343	526, 770
12	New York	134	7, 902, 150	3, 369	5, 722	1, 326	3, 049, 305
13	Ohio	5	20, 200	20	45	10	14, 650
14	Pennsylvania	126	11, 536, 818	5, 361	6, 971	1, 936	4, 223, 662
15	Rhode Island	16	1, 591, 000	817	663	163	488, 068
16	Tennessee	1	35, 000	15	8	5	7, 500
17	Vermont	7	776, 000	361	253	82	190, 775
18	Virginia	2	83, 000	28	17	....	10, 000
19	Wisconsin	2	100, 805	25	23	9	19, 048

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

9.—LUMBER, SAWED.

PRODUCTS.								
Lumber (board measure).	Laths.	Shingles.	Staves.	Sets of headings.	Spool and bobbin stock (board measure).	Value of all other products.	Total value of all products.	
Feet. 18,091,356,000	*Number.* 1,761,788,000	*Number.* 5,555,046,000	*Number.* 1,248,226,000	*Number.* 146,523,000	*Feet.* 34,076,000	*Dollars.* 2,682,668	*Dollars.* 233,268,729	
251,851,000	14,147,000	5,427,000	2,357,000	437,000	....	....	2,649,634	1
10,715,000	150,000	1,760,000	300,000	....	....	1,010	215,918	2
172,503,000	6,527,000	61,758,000	1,640,000	350,000	....	....	1,793,848	3
304,795,000	2,420,000	138,718,000	2,063,000	1,203,000	....	3,000	4,428,950	4
63,792,000	4,925,000	27,214,000	....	....	....	700	1,051,295	5
64,427,000	1,719,000	7,192,000	270,000	12,000	33,000	12,930	1,076,475	6
29,286,000	564,000	4,823,000	....	....	....	500	435,792	7
31,572,000	317,000	506,000	4,510,000	550,000	....	....	411,060	8
4,000,000	1,000,000	....	....	....	....	2,000	50,000	9
247,627,000	20,101,000	3,061,000	791,000	110,000	....	13,999	3,060,291	10
451,788,000	17,438,000	25,332,000	2,014,000	964,000	4,000	3,975	4,875,310	11
18,204,000	750,000	4,235,000	....	....	....	60,200	349,635	12
334,244,000	25,977,000	15,306,000	24,443,000	1,385,000	30,000	16,807	5,063,037	13
915,943,000	28,031,000	26,634,000	283,071,000	26,389,000	1,957,000	145,750	14,260,830	14
412,578,000	79,924,000	128,100,000	5,335,000	650,000	....	38,343	6,185,628	15
45,281,000	25,000	835,000	....	....	150,000	3,400	682,697	16
305,684,000	26,856,000	25,253,000	23,148,000	8,174,000	383,000	75,655	4,064,361	17
133,472,000	7,745,000	30,195,000	220,000	33,000	....	15,470	1,764,640	18
566,656,000	184,820,000	426,530,000	62,376,000	3,312,000	13,426,000	182,618	7,933,868	19
123,336,000	7,955,000	4,429,000	16,227,000	....	....	149,894	1,813,332	20
205,244,000	16,947,000	19,667,000	21,062,000	1,860,000	572,000	44,395	3,120,184	21
4,172,572,000	461,805,000	2,584,717,000	199,821,000	21,897,000	6,038,000	531,406	52,449,928	22
563,974,000	88,088,000	194,566,000	7,825,000	547,000	....	21,100	7,366,038	23
168,747,000	7,908,000	5,355,000	60,000	....	....	5,349	1,920,335	24
399,744,000	20,839,000	8,832,000	21,426,000	3,363,000	....	7,097	5,265,617	25
21,420,000	2,620,000	9,627,000	....	....	....	1,900	527,695	26
13,585,000	....	....	....	....	....	1,100	265,062	27
21,545,000	....	485,000	....	....	....	....	248,200	28
292,267,000	49,454,000	67,086,000	31,354,000	3,491,000	3,072,000	58,612	3,842,012	29
109,679,000	8,948,000	10,717,000	40,000	155,000	883,000	40,385	1,627,640	30
11,195,000	107,000	722,000	20,000	....	....	....	173,930	31
1,184,220,000	79,399,000	305,711,000	62,654,000	22,136,000	1,003,000	285,263	14,356,910	32
241,822,000	13,340,000	8,707,000	45,000	571,000	1,253,000	7,195	2,672,796	33
910,832,000	50,625,000	24,876,000	214,245,000	25,779,000	25,000	196,788	13,864,460	34
177,171,000	18,245,000	5,040,000	....	....	....	10,500	2,030,463	35
1,733,844,000	183,740,000	288,561,000	80,062,000	10,401,000	326,000	393,044	22,457,359	36
8,469,000	10,000	1,986,000	365,000	....	3,700,000	174	240,579	37
185,772,000	23,133,000	10,036,000	385,000	93,000	....	41,700	2,031,507	38
302,673,000	21,275,000	14,205,000	4,342,000	570,000	6,000	72,998	3,714,905	39
328,968,000	14,131,000	112,523,000	....	140,000	....	10,350	3,673,449	40
25,709,000	1,583,000	9,293,000	....	....	....	1,765	375,164	41
322,942,000	19,745,000	55,711,000	13,219,000	1,572,000	415,000	2,575	3,258,816	42
315,939,000	14,402,000	8,223,000	14,333,000	929,000	800,000	30,355	3,434,163	43
160,176,000	6,550,000	3,610,000	23,666,000	....	....	....	1,734,742	44
180,112,000	12,071,000	3,695,000	41,992,000	1,952,000	....	40,195	2,431,857	45
1,542,021,000	215,132,000	862,922,000	82,545,000	7,498,000	....	152,171	17,952,347	46
2,960,000	300,000	865,000	....	....	....	....	40,990	47

10.—MIXED TEXTILES.

MATERIALS.										Total value of all products.	
Chemicals.	Textiles.			Wood.	Value.	Coal.	Value.	All other materials.	Total value of all materials.		
	Wool.	Cotton yarns.	Silk.								
Dollars. 1,495,845	*Dollars.* 17,636,639	*Dollars.* 10,571,606	*Dollars.* 3,178,128	*Cords.* 34,712	*Dollars.* 108,655	*Tons.* 134,362	*Dollars.* 557,797	*Dollars.* 3,679,071	*Dollars.* 37,227,741	*Dollars.* 66,221,703	
......	2,000	1,500	7,645	....	....	....	....	250	11,395	22,350	1
135,761	2,002,140	653,162	4,600	7,664	24,966	13,538	74,792	249,822	3,145,246	5,919,505	2
290	5,400	8,600	....	363	876	20	120	5,629	20,915	56,270	3
2,000	67,520	58,100	25,185	50	87	600	1,150	12,000	166,042	227,600	4
6,780	306,181	94,234	....	1,725	3,562	3,785	9,450	82,845	503,052	918,150	5
12,156	343,273	151,599	....	210	425	3,195	11,540	60,183	579,176	869,329	6
47,709	858,547	245,824	....	4,981	13,987	1,250	6,850	65,330	1,238,247	1,909,937	7
....	2,180	800	4,870	....	....	....	....	....	7,850	20,240	8
409,322	4,189,749	1,607,095	348,482	5,680	18,464	28,401	140,352	857,421	7,570,885	13,043,829	9
42,904	941,972	233,517	25,054	6,465	21,002	1,752	9,105	183,093	1,456,647	2,703,281	10
3,720	88,302	138,925	534,995	20	60	3,108	9,645	33,391	829,038	1,906,680	11
180,370	1,902,864	2,300,994	1,581,222	939	2,588	18,289	79,425	888,095	6,935,558	13,376,380	12
....	700	1,250	1,165	....	....	10	40	25,165	28,320	80,970	13
542,674	5,292,128	4,585,429	624,910	1,041	6,159	53,239	177,928	972,800	12,202,028	20,882,764	14
81,636	832,252	344,645	....	3,129	10,179	4,272	21,340	170,047	1,520,099	2,718,822	15
1,200	38,250	11,580	....	750	950	....	....	800	52,780	79,000	16
23,820	626,200	114,890	....	1,240	4,225	2,700	15,200	61,575	845,910	1,277,903	17
3,000	45,000	5,800	....	450	1,100	20	60	3,100	58,060	108,500	18
2,500	31,981	13,662	....	5	25	183	800	7,525	56,493	106,243	19

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

11.—PAPER.

NOTE.—In addition to the 692 establishments engaged in the paper manufacture proper, and forming the subject of this table, Table II contains an account of 8 establishments engaged in the manufacture of cardboard, 24 establishments in the manufacture of leather board, 25 establishments in the manufacture of paper-hangings, and 50 establishments in the manufacture of wood pulp, not to mention establishments manufacturing collars and cuffs (paper) and envelopes.

States and Territories.	No. of establishments.	Capital.	Average number of hands employed.			Total amount paid in wages during the year.	Materials.										
			Males above 16 years.	Females above 15 years.	Children and youths.		Rags.	Old paper.	Cotton waste.	Manila stock.	Straw.	Corn stock.	Esparto grass.	Value of all chemicals.	Value of all other materials.	Value of pulp purchased.	Total value of all materials.
		Dollars.				*Dollars.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*
The United States.	692	46,241,202	16,133	7,640	649	8,525,355	187,917	87,840	12,088	84,786	245,838	954	264	3,628,798	7,039,497	1,681,762	33,951,297
California	6	610,000	156	5	3	87,622	865	562		512	4,125			56,085	61,738	6,000	241,015
Colorado	1	25,000	14	1	5	6,000	100	40		35	300			1,000	1,000		10,350
Connecticut	65	3,168,931	1,173	478	51	656,000	15,580	10,810	625	9,698	2,304	150		265,387	446,487	125,950	2,761,316
Delaware	4	2,508,000	179	67	6	112,666	4,405	1,479	75	40				38,482	89,890	231,692	582,154
District of Columbia	1	35,000	20	8		7,497		400		200				3,120	9,400		44,520
Georgia	7	255,000	102	41	7	31,668	700	81	20	1,051				13,636	5,257	500	149,563
Illinois	23	1,246,000	646	82	41	293,144	1,667	2,574	40	1,025	42,237			103,395	261,850	29,025	884,688
Indiana	19	875,000	291	167	26	166,628	4,622	1,685	445	541	8,325			108,525	174,410	28,250	741,793
Iowa	4	305,000	118	29	5	59,235	75	104		5	7,171			5,360	33,670		82,135
Kansas	1	22,000	6	3		584	20	1		1	40			150	150		1,450
Kentucky	2	600,000	172	113	10	82,460	3,266	906	195	280	2,630			68,455	19,000	20,647	363,070
Maine	12	1,995,000	753	314		325,691	10,383	1,960	822	1,712	100			93,554	355,925	109,126	1,347,509
Maryland	25	475,048	298	121	46	119,876	1,842	4,027	325	2,204	7,577			82,168	183,125	14,350	738,140
Massachusetts	96	11,722,046	3,523	3,563	62	2,467,359	62,922	14,910	2,686	13,861	5,312	72	23	640,280	1,970,334	316,881	9,213,221
Michigan	21	1,033,338	428	132	29	214,812	6,568	1,258	57	359	15,285			106,514	93,376	62,325	730,614
Minnesota	2	310,000	61	22		34,000	1,300	200		200	1,200			15,800	27,350	15,600	118,150
Nebraska	1	40,000	13		3	1,561					250			150	200		2,350
New Hampshire	25	1,197,000	497	202	3	249,612	4,435	3,156	1,387	3,372	2,905			104,252	245,635	15,100	1,131,425
New Jersey	32	1,830,500	670	139	33	272,936	3,363	5,154	587	11,393	1,210		1	120,526	173,283	48,666	1,286,182
New York	168	6,859,565	2,929	751	134	1,217,580	19,083	15,709	1,402	15,400	76,191	200	240	726,463	1,115,926	266,219	5,579,525
North Carolina	4	129,500	47	29	4	20,860	1,125	10	6	5	8			9,200	15,200		88,200
Ohio	60	4,804,274	1,684	527	97	839,231	20,012	8,583	588	10,554	36,129	514		345,840	558,979	129,937	3,024,068
Oregon	1	12,000	18			8,888	116	40		110	200			3,400	6,000		20,360
Pennsylvania	78	4,099,000	1,481	555	47	752,151	16,678	11,411	1,324	4,841	15,133	18		518,364	892,541	198,169	3,185,168
Tennessee	1	20,500	5	5	10	3,250	30	21	4	2	6			35	6,125		12,600
Utah	1	5,000	4	2		3,000	120	15		15				640	350		8,000
Vermont	13	785,500	283	92	2	189,889	770	2,562	1,500	4,130	675			65,129	97,302	31,725	556,667
Virginia	3	170,000	87	26	2	40,000	1,050	100		250	2,600			22,014	29,300		128,014
West Virginia	3	160,000	74	1	3	25,200				990	4,400			19,900	15,000		145,900
Wisconsin	13	943,000	401	165	20	235,955	6,820	82		2,000	9,525			90,954	150,703	31,600	773,150

States and Territories.	Products.									
	Printing paper.	Writing paper.	Wrapping paper.	Binders' board.	Wall paper.	Colored paper.	Bank-note paper.	Tissue paper.	All other paper.	Total value of all products.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Dollars.*
The United States.	149,177	32,937	134,294	20,014	14,737	14,756,268	296,000	8,125,957	178,719,831	55,109,914
California	1,284		2,588	60	10	10,000			300,695	386,197
Colorado	30		285							27,300
Connecticut	8,213	2,218	6,491	2,562	450	2,838,040		1,459,148	10,163,137	4,337,550
Delaware	6,775					500,000		50,000		737,905
District of Columbia	320		160							70,400
Georgia	441		895							221,572
Illinois	2,398		18,374	1,400					12,168,000	1,679,692
Indiana	5,525	600	2,819	600		80,000		360,000	3,327,228	1,112,660
Iowa			1,695					5,000	5,570,000	193,075
Kansas	1		26							3,050
Kentucky	3,775									619,422
Maine	10,619		1,166		100	420,000			1,170,000	2,170,321
Maryland	2,977		5,527	270	510					1,028,591
Massachusetts	27,638	24,746	10,255	600	945	3,706,010	255,000	878,000	27,607,706	15,188,196
Michigan	5,521		4,985	450		408,000	31,000		4,331,216	1,204,664
Minnesota	885		1,000						600,000	183,900
Nebraska			100							5,000
New Hampshire	5,480	450	2,680	200	480	1,180,000		470,000	7,604,000	1,731,170
New Jersey	1,089	511	7,964	4,209	524	536,000		955,776	1,887,262	2,015,569
New York	23,077	2,780	36,295	2,835	8,929	595,381		1,224,137	32,365,518	8,524,279
North Carolina	360	25	22	5		15,000			580,000	145,000
Ohio	13,113	384	19,953	3,296		2,995,000		8,000	27,619,719	5,108,194
Oregon	100		130						160,000	43,100
Pennsylvania	20,234	1,223	4,799	3,527	1,101	872,837	10,000	465,896	20,240,850	5,355,912
Tennessee	82		45							17,975
Utah	60		15						202,500	12,000
Vermont	2,620				1,688			1,850,000	6,922,000	1,237,484
Virginia	780							400,000	3,400,000	261,000
West Virginia			500						5,100,000	211,000
Wisconsin	5,780		5,525			600,000			7,400,000	1,277,736

TABLE VII—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

12.—SALT.

States and Territories.	Number of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	SUBTERRANEAN BRINES.			BY ARTIFICIAL HEAT.									
										Machines.									
			Males above 16 years.	Females above 15 years.	Children and youths.		Wells.	Average depth of wells.	Average strength of brine (degrees salometer). (*a*)	Blocks or furnaces.	Kettles.	Aggregate capacity.	Pans.	Aggregate capacity.	Settlers.	Aggregate capacity.	Grainers.	Aggregate capacity.
		Dollars.				*Dollars.*	*No.*	*Feet.*		*No.*	*No.*	*Gallons.*	*No.*	*Gallons.*	*No.*	*Gallons.*	*No.*	*Gallons.*
The United States	268	8,225,740	4,125	20	144	1,260,023	546	......	......	308	9,345	1,187,507	1,058	668,207	661	19,736,670	527	5,178,718
California (*b*)	25	375,650	188	......	......	50,620	......	......	......	2	56	6,750	2	500	......	......	......	......
Kansas	1	6,000	2	......	......	700	1	93	24.0	......	......	......	......	......	......	......	......	......
Kentucky	3	20,500	34	......	......	8,750	3	560	34.0	3	78	7,600	4	3,040	2	15,484	1	12,791
Louisiana (*c*)	1	250,000	45	......	......	11,000	......	......	......	......	......	......	......	......	......	......	......	......
Massachusetts (*b*)	5	9,000	8	......	......	1,030	......	......	......	......	......	......	......	......	......	......	......	......
Michigan	86	2,147,209	1,416	......	52	541,852	209	882	92.3	103	174	21,352	54	231,257	237	6,160,246	355	3,295,527
Nevada	7	45,300	31	3	2	9,688	150	30	12.0	......	......	......	......	......	......	......	......	......
New York	69	2,286,081	962	11	39	274,087	42	322	69.5	134	8,347	1,086,540	......	......	269	10,331,931	......	......
Ohio	25	832,600	449	2	2	105,261	58	912	36.8	26	291	22,265	359	150,632	59	1,202,035	59	561,484
Pennsylvania	16	234,500	131	......	6	52,047	19	883	24.9	16	......	......	21	66,390	21	450,062	24	174,507
Texas	3	92,000	17	1	1	8,150	1	10	......	2	59	5,600	......	......	2	400	9	500
Utah	10	13,400	62	3	8	20,932	4	2	82.5	2	......	......	......	......	......	......	......	......
Virginia	1	1,000,000	76	......	......	14,219	2	272	90.0	4	340	37,400	......	......	......	......	......	......
West Virginia	15	910,500	702	....	34	160,227	57	1,042	35.6	16	......	......	614	215,588	71	1,576,512	79	1,133,909
Wyoming	1	3,000	2	......	......	1,460	......	......	......	......	......	......	4	800	......	......	......	......

States and Territories.	BY ARTIFICIAL HEAT—continued.						BY SOLAR EVAPORATION.			PRODUCTS.	
	Materials.						Machines.				
	Coal.	Value.	Wood.	Value.	Value of all other materials.	Total value of all materials.	Vats or ponds.	Aggregate area.	Total value of materials.	Salt.	Total value of all products.
	Tons.	*Dollars.*	*Cords.*	*Dollars.*	*Dollars.*	*Dollars.*	*Number.*	*Square feet.*	*Dollars.*	*Bushels.*	*Dollars.*
The United States	453,846	492,959	541,179	423,141	1,090,936	2,007,036	47,462	75,253,446	67,013	29,805,298	4,829,566
California (*b*)	13	76	125	300	40	416	203	17,713,602	19,079	884,743	121,650
Kansas	......	......	......	......	......	......	33	60,000	710	13,000	5,700
Kentucky	3,760	3,408	......	......	5,600	9,008	......	......	......	83,000	21,950
Louisiana (*c*)	......	......	......	......	......	......	......	......	......	312,000	56,160
Massachusetts (*b*)	......	......	......	......	......	......	456	316,420	20	9,575	3,800
Michigan	......	......	524,655	377,939	629,294	1,007,233	3,750	867,180	2,500	12,425,885	2,271,913
Nevada	......	......	......	......	......	......	54	543,953	5,800	182,408	92,640
New York	136,843	240,112	......	......	233,004	473,116	42,939	12,068,796	33,904	8,748,203	1,107,760
Ohio	133,470	112,044	207	293	90,206	202,543	......	......	......	2,650,301	363,791
Pennsylvania	55,750	37,141	......	......	36,906	74,047	......	......	......	851,450	177,415
Texas	......	......	2,900	6,400	1,200	7,600	8	16,640	1,500	50,600	29,700
Utah	......	......	400	480	20	500	18	43,645,075	3,500	483,800	60,280
Virginia	......	......	12,000	36,000	3,000	39,000	......	......	......	425,895	127,678
West Virginia	124,010	100,178	162	269	91,666	192,113	......	......	......	2,679,438	380,369
Wyoming	......	......	730	1,460	......	1,460	1	21,780	......	5,000	8,760

a 4° salometer=1° Baumé. *b* Salt made from sea-water. *c* Rock salt mined and ground.

13.—SALT, GROUND.

States.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	MATERIALS.						PRODUCTS.	
			Males above 16 years.	Females above 15 years.	Children and youths.		Coal.	Value.	Wood.	Value.	Value of all other materials.	Total value of all materials.	Salt.	Value.
		Dollars.				*Dollars.*	*Tons.*	*Dollars.*	*Cords.*	*Dollars.*	*Dollars.*	*Dollars.*	*Bushels.*	*Dollars.*
The United States	8	322,900	149	47	8	44,997	1,746	5,743	200	500	274,450	280,693	1,044,600	361,656
California	1	85,000	8	2	2	6,800	......	......	......	......	40,000	40,000	66,600	60,000
Maine	2	1,700	4	......	......	1,300	......	......	......	......	2,750	2,750	8,000	4,750
Michigan	1	7,000	7	7	6	5,000	500	2,500	200	500	16,000	19,000	50,000	30,000
New York	4	229,200	130	38	......	31,897	1,246	3,243	......	......	215,700	218,943	920,000	266,906

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

14.—SHIPBUILDING: A—AGGREGATE.

[See Introductory Notes, page 1.]

	States and Territories.	Boats.	Vessels repaired.	New vessels.	Tonnage of new vessels.	No. of establishments.	Capital.	Average number of hands employed.	Total amount paid in wages on vessels in the ship-yard.
		Number.	Number.	Number.			Dollars.		Dollars.
	The United States	8, 026	16, 507	2, 415	498, 878	2, 188	20, 979, 874	21, 345	12, 713, 813
1	Alabama					1	25, 000	25	22, 500
2	Arkansas			3	300	3	2, 500	25	3, 600
3	California	200		21	7, 361	62	1, 806, 923	534	589, 564
4	Connecticut	280	840	52	11, 473	94	334, 300	500	256, 849
5	Delaware	100		55	31, 123	18	935, 200	1, 576	900, 322
6	Florida	45		13	217	48	30, 750	46	33, 580
7	Georgia			2	539	2	3, 000	4	2, 250
8	Illinois	85		11	1, 397	28	457, 000	465	247, 395
9	Indiana	52		64	26, 524	23	194, 250	312	211, 736
10	Iowa			2	860	1	25, 000	75	37, 000
11	Kansas			1	178	1	1, 000	11	1, 900
12	Kentucky	25		23	2, 130	11	88, 450	157	92, 171
13	Louisiana	80		36	1, 231	38	152, 100	218	113, 526
14	Maine	970	1, 687	88	41, 396	379	811, 750	1, 967	838, 559
15	Maryland	133	712	131	7, 499	166	1, 606, 535	1, 178	657, 789
16	Massachusetts	3, 765	3, 269	39	5, 605	276	1, 765, 450	1, 328	804, 571
17	Michigan	210		69	15, 909	72	476, 775	1, 537	745, 933
18	Minnesota					1	10, 000	16	8, 000
19	Mississippi			3	33	3	2, 500	4	2, 860
20	Missouri			17	3, 451	14	247, 900	293	196, 005
21	Nebraska			1	52	1	300	[illegible]	1, 400
22	New Hampshire	44	8			15	15, 330	26	12, 243
23	New Jersey	134	2, 680	53	7, 455	93	943, 070	930	548, 807
24	New York	1, 221	6, 469	635	76, 418	457	3, 944, 100	4, 661	2, 907, 129
25	North Carolina			8	487	11	15, 400	38	19, 256
26	Ohio	91		55	25, 132	54	423, 050	773	414, 360
27	Oregon			19	2, 162	14	63, 300	85	77, 150
28	Pennsylvania	318		802	204, 507	125	5, 797, 731	3, 298	2, 279, 629
29	Rhode Island	68	840	17	379	22	227, 700	318	194, 662
30	South Carolina			27	1, 615	16	46, 300	94	55, 990
31	Tennessee			1	48	1	500	6	600
32	Texas			16	758	16	23, 350	43	30, 170
33	Vermont			5	550	3	20, 700	12	4, 400
34	Virginia	48	[illegible]	26	514	65	185, 960	146	75, 526
35	Washington	80		14	1, 769	11	33, 000	62	51, 298
36	West Virginia			85	16, 727	19	55, 000	99	51, 510
37	Wisconsin	77		21	3, 079	24	208, 700	474	223, 573

14.—SHIPBUILDING: B—NEW VESSELS.

	States and Territories.	Boats.	Vessels repaired.	New vessels.	Tonnage of new vessels.	No. of establishments.	Capital.	Average number of hands employed.	Total amount paid in wages on vessels in the ship-yard.
	The United States			2, 415	498, 878	640	8, 777, 150	10, 039	5, 616, 071
1	Arkansas			3	300	3	2, 500	25	3, 600
2	California			21	7, 361	13	45, 050	181	199, 485
3	Connecticut			52	11, 473	8	34, 700	211	106, 400
4	Delaware			55	31, 123	12	904, 400	1, 105	623, 997
5	Florida			13	217	13	2, 150	9	7, 030
6	Georgia			2	539	2	3, 000	4	2, 250
7	Illinois			11	1, 397	8	20, 250	50	24, 960
8	Indiana			64	26, 524	16	146, 450	246	172, 186
9	Iowa			2	860	(a)	5, 000	20	11, 000
10	Kansas			1	178	1	1, 000	11	1, 900
11	Kentucky			23	2, 130	5	15, 300	28	16, 721
12	Louisiana			36	1, 231	27	9, 900	34	21, 350
13	Maine			88	41, 396	51	433, 200	1, 390	576, 502
14	Maryland			131	7, 499	37	100, 300	208	96, 405
15	Massachusetts			39	5, 605	26	83, 200	217	116, 560
16	Michigan			69	15, 909	47	178, 600	920	431, 058
17	Mississippi			3	33	2	1, 500	2	1, 360
18	Missouri			17	3, 451	10	59, 900	168	103, 705
19	Nebraska			1	52	1	300	9	1, 400
20	New Jersey			53	7, 455	30	309, 000	227	115, 488
21	New York			635	76, 418	142	736, 250	1, 742	884. 887
22	North Carolina			8	487	6	4, 400	12	5, 056
23	Ohio			55	25, 132	21	214, 350	429	232, 613
24	Oregon			19	2, 162	12	47, 000	64	57, 950
25	Pennsylvania			802	204, 507	58	5, 184, 200	2, 221	1, 525, 120
26	Rhode Island			17	379	2	40, 500	63	38, 000
27	South Carolina			27	1, 615	9	13, 700	54	32, 530
28	Tennessee			1	48	1	500	6	600
29	Texas			16	758	15	18, 050	24	15, 970
30	Vermont			5	550	3	20, 700	12	4, 400
31	Virginia			26	514	20	8, 500	44	20, 180
32	Washington			14	1, 769	8	24, 000	49	37, 898
33	West Virginia			85	16, 727	18	48, 000	87	45, 350
34	Wisconsin			21	3, 079	13	61, 300	167	82, 160

a Included in "Repairing of vessels".

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

14.—SHIPBUILDING: A—AGGREGATE.

[See Introductory Notes, page 1.]

PRINCIPAL MATERIALS.												
Hard pine.	White pine.	White oak.	Knees.	Total quantity of lumber, including other kinds.	Iron.	Yellow metal and brass.	Duck.	Manila rope.	Hemp cordage.	Total value of all materials.	Total value of all products.	
Feet.	*Feet.*	*Feet.*	*Number.*	*Feet.*	*Pounds.*	*Pounds.*	*Yards.*	*Pounds.*	*Pounds.*	*Dollars.*	*Dollars.*	
39,327,372	47,506,048	69,701,360	97,192	179,873,966	125,701,922	7,669,826	4,684,464	1,996,163	1,125,131	19,736,358	36,800,327	
30,000	....	....	....	30,000	40,000	20,000	....	....	....	25,000	60,000	1
32,000	24,000	115,000	....	171,000	176,000	3,100	700	900	....	21,700	28,000	2
....	....	196,000	1,621	6,580,000	2,092,656	1,058,730	151,453	73,840	36,880	959,349	1,797,639	3
2,777,000	604,080	722,900	3,320	4,793,450	1,042,156	60,800	85,870	38,981	41,142	430,425	767,660	4
1,966,500	1,886,500	2,217,800	4,651	6,411,800	13,045,744	135,866	65,602	67,097	74,804	964,275	2,162,503	5
95,100	....	38,800	....	176,400	138,160	800	19,520	6,530	200	43,250	85,050	6
95,000	8,000	14,000	....	117,000	90,000	1,200	550	750	....	13,700	17,000	7
....	1,234,500	3,631,800	45	5,137,300	1,130,400	7,250	761,350	2,580	....	492,010	892,093	8
....	1,569,100	4,878,300	....	7,046,400	3,173,600	47,900	28,800	36,300	....	529,840	810,655	9
....	160,000	300,000	....	460,000	139,000	4,000	1,600	1,250	....	62,000	112,000	10
....	30,000	60,000	....	90,000	72,000	1,000	400	380	....	23,000	26,000	11
2,500	1,352,500	1,451,000	....	3,291,000	569,699	3,700	2,250	2,350	....	126,550	219,015	12
233,100	....	72,500	40	423,600	362,230	5,100	85,030	7,120	680	162,405	345,525	13
13,882,112	3,064,208	5,193,710	26,560	25,866,351	9,981,416	467,956	601,298	446,862	373,712	1,935,857	2,969,846	14
4,596,700	3,430,200	2,376,500	3,440	10,536,400	3,299,358	514,554	408,940	118,920	151,600	884,299	1,788,650	15
2,197,760	2,065,860	1,877,650	8,750	6,958,745	2,955,965	1,044,611	423,275	94,235	125,000	1,173,640	2,281,666	16
....	2,482,600	6,122,600	6,383	8,636,200	9,479,730	48,300	147,776	84,320	19,650	1,089,985	2,034,076	17
....	....	....	....	....	....	....	....	....	....	2,500	15,000	18
9,000	....	8,000	....	19,000	11,600	....	610	430	150	1,950	5,500	19
....	978,000	2,165,500	....	3,336,500	2,421,260	8,000	4,600	4,150	....	313,392	565,187	20
....	15,000	23,000	....	38,000	18,000	400	200	300	....	7,000	9,000	21
10,000	39,600	16,400	70	74,000	19,300	....	10,900	....	....	14,369	30,670	22
1,827,800	1,665,300	2,274,300	5,620	6,279,900	2,455,048	211,958	87,940	47,687	58,316	649,194	1,281,129	23
7,652,800	10,461,000	14,535,900	23,103	35,905,020	16,252,176	3,072,264	811,130	267,121	34,477	4,055,637	7,985,014	24
232,000	13,000	25,000	310	270,000	124,400	2,600	1,300	1,560	....	32,075	57,219	25
40,000	1,937,000	7,793,500	2,518	10,166,500	7,635,020	74,900	157,750	100,350	16,300	985,960	1,552,210	26
....	....	12,500	125	836,000	420,700	5,200	3,210	8,500	2,080	124,400	206,500	27
2,099,300	10,960,800	7,908,900	6,055	24,321,600	43,810,621	763,487	639,580	523,570	162,400	3,610,367	6,689,479	28
185,000	178,300	190,600	1,330	726,900	952,058	65,000	4,100	5,400	....	266,858	517,011	29
584,600	10,400	40,100	436	680,100	220,600	900	16,080	2,810	....	55,250	144,000	30
8,000	3,000	18,000	....	29,000	28,000	300	200	300	....	4,100	5,000	31
278,100	8,300	167,100	....	459,500	129,500	14,750	8,180	13,810	18,590	40,340	77,750	32
....	120,400	63,800	102	184,200	52,000	....	....	1,420	....	9,200	17,800	33
493,000	30,300	190,600	931	720,900	183,125	8,500	9,270	7,240	4,350	74,578	181,024	34
....	....	16,000	147	890,000	519,700	7,000	6,600	6,700	3,800	121,300	154,500	35
....	2,093,000	1,228,000	....	3,363,000	389,300	3,200	3,900	6,400	....	162,300	231,130	36
....	1,081,100	3,755,600	1,635	4,848,200	2,231,400	6,500	134,500	16,020	1,000	268,303	570,305	37

14.—SHIPBUILDING: B—NEW VESSELS.

29,653,232	33,072,968	52,461,950	69,903	131,231,191	99,296,779	1,294,808	670,704	1,374,618	736,931	11,944,212	19,225,714	
32,000	24,000	115,000	....	171,000	176,000	3,100	700	900	....	21,700	28,000	1
....	....	101,000	1,615	3,880,000	1,811,156	51,650	20,653	33,540	16,880	518,618	770,636	2
2,445,000	154,080	446,000	1,965	3,467,600	817,676	28,300	17,285	26,331	38,142	276,550	413,000	3
1,881,500	1,853,500	2,029,800	4,101	6,100,800	11,390,744	135,866	46,602	67,097	74,804	758,289	1,614,[illegible]	4
38,100	....	34,800	....	77,900	54,400	800	2,020	2,350	200	17,450	[illegible],000	5
95,000	8,000	14,000	....	117,000	90,000	1,200	550	750	....	13,700	17,000	6
....	212,500	611,800	45	859,300	365,900	7,050	1,350	2,580	....	100,890	137,300	7
....	1,434,100	4,578,300	....	6,611,400	2,971,100	47,900	13,800	36,300	....	500,290	726,670	8
....	160,000	280,000	....	440,000	115,000	4,000	1,600	1,250	....	53,000	70,000	9
....	30,000	60,000	....	90,000	72,000	1,000	400	380	....	23,000	26,000	10
2,500	512,500	261,000	....	981,000	329,699	3,700	2,250	2,350	....	62,150	86,215	11
223,100	....	72,000	40	375,100	360,030	4,300	7,130	6,320	680	73,080	105,525	12
13,166,072	2,327,038	4,686,600	21,823	23,295,811	8,806,343	321,202	228,738	413,962	335,512	1,532,346	2,174,670	13
527,200	1,321,200	1,581,500	1,690	3,429,900	1,252,448	3,700	25,240	37,660	31,600	201,545	320,200	14
1,066,760	347,550	767,150	2,857	2,280,460	1,266,986	19,291	31,345	38,750	43,000	255,361	391,655	15
....	1,577,200	5,229,600	4,473	6,806,800	8,321,570	46,500	51,996	83,910	19,650	842,115	1,390,050	16
9,000	....	8,000	....	19,000	11,600	....	610	430	150	1,450	3,500	17
....	278,000	335,500	....	628,500	1,871,260	8,000	4,600	4,150	....	231,392	358,487	18
....	15,000	23,000	....	38,000	18,000	400	200	300	....	7,000	9,000	19
1,122,500	430,700	1,240,800	3,409	2,862,400	1,568,794	26,185	26,750	42,267	58,316	248,561	409,714	20
5,892,000	7,833,600	10,862,800	16,691	26,431,820	9,919,842	48,681	45,510	150,931	34,477	1,921,523	3,145,536	21
232,000	13,000	25,000	310	270,000	124,400	2,600	1,300	1,560	....	14,875	22,650	22
40,000	1,779,000	7,415,500	2,248	9,594,500	6,682,800	58,800	35,550	98,730	16,300	821,550	1,127,000	23
....	....	12,500	125	836,000	420,700	5,200	3,210	8,500	2,080	114,300	176,000	24
1,919,800	10,071,500	7,372,100	5,240	22,516,000	36,721,231	380,733	60,285	256,040	37,400	2,706,107	4,676,258	25
60,000	79,000	63,000	990	375,000	448,000	52,000	2,600	3,400	....	65,500	129,000	26
469,600	10,400	16,100	436	535,100	163,600	900	3,080	2,810	....	37,550	92,900	27
8,000	3,000	18,000	....	29,000	28,000	300	200	300	....	4,100	5,000	28
258,100	8,300	157,100	....	429,500	113,500	14,750	8,180	13,840	18,590	34,940	55,750	29
....	120,400	63,800	102	184,200	52,000	....	....	1,420	....	9,200	17,800	30
165,000	16,300	98,200	641	284,000	133,900	....	6,870	6,360	4,350	31,500	62,050	31
....	....	16,000	147	856,000	509,100	7,000	6,600	6,700	3,800	114,100	161,600	32
....	2,063,000	1,198,000	....	3,303,000	367,300	3,200	3,900	6,400	....	159,600	221,230	33
....	390,100	2,668,000	955	3,058,100	1,941,700	6,500	9,500	16,020	1,000	140,880	254,000	34

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

14.–SHIPBUILDING: C–REPAIRING OF VESSELS.

	States and Territories.	Boats.	New vessels.	Tonnage of new vessels.	Boats built.	No. of establishments.	Capital.	Average number of hands employed.	Total amount paid in wages on the vessels in the ship-yard.
		Number.	*Number.*		*Number.*		*Dollars.*		*Dollars.*
	The United States					812	11, 882, 059	10, 671	6, 730, 136
1	Alabama					1	25, 000	25	22, 500
2	California					40	1, 754, 423	326	308, 746
3	Connecticut					22	279, 900	255	126, 520
4	Delaware					5	25, 800	465	272, 713
5	Florida					[illegible]	25, 700	25	18, 600
6	Illinois					17	435, 450	408	218, 635
7	Indiana					5	47, 000	63	37, 950
8	Iowa					1	20, 000	55	26, 000
9	Kentucky					5	73, 000	127	75, 000
10	Louisiana					9	139, 700	173	85, 176
11	Maine					100	346, 775	520	238, 380
12	Maryland					70	1, 497, 125	931	542, 529
13	Massachusetts					140	1, 586, 925	974	610, 917
14	Michigan					17	290, 700	603	307, 943
15	Minnesota					1	10, 000	16	8, 000
16	Mississippi					1	1, 000	2	1, 500
17	Missouri					4	188, 000	125	92, 300
18	New Hampshire					7	11, 930	22	10, 048
19	New Jersey					48	621, 700	679	419, 992
20	New York					192	3, 126, 550	2, 750	1, 908, 892
21	North Carolina					5	11, 000	26	14, 200
22	Ohio					28	202, 600	333	174, 142
23	Oregon					2	16, 300	21	19, 200
24	Pennsylvania					48	599, 281	1, 044	733, 795
25	Rhode Island					8	172, 000	234	144, 927
26	South Carolina					7	32, 600	40	23, 460
27	Texas					1	5, 300	19	14, 200
28	Virginia					13	175, 800	89	49, 648
29	Washington					2	8, 000	12	12, 400
30	West Virginia					1	7, 000	12	6, 160
31	Wisconsin					[illegible]	145, 500	297	135, 663

14.–SHIPBUILDING: D–BOATS.

	States and Territories.	Boats.	New vessels.	Tonnage of new vessels.	Boats built.	No. of establishments.	Capital.	Average number of hands employed.	Total amount paid in wages on the vessels in the ship-yard.
	The United States				8, 026	736	320, 665	635	367, 606
1	California				200	[illegible]	7, 450	27	21, 333
2	Connecticut				280	64	19, 700	34	13, 929
3	Delaware				100	1	5, 000	6	3, 612
4	Florida				45	29	2, 900	12	7, 950
5	Illinois				85	3	1, 300	7	3, 800
6	Indiana				52	2	800	3	1, 600
7	Kentucky				25	1	150	2	450
8	Louisiana				80	2	2, 500	11	7, 000
9	Maine				970	228	31, 775	57	23, 677
10	Maryland				133	59	9, 110	39	18, 855
11	Massachusetts				3, 765	110	95, 325	137	77, 094
12	Michigan				210	8	7, 475	14	6, 932
13	New Hampshire				44	8	3, 400	4	2, 195
14	New Jersey				134	15	12, 370	24	13, 327
15	New York				1, 221	123	81, 300	169	113, 350
16	Ohio				91	5	6, 100	11	7, 605
17	Pennsylvania				318	19	14, 250	33	20, 714
18	Rhode Island				68	12	15, 200	21	11, 735
19	Virginia				48	32	1, 660	13	5, 698
20	Washington				80	1	1, 000	1	1, 000
21	Wisconsin				77	5	1, 900	10	5, 750

14.–SHIPBUILDING: E–OCEAN, COAST, AND RIVER VESSELS.

	States and Territories.	Boats.	New vessels.	Tonnage of new vessels.	Boats built.	No. of establishments.	Capital.	Average number of hands employed.	Total amount paid in wages on the vessels in the ship-yard.
	The United States	7, 240	731	159, 325		1, 645	16, 806, 599	14, 284	9, 092, 538
1	Alabama					1	25, 000	25	22, 500
2	California	200	21	7, 361		62	1, 806, 923	534	589, 564
3	Connecticut	280	52	11, 473		94	334, 300	500	256, 849
4	Delaware	100	55	31, 123		18	935, 200	1, 576	900, 322
5	Florida	45	13	217		48	30, 750	46	33, 580
6	Georgia		2	539		2	3, 000	4	2, 250
7	Louisiana	80	28	864		31	147, 900	203	102, 626
8	Maine	970	88	41, 396		379	811, 750	1, 967	838, 559
9	Maryland	133	71	3, 229		159	1, 587, 535	1, 103	624, 539
10	Massachusetts	3, 765	39	5, 605		276	1, 765, 450	1, 328	804, 571
11	Mississippi		3	33		3	2, 500	4	2, 860
12	New Hampshire	44				15	15, 330	26	12, 243
13	New Jersey	134	43	6, 445		74	821, 170	787	469, 762
14	New York	1, 061	159	22, 574		275	2, 601, 850	2, 821	2, 041, 988
15	North Carolina		8	487		11	15, 400	38	19, 256
16	Oregon		19	2, 162		14	63, 300	85	77, 150
17	Pennsylvania	232	33	20, 962		55	5, 324, 231	2, 588	1, 800, 673
18	Rhode Island	68	17	379		22	227, 700	318	194, 662
19	South Carolina		27	1, 615		16	46, 300	94	55, 990
20	Texas		16	758		16	23, 350	43	30, 170
21	Virginia	48	23	334		63	184, 660	132	71, 126
22	Washington	80	14	1, 769		11	33, 000	62	51, 298

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

14.—SHIPBUILDING: C—REPAIRING OF VESSELS.

PRINCIPAL MATERIALS.												
Hard pine.	White pine.	White oak.	Knees.	Total quantity of lumber, including other kinds.	Iron.	Yellow metal and brass.	Duck.	Manila rope.	Hemp cordage.	Total value of all materials.	Total value of all products.	
Feet.	*Feet.*	*Feet.*	*Number.*	*Feet.*	*Pounds.*	*Pounds.*	*Yards.*	*Pounds.*	*Pounds.*	*Dollars.*	*Dollars.*	
9, 279, 340	13, 048, 370	16, 505, 620	23, 527	45, 355, 100	26, 016, 654	6, 355, 383	3, 965, 105	586, 800	388, 200	7, 422, 914	16, 697, 614	
30, 000	....	....	....	30, 000	40, 000	20, 000	....	....	....	25, 000	60, 000	1
....	....	89, 000	6	2, 654, 000	277, 700	1, 007, 080	130, 000	40, 000	20, 000	393, 992	969, 398	2
330, 000	409, 000	258, 500	1, 135	1, 233, 500	200, 800	32, 500	56, 165	2, 000	3, 000	136, 789	317, 451	3
85, 000	30, 000	180, 000	550	295, 000	1, 617, 000	....	19, 000	....	....	195, 325	529, 097	4
41, 000	....	4, 000	....	68, 000	66, 000	....	13, 000	....	....	18, 000	44, 000	5
....	1, 010, 000	3, 000. 000	....	4, 240, 000	763, 000	....	760, 000	....	....	388, 840	745, 743	6
....	135, 000	300, 000	....	435, 000	202, 500	....	15, 000	....	....	28, 050	80, 875	7
....	....	20, 000	....	20, 000	24, 000	....	....	....	....	9, 000	42, 000	8
....	840, 000	1, 190, 000	....	2, 310, 000	240, 000	....	....	....	....	64, 300	161, 800	9
....	....	....	....	....	....	....	76, 000	....	....	84, 325	222, 400	10
716, 040	519, 870	423, 520	4, 497	2, 220, 100	1, 130, 443	146, 354	371, 740	32, 200	38, 200	376, 917	681, 378	11
3, 834, 000	2, 097, 000	787, 000	1, 750	6, 832, 000	2, 041, 150	510, 374	380, 000	80, 000	120, 000	666, 296	1, 423, 370	12
1, 130, 000	1, 048, 700	871, 800	3, 405	3, 539, 300	1, 620, 450	1, 024, 620	380, 300	46, 100	82, 000	836, 478	1, 703, 284	13
....	866, 000	870, 000	1, 610	1, 761, 000	1, 150, 000	1, 800	95, 000	....	....	243, 347	631, 469	14
....	....	....	....	....	....	....	....	....	....	2, 500	15, 000	15
....	....	....	....	....	....	....	....	....	....	500	2, 000	16
....	700, 000	1, 830, 000	....	2, 708, 000	550, 000	....	....	....	....	82, 000	206, 700	17
10, 000	23, 000	8, 000	50	49, 000	6, 500	....	10, 900	....	....	12, 284	25, 630	18
705, 300	1, 210, 100	1, 010, 900	2, 199	3, 331, 300	879, 204	185, 473	60, 000	5, 000	....	384, 058	940, 455	19
1, 758, 000	2, 431, 700	3, 464, 900	6, 060	8, 822, 900	6, 255, 829	3, 007, 718	762, 000	114, 500	....	2, 021, 964	4, 575, 551	20
....	....	....	....	....	....	....	....	....	....	17, 200	34, 569	21
....	108, 000	361, 000	270	497, 000	933, 000	16, 000	120, 000	....	....	155, 760	406, 210	22
....	....	....	....	....	....	....	....	....	....	10, 100	29, 900	23
178, 000	820, 000	505, 000	775	1, 683, 000	7, 081, 500	381, 964	578, 000	267, 000	125, 000	883, 895	1, 965, 324	24
125, 000	77, 000	112, 000	250	314, 000	498, 078	13, 000	....	....	....	189, 183	360, 431	25
115, 000	....	24, 000	....	145, 000	57, 000	....	13, 000	....	....	17, 700	51, 100	26
20, 000	....	10, 000	....	30, 000	16, 000	....	....	....	....	5, 400	22, 000	27
202, 000	14, 000	91, 000	290	307, 000	47, 500	8, 500	....	....	....	40, 538	109, 174	28
....	....	....	....	18, 000	9, 000	....	....	....	....	6, 800	21, 000	29
....	30, 000	30, 000	....	60, 000	22, 000	....	....	....	....	2, 700	9, 900	30
....	679, 000	1, 065, 000	680	1, 752, 000	288, 000	....	125, 000	....	....	123, 673	310, 405	31

14.—SHIPBUILDING: D—BOATS.

394, 800	1, 384, 710	733, 790	3, 762	3, 284, 675	388, 489	19, 635	48, 655	34, 745	....	369, 232	876, 999	
....	....	6, 000	....	46, 000	3, 800	....	800	300	....	16, 739	57, 545	1
2, 000	41, 000	18, 400	220	92, 350	23, 680	....	12, 320	10, 650	....	17, 086	37, 200	2
....	3, 000	8, 000	....	16, 000	38, 000	....	....	....	....	10, 661	18, 437	3
16, 000	....	....	....	30, 500	17, 760	....	4, 500	4, 180	....	7, 800	16, 050	4
....	12, 000	20, 000	....	38, 000	1, 500	200	....	....	....	2, 280	9, 050	5
....	....	....	....	....	....	....	....	....	....	1, 500	3, 100	6
....	....	....	....	....	....	....	....	....	....	100	1, 000	7
10, 000	....	500	....	48, 500	2, 200	800	1, 900	800	....	5, 000	15, 600	8
....	217, 300	83, 590	240	350, 440	44, 630	400	820	700	....	26, 594	53, 818	9
235, 500	12, 000	8, 000	....	274, 500	5, 760	480	3, 700	1, 260	....	16, 458	45, 000	10
1, 000	669, 610	238, 700	2, 488	1, 138, 985	68, 529	700	11, 630	9, 385	....	81, 801	186, 727	11
....	39, 400	23, 000	300	68, 400	8, 160	....	780	380	....	4, 523	13, 117	12
....	16, 600	8, 400	20	25, 000	12, 800	....	....	....	....	2, 085	4, 440	13
....	24, 500	22, 600	12	86, 200	7, 050	300	1, 190	420	....	16, 575	34, 460	14
2, 800	195, 700	208, 200	352	650, 300	116, 505	15, 865	3, 620	1, 690	....	112, 150	263, 957	15
....	50, 000	17, 000	....	75, 000	19, 220	100	2, 200	1, 620	....	8, 650	18, 400	16
1, 500	69, 300	31, 800	40	122, 600	7, 890	790	1, 295	480	....	20, 365	47, 888	17
....	22, 300	15, 600	90	37, 900	5, 980	....	1, 500	2, 000	....	12, 175	27, 610	18
126, 000	....	1, 400	....	129, 900	1, 725	....	2, 400	880	....	2, 540	9, 800	19
....	....	....	....	16, 000	1, 600	....	....	....	....	400	1, 900	20
....	12, 000	22, 600	....	38, 100	1, 700	....	....	....	....	3, 750	11, 900	21

14.—SHIPBUILDING: E—OCEAN, COAST, AND RIVER VESSELS.

38, 501, 272	16, 434, 348	19, 999, 260	75, 093	91, 580, 066	85, 876, 577	7, 403, 526	3, 184, 138	1, 402, 242	1, 083, 434	13, 011, 784	25, 149, 750	
30, 000	....	....	....	30, 000	40, 000	20, 000	....	....	....	25, 000	60, 000	1
....	....	196, 000	1, 621	6, 580, 000	2, 092, 656	1, 058 730	151, 453	73, 840	36, 880	959, 349	1, 797, 639	2
2, 777, 000	604, 080	722, 900	3, 320	4, 793, 450	1, 042, 156	60, 800	85, 870	38, 981	41, 142	430, 425	767, 660	3
1, 966, 500	1, 886, 500	2, 217, 800	4, 651	6, 411, 800	13, 045, 744	135, 866	65, 602	67, 097	74, 804	964, 275	2, 162, 503	4
95, 100	....	38, 800	....	176, 400	138, 160	800	19, 520	6, 530	200	43, 250	85, 050	5
95, 000	8, 000	14, 000	....	117, 000	90, 000	1, 200	550	750	....	13, 700	17, 000	6
134, 100	....	39, 500	40	240, 600	102, 230	1, 400	83, 630	4, 870	680	115, 905	279, 525	7
13, 882, 112	3, 064, 208	5, 193, 710	26, 560	25, 866, 351	9, 981, 416	467, 956	601, 298	446, 862	373, 712	1, 935, 857	2, 909, 846	8
4, 593, 700	2, 175, 200	1, 454, 500	3, 422	8, 356, 400	2, 644, 358	514, 354	408, 940	106, 340	151, 600	814, 799	1, 674, 130	9
2, 197, 760	2, 065, 860	1, 877, 650	8, 750	6, 958, 745	2, 955, 965	1, 044, 611	423, 275	94, 235	125, 000	1, 173, 640	2, 281, 666	10
9, 000	....	8, 000	....	19, 000	11, 600	....	610	430	150	1, 950	5, 500	11
10, 000	39, 600	16, 400	70	74, 000	19, 300	....	10, 900	....	....	14, 369	30, 070	12
1, 776, 800	1, 421, 600	1, 938, 400	5, 165	5, 649, 300	2, 319, 483	203, 958	87, 940	46, 737	58, 316	583, 264	1, 214, 829	13
7, 145, 200	2, 748, 500	4, 547, 300	14, 765	16, 022, 420	9, 334, 277	3, 064, 014	595, 170	166, 290	29, 730	2, 700, 146	5, 441, 588	14
232, 000	13, 000	25, 000	310	270, 000	124, 400	2, 600	1, 300	1, 560	....	32, 075	57, 219	15
....	....	12, 500	125	836, 000	420, 700	5, 200	3, 210	8, 500	2, 080	124, 400	206, 500	16
2, 091, 300	2, 180, 500	1, 092, 400	3, 450	5, 776, 200	39, 533, 149	725, 887	600, 640	303, 830	162, 400	2, 524, 654	5, 063, 680	17
185, 000	178, 300	190, 600	1, 330	726, 900	952, 058	65, 000	4, 100	5, 400	....	266, 858	517, 041	18
584, 600	10, 400	40, 100	436	680, 100	220, 600	900	16, 080	2, 810	....	55, 250	144, 000	19
278, 100	8, 300	167, 100	....	459, 500	129, 500	14, 750	8, 180	13, 840	18, 590	40, 340	77, 780	20
418, 000	30, 300	190, 600	931	645, 900	159, 125	8, 500	9, 270	6, 640	4, 350	70, 978	172, 024	21
....	....	16, 000	147	890, 000	519, 700	7, 000	6, 600	6, 700	3, 800	121, 300	184, 500	22

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

14.—SHIPBUILDING: F—NORTHERN LAKES.

	States.	Boats.	New vessels.	Tonnage of new vessels.	No. of establishments.	Capital.	Average number of hands employed.	Total amount paid in wages on vessels in the ship-yard.
		Number.	*Number.*			*Dollars.*		*Dollars.*
	The United States	629	142	30, 752	199	1, 865, 325	3, 352	1, 664, 917
1	Illinois	85	2	50	19	352, 300	339	176, 975
2	Michigan	210	69	15, 909	72	476, 775	1, 537	745, 933
3	New York	160	35	3, 957	59	592, 500	629	321, 081
4	Ohio	91	18	8, 057	26	246, 050	439	231, 905
5	Pennsylvania	6			1	10,000	8	4, 200
6	Wisconsin	77	18	2, 779	22	187, 700	400	184, 823

14.—SHIPBUILDING: G—WESTERN RIVERS.

	States.	Boats.	New vessels.	Tonnage of new vessels.	No. of establishments.	Capital.	Average number of hands employed.	Total amount paid in wages on vessels in the ship-yard.
	The United States	157	899	242, 094	155	1, 227, 500	1, 996	1, 183, 072
1	Arkansas		3	300	3	2, 500	25	3, 600
2	Illinois		8	1, 259	7	102, 000	118	65, 720
3	Indiana	52	64	26, 524	23	194, 250	312	211, 736
4	Iowa		2	860	1	25, 000	75	37, 000
5	Kansas		1	178	1	1, 000	11	1, 900
6	Kentucky	25	23	2, 130	11	88, 450	157	92, 171
7	Louisiana		8	367	7	4, 200	15	10, 900
8	Minnesota				1	10, 000	16	8, 000
9	Missouri		17	3, 451	14	247, 900	293	196, 005
10	Nebraska		1	52	1	300	9	1, 400
11	Ohio		36	17, 064	14	155, 000	266	153, 420
12	Pennsylvania	80	647	172, 834	50	320, 400	520	310, 360
13	Tennessee		1	48	1	500	[illegible]	600
14	West Virginia		85	16, 727	19	55, 000	99	51, 510
15	Wisconsin		3	300	2	21, 000	74	38, 750

14.—SHIPBUILDING: H—CANAL-BOATS.

	States.	Boats.	New vessels.	Tonnage of new vessels.	No. of establishments.	Capital.	Average number of hands employed.	Total amount paid in wages on vessels in the ship-yard.
	The United States		643	66, 707	189	1, 080, 450	1, 713	773, 286
1	Illinois		1	88	2	2, 700	8	4, 700
2	Maryland		60	4, 270	7	10, 000	75	33, 250
3	New Jersey		10	1, 010	19	121, 900	143	79, 045
4	New York		441	49, 887	123	749, 750	1, 211	544, 060
5	Ohio		1	11	14	22, 000	68	29, 035
6	Pennsylvania		122	10, 711	19	143, 100	182	74, 396
7	Vermont		5	550	3	20, 700	12	4, 400
8	Virginia		3	180	2	1, 300	14	4, 400

14.—SHIPBUILDING: I—IRON VESSELS.

	States.	Boats.	New vessels.	Tonnage of new vessels.	No. of establishments.	Capital.	Average number of hands employed.	Total amount paid in wages on vessels in the ship-yard.
	The United States		67	31, 347	16	7, 497, 000	4, 262	2, 732, 599
1	Delaware		22	8, 925	2	800, 000	1, 252	753, 953
2	Maryland		1	55	2	1, 000, 000	223	134, 000
3	Massachusetts				2	500, 000	60	35, 500
4	Michigan		3	1, 533	1	100, 000	240	155, 600
5	Missouri		7	2, 740	1	30, 000	120	78, 412
6	New Jersey		4	382	1	200, 000	72	43, 600
7	New York		6	679	2	62, 000	77	46, 000
8	Pennsylvania		24	17, 033	5	4, 805, 000	2, 218	1, 485, 534

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

14.–SHIPBUILDING: F–NORTHERN LAKES.

PRINCIPAL MATERIALS.												
Hard pine.	White pine.	White oak.	Knees.	Total quantity of lumber, including other kinds.	Iron.	Yellow metal and brass.	Duck.	Manila rope.	Hemp cordage.	Total value of all materials.	Total value of all products.	
Feet. 3,000	*Feet.* 5,951,300	*Feet.* 18,967,700	*Number.* 13,733	*Feet.* 25,172,600	*Pounds.* 19,175,755	*Pounds.* 86,000	*Yards.* 1,398,176	*Pounds.* 155,956	*Pounds.* 41,697	*Dollars.* 2,642,455	*Dollars.* 4,870,645	
....	458,500	1,777,300	27	2,241,800	506,500	650	760,000	150	....	356,220	650,833	1
....	2,482,600	6,122,600	6,383	8,636,200	9,479,730	48,300	147,776	84,320	19,650	1,089,985	2,034,636	2
3,000	1,421,600	3,145,500	3,186	4,764,200	2,906,825	8,250	215,960	16,746	4,747	455,307	848,321	3
....	585,000	4,365,500	2,502	4,958,500	4,211,020	23,800	140,600	39,470	16,300	476,400	796,650	4
....	2,500	1,200	....	3,700	280	....	540	150	....	3,600	9,500	5
....	1,001,100	3,555,600	1,635	4,568,200	2,071,400	5,000	133,300	15,120	1,000	260,943	530,705	6

14.–SHIPBUILDING: G–WESTERN RIVERS.

181,500	16,008,600	20,619,000	....	41,684,100	15,141,519	170,950	102,150	322,310	....	2,856,745	4,450,587	
32,000	24,000	115,000	....	171,000	176,000	3,100	700	900	....	21,700	28,000	1
....	766,000	1,830,500	....	2,861,500	622,400	6,400	1,350	2,430	....	133,190	232,960	2
....	1,569,100	4,878,300	....	7,046,400	3,173,600	47,900	28,800	36,300	....	529,840	810,655	3
....	160,000	300,000	....	460,000	139,000	4,000	1,600	1,250	....	62,000	112,000	4
....	30,000	60,000	....	90,000	72,000	1,000	400	380	....	23,000	26,000	5
2,500	1,352,500	1,451,000	....	3,291,000	569,699	3,700	2,250	2,350	....	126,550	249,015	6
99,000	....	33,000	....	183,000	260,000	3,700	1,400	2,250	....	46,500	64,000	7
....	....	....	....	....	....	....	....	....	....	2,500	15,000	8
....	978,000	2,165,500	....	3,336,500	2,421,260	8,000	4,600	4,150	....	313,392	505,187	9
....	15,000	23,000	....	38,000	18,000	400	200	300	....	7,000	9,000	10
40,000	1,346,000	3,408,000	....	5,182,000	3,419,600	51,100	17,150	60,700	....	494,200	701,700	11
....	7,592,000	4,908,700	....	15,352,700	3,692,660	36,650	38,400	203,700	....	923,113	1,355,340	12
8,000	3,000	18,000	....	29,000	28,000	300	200	300	....	4,100	5,000	13
....	2,093,000	1,228,000	....	3,363,000	389,300	3,200	3,900	6,400	....	162,300	231,130	14
....	80,000	200,000	....	280,000	160,000	1,500	1,200	900	....	7,360	45,600	15

14.–SHIPBUILDING: H–CANAL-BOATS.

641,600	9,111,800	10,115,400	8,366	21,437,200	5,508,071	9,350	....	115,655	....	1,225,574	2,329,345	
....	10,000	24,000	18	34,000	1,500	200	....	....	....	2,600	8,300	1
3,000	1,255,000	922,000	18	2,180,000	655,000	200	....	12,580	....	69,500	114,500	2
51,000	243,700	335,900	455	630,600	135,565	8,000	....	950	....	65,930	169,800	3
504,600	6,290,900	6,843,100	5,152	15,118,400	4,051,074	....	....	84,085	....	900,184	1,695,135	4
....	6 000	20,000	16	26,000	4,400	....	....	180	....	15,360	53,860	5
8,000	1,185,800	1,906,600	2,603	3,189,000	584,532	950	....	15,840	....	159,000	260,950	6
....	120,400	63,800	102	184,200	52,000	....	....	1,420	....	9,200	17,800	7
75,000	....	....	....	75,000	24,000	....	....	600	....	3,600	9,000	8

14.–SHIPBUILDING: I–IRON VESSELS.

2,254,000	3,353,000	639,100	....	6,663,100	54,326,737	501,332	47,000	51,450	31,400	2,851,073	6,394,838	
723,000	1,264,000	207,000	....	2,425,000	11,981,186	118,945	17,800	15,700	8,000	692,435	1,703,345	1
....	5,000	1,000	....	6,000	468,000	400	....	250	....	28,000	177,500	2
....	....	....	....	....	196,000	....	....	....	....	35,000	80,000	3
....	285,000	40,000	....	325,000	4,502,000	16,000	2,400	1,500	....	187,000	387,500	4
....	122,000	41,500	....	163,500	1,585,000	4,000	2,500	1,500	....	153,000	241,600	5
3,000	34,000	2,000	....	39,000	1,220,000	15,600	800	1,800	....	39,200	104,875	6
....	56,000	17,000	....	76,000	875,000	5,000	1,100	900	....	55,000	116,000	7
1,528,000	1,587,000	330,600	....	3,628,600	33,499,551	341,387	22,400	29,800	23,400	1,661,438	3,584,618	8

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

SILK AND SILK GOODS.

[See Report by Special Agent William C. Wyckoff, *post.*]

15.—SLAUGHTERING AND MEAT-PACKING.

[NOTE.—The statistics of retail butchering establishments are not included in this statement.]

	States.	No. of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.		Total amount paid in wages during the year.	MATERIALS.		
				Males above 16 years.	Children and youths.		Total beeves slaughtered.	Average gross weight of beeves.	Total value of beeves slaughtered.
	The United States	872	*Dollars.* 49, 419, 213	26, 113	1, 184	*Dollars.* 10, 508, 530	*Number.* 1, 755, 533	*Pounds.* *a* 1, 100	*Dollars.* 71, 333, 182
1	Arkansas	2	4, 500	10		3, 800	2, 500	900	46, 000
2	California	51	2, 130, 200	467	20	341, 488	111, 668	1, 061	2, 966, 270
3	Colorado	14	166, 000	82	5	51, 190	21, 018	991	675, 390
4	Connecticut	12	304, 000	418	5	206, 959	11, 293	1, 136	633, 088
5	Delaware	2	160, 000	26		11, 200			
6	Georgia	9	25, 700	35	6	9, 473	4, 304	889	122, 916
7	Illinois	143	12, 019, 980	10, 217	731	4, 077, 617	595, 274	990	18, 391, 769
8	Indiana	25	3, 974, 000	1, 790	25	494, 622	59, 190	1, 202	3, 546, 250
9	Iowa	38	1, 955, 500	1, 488	44	530, 188	4, 885	1, 104	161, 419
10	Kansas	14	1, 669, 400	1, 017	53	263, 600	11, 958	1, 004	332. 490
11	Kentucky	31	2, 229, 500	389	8	150, 576	3, 727	970	109, 815
12	Louisiana	1	500, 000	18		13, 830	38, 000	1, 000	1, 140, 000
13	Maine	6	194, 500	83		34, 300	8, 400	957	620, 000
14	Maryland	9	865, 000	228		100, 000			
15	Massachusetts	77	2, 904, 440	1, 258	5	653, 149	133, 484	1, 196	8, 012, 553
16	Michigan	12	573, 000	162	10	89, 527	5, 442	911	179, 985
17	Minnesota	12	230, 000	92	4	41, 700	6, 265	1, 113	231, 720
18	Missouri	65	2, 327, 500	1, 743	103	657, 918	37, 627	923	855, 407
19	Nebraska	12	330, 700	189	2	64, 717	6, 252	1, 081	177, 420
20	New Jersey	31	1, 775, 200	572	10	374, 278	70, 521	1, 252	4, 486, 992
21	New York	128	4, 543, 625	1, 688	22	1, 020, 790	437, 743	1, 271	21, 213, 703
22	Ohio	93	5, 487, 682	1, 950	74	633, 014	40, 373	1, 014	1, 303, 505
23	Oregon	9	56, 800	37		17, 120	5, 809	1, 196	126, 102
24	Pennsylvania	35	2, 938, 625	531	21	242, 077	70, 616	1, 316	3, 454, 020
25	Rhode Island	9	598, 000	178	7	97, 362	29, 000	1, 200	1, 480, 000
26	Tennessee	6	105, 000	227		47, 600	12, 335	965	443, 100
27	Texas	3	202, 200	132		49, 800	16, 688	819	213, 600
28	Virginia	4	89, 000	53		13, 750	1, 100	1, 000	39, 000
29	West Virginia	6	100, 161	30		13, 050	800	938	27, 000
30	Wisconsin	13	959, 000	1, 003	29	203, 805	9, 261	1, 074	343, 668

	States.	MATERIALS—continued.			PRODUCTS.	
		Value of all animals.	Value of all other materials used, including cooperage.	Total value of all materials.	Beef sold fresh.	Beef canned.
	The United States	*Dollars.* 256, 738, 905	*Dollars.* 10, 999, 997	*Dollars.* 267, 738, 902	*Pounds.* 759, 142, 875	*Pounds.* 101, 371, 199
1	Arkansas	59, 200	1, 975	61, 175	1, 560, 000	
2	California	5, 922, 948	226, 675	6, 149, 623	54, 530, 967	120, 000
3	Colorado	889, 215	36, 850	926, 065	10, 371, 750	50, 000
4	Connecticut	4, 021, 700	167, 451	4, 189, 151	7, 623, 997	
5	Delaware	164, 368	15, 000	179, 368		
6	Georgia	266, 791	2, 286	269, 077	1, 881, 900	
7	Illinois	79, 679, 478	4, 970, 240	84, 649, 718	144, 379, 073	91, 227, 699
8	Indiana	13, 058, 071	587, 856	13, 645, 927	35, 159, 000	
9	Iowa	9, 169, 587	827, 258	9, 996, 845	2, 649, 125	
10	Kansas	3, 885, 261	435, 541	4, 320, 802	3, 368, 430	1, 500, 000
11	Kentucky	3, 538, 522	105, 537	3, 644, 059	1, 553, 400	
12	Louisiana	1, 360, 000	15, 000	1, 375, 000	19, 000, 000	
13	Maine	993, 240	15, 365	1, 008, 605	5, 230, 000	
14	Maryland	3, 104, 587	59, 215	3, 163, 802		
15	Massachusetts	20, 325, 655	331, 675	20, 657, 330	90, 025, 843	
16	Michigan	1, 599, 684	112, 795	1, 712, 479	2, 528, 620	
17	Minnesota	673, 601	42, 552	716, 153	3, 374, 387	
18	Missouri	11, 870, 017	482, 890	12, 352, 907	12, 930, 495	1, 713, 500
19	Nebraska	1, 062, 043	35, 796	1, 097, 839	3, 717, 267	
20	New Jersey	19, 203, 652	145, 783	19, 349, 435	48, 766, 546	70, 000
21	New York	39, 479, 547	670, 303	40, 149, 850	227, 119, 576	600, 000
22	Ohio	16, 480, 392	693, 054	17, 173, 446	18, 579, 810	
23	Oregon	194, 092	11, 425	205, 517	3, 206, 667	
24	Pennsylvania	8, 570, 372	284, 406	8, 854, 778	30, 367, 367	100, 000
25	Rhode Island	3, 306, 589	143, 227	3, 449, 816	19, 460, 000	
26	Tennessee	989, 792	29, 900	1, 019, 692	5, 819, 500	
27	Texas	215, 320	64, 900	280, 220	1, 036, 600	5, 990, 000
28	Virginia	942, 600	25, 300	967, 900	550, 000	
29	West Virginia	257, 500	16, 340	273, 840	313, 475	
30	Wisconsin	5, 455, 081	443, 402	5, 898, 483	4, 039, 080	

a The average is based upon the omission in computation of—
55,199 beeves in Illinois, bought dressed, the average weight of which was 500 pounds.
3,733 beeves in New York, bought dressed, the average weight of which was 600 pounds.
25,186 beeves in Pennsylvania, bought dressed, the average weight of which was 600 pounds.
And—
131.059 calves in New York, the average weight of which was 139 pounds.
3,120 calves in Pennsylvania, the average weight of which was 200 pounds

TABLE VII.—SPECIAL STATISTICS OF MANUFACTURES FOR PRINCIPAL INDUSTRIES: 1880.

SILK AND SILK GOODS.

[See Report by Special Agent William C. Wyckoff, *post.*]

15.—SLAUGHTERING AND MEAT-PACKING.

[NOTE.—The statistics of retail slaughtering establishments are not included in this statement.]

MATERIALS—continued.

Total sheep slaughtered.	Average gross weight of sheep.	Total value of sheep slaughtered.	Total hogs slaughtered.	Average gross weight of hogs.	Total value of hogs slaughtered.	Total hogs bought dressed.	Average gross weight of hogs.	Total value of hogs bought dressed.	
Number. 2, 233, 701	*Pounds.* 92	*Dollars.* 8, 957, 727	*Number.* 16, 098, 428	*Pounds.* 248	*Dollars.* 158, 680, 844	*Number.* 1, 748, 979	*Pounds.* 209	*Dollars.* 17, 767, 152	
1, 300	100	6, 000	1, 600	223	7, 200				1
414, 185	90	1, 009, 946	235, 777	211	1, 805, 482	14, 400	188	141, 250	2
37, 166	104	107, 415	9, 590	340	106, 410				3
21, 667	86	107, 470	247, 480	266	2, 799, 642	40, 045	180	481, 500	4
			11, 511	284	164, 368				5
5, 530	72	11, 627	13, 252	256	132, 248				6
47, 783	94	196, 010	5, 745, 263	259	58, 231, 953	259, 207	234	2, 859, 746	7
5, 200	67	18, 200	963, 482	247	9, 493, 621				8
4, 137	102	13, 980	972, 965	262	8, 959, 921	2, 735	178	34, 267	9
5, 023	97	16, 405	384, 502	256	3, 495, 566	6, 786	162	40, 800	10
14, 050	91	41, 240	348, 416	256	3, 387, 467				11
22, 000	100	55, 000	22, 000	225	165, 000				12
500	80	2, 000	19, 030	283	351, 440	1, 650	200	19, 800	13
			346, 590	217	3, 104, 587				14
358, 689	94	1, 653, 249	761, 827	290	10, 524, 853	9, 200	215	135, 000	15
2, 039	91	6, 353	137, 087	251	1, 375, 346	3, 311	250	38, 000	16
9, 300	93	37, 031	10, 160	306	123, 850	24, 000	219	281, 000	17
10, 011	94	33, 128	1, 138, 068	247	10, 003, 184	136, 064	215	978, 298	18
10, 859	95	34, 410	86, 142	280	850, 213				19
324, 750	84	1, 193, 460	1, 426, 560	198	12, 354, 848	115, 088	163	1, 168, 352	20
766, 141	93	3, 664, 355	913, 245	202	8, 539, 980	718, 630	160	6, 061, 509	21
12, 318	96	48, 080	1, 434, 179	246	13, 484, 758	143, 250	213	1, 644, 049	22
9, 840	115	18, 540	5, 225	281	49, 450				23
117, 940	93	555, 740	152, 266	272	1, 796, 731	196, 608	201	2, 763, 881	24
12, 500	100	62, 500	116, 096	299	1, 604, 089	11, 835	200	160, 000	25
14, 890	92	46, 110	56, 770	277	500, 582				26
300	90	700	375	112	1, 020				27
			16, 700	215	123, 600	50, 000	200	780, 000	28
800	80	1, 600	25, 691	213	228, 900				29
4, 783	92	17, 178	496, 579	243	4, 914, 535	16, 170	176	179, 700	30

PRODUCTS—continued.

Beef salted or canned.	Mutton sold fresh.	Pork sold fresh.	Pork salted.	Bacon and hams.	Lard.	Value of all other products.	Total value of all products.	
Pounds. 90, 763, 466	*Pounds.* 106, 692, 216	*Pounds.* 506, 077, 052	*Pounds.* 859, 045, 987	*Pounds.* 1, 122, 742, 816	*Pounds.* 501, 471, 698	*Dollars.* 16, 926, 091	*Dollars.* 303, 562, 413	
	66, 000	64, 000	79, 000	56, 000	32, 000	24, 000	85, 680	1
7, 272, 610	18, 719, 399	12, 296, 236	9, 654, 136	9, 970, 414	4, 388, 650	1, 056, 475	7, 953, 914	2
146, 800	1, 922, 840	1, 517, 808	150, 500	116, 550	344, 650	73, 076	1, 082, 690	3
100, 000	952, 211	6, 387, 199	5, 000, 022	29, 595, 794	9, 386, 500	146, 816	4, 669, 540	4
		820, 000	810, 000	196, 124	354, 710		198, 000	5
130, 000	198, 575	1, 200, 000	718, 000	250, 000	128, 900	20, 146	309, 093	6
44, 568, 911	2, 265, 592	80, 861, 497	305, 732, 979	474, 019, 462	190, 066, 782	4, 448, 272	97, 891, 517	7
405, 000	174, 000	16, 610, 477	65, 507, 850	55, 232, 896	21, 605, 686	466, 144	15, 209, 204	8
214, 190	227, 585	10, 639, 668	80, 783, 733	47, 718, 586	32, 016, 432	148, 938	11, 285, 032	9
2, 052, 720	241, 400	2, 728, 784	12, 816, 865	38, 288, 268	11, 813, 600	88, 265	5, 618, 714	10
300, 000	639, 800	2, 663, 854	25, 530, 124	22, 850, 399	8, 073, 226	133, 043	4, 538, 888	11
	1, 100, 000	3, 300, 000					1, 500, 000	12
204, 000	20, 000	551, 000	1, 594, 000	728, 000	1, 015, 000		1, 093, 687	13
		1, 307, 800	16, 394, 600	23, 058, 900	9, 069, 270	28, 898	3, 377, 405	14
5, 837, 010	16, 671, 475	26, 353, 773	32, 254, 443	64, 916, 381	30, 659, 086	1, 841, 316	22, 951, 782	15
463, 700	97, 250	2, 806, 500	10, 911, 061	5, 967, 238	3, 786, 489	30, 275	2, 065, 634	16
542, 013	451, 750	1, 862, 219	2, 842, 500	1, 762, 400	975, 700	54, 685	887, 552	17
754, 740	491, 200	34, 025, 358	70, 333, 664	86, 633, 027	32, 331, 978	316, 618	14, 628, 030	18
46, 000	537, 849	1, 531, 850	7, 263, 443	4, 818, 974	2, 916, 475	42, 923	1, 259, 397	19
675, 000	13, 682, 600	133, 121, 449	7, 014, 013	37, 358, 506	28, 176, 387	693, 024	20, 719, 640	20
5, 328, 000	39, 844, 255	104, 604, 132	50, 582, 822	52, 851, 799	25, 098, 979	5, 049, 014	43, 096, 138	21
3, 809, 134	657, 510	39, 565, 995	102, 610, 612	74, 507, 202	48, 985, 283	502, 369	19, 231, 297	22
710, 750	558, 000	158, 750	192, 000	561, 250	68, 600	20, 940	264, 712	23
15, 554, 068	5, 560, 000	2, 068, 250	19, 481, 120	30, 526, 795	15, 571, 443	707, 228	9, 908, 545	24
100, 000	625, 000	7, 018, 264	6, 511, 260	6, 531, 250	5, 554, 800	339, 716	3, 876, 740	25
180, 000	681, 375	3, 542, 144	3, 545, 553	747, 500	1, 479, 275	156, 277	1, 376, 476	26
72, 000	13, 000	5, 700	1, 000	14, 000	6, 450	158, 000	486, 400	27
		1, 382, 000	6, 610, 000	2, 700, 000	1, 700, 000	4, 900	1, 054, 500	28
175, 000	32, 000	507, 865	1, 253, 129	1, 317, 220	513, 275	11, 000	307, 500	29
1, 121, 820	261, 550	6, 574, 480	12, 867, 558	49, 447, 881	15, 352, 072	363, 733	6, 533, 926	30

WOOLEN GOODS, WOOL HATS, AND WORSTED GOODS.

[See Report by Special Agent George W. Bond, *post.*]

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STATISTICS

OF

POWER USED IN MANUFACTURES.

BY

HERMAN HOLLERITH, E. M.,
SPECIAL AGENT.

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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
CENSUS OFFICE,
Washington, D. C., January 2, 1883.

Hon. C. W. SEATON,
Superintendent of Census.

SIR: I have the honor to submit tables giving the statistics of steam- and water-power used in manufactures, as returned at the census of 1880. These statistics have been compiled under the direction of Professor W. P. Trowbridge, special agent in charge of the statistics of power and machinery used in manufactures, from the returns made upon the schedules used in collecting statistics of manufactures, and include the power used in all industries embraced in the manufacturing statistics, with the following exceptions: Coke; dyeing and finishing textiles; glass; liquors, distilled; liquors, malt; mixed textiles; and shipbuilding. The classification by industries is the same as that adopted by the division of manufactures.

These tables show: (1) The number of establishments which used either steam- or water-power, or both, during the whole or a part of the census year from June 1, 1879, to May 31, 1880. The number of establishments here reported is generally less than reported as engaged in manufacture for any district or industry, the difference being due to such establishments as do not use either steam- or water-power, or to such as were not in operation during any part of the census year. Thus, in the state of Massachusetts there are reported 350 flouring- and grist-mills, but only 344 of these are returned as using either steam- or water-power, the remaining 6 being driven by wind; (2) the number of water-wheels used; (3) the total power of these wheels; (4) the number of steam-boilers, not including such boilers as are used for generating steam exclusively for heating purposes; (5) the total number of steam-engines used; (6) the total power of these steam-engines; (7) the total power of all the steam-engines and water-wheels reported as used in manufacture during the census year.

In Table I are presented the statistics of power used in manufactures, first, by totals for states and territories, and second, by totals for some of the leading industries. In many cases the same steam-engine or water-wheel was reported as being used in two or more industries. Where no satisfactory division of power could be made, it was included in each industry, and a deduction made from the total of all industries for such duplication, as is shown in the table. In many cases, especially in the larger manufacturing centers, small manufacturing establishments will rent rooms supplied with power from some larger establishment, engaged, perhaps, in an entirely different class of manufacture. In such cases the steam-engines and boilers or the water-wheels will be included with the larger establishment, the smaller merely being credited with the few horse-power used. Again, in other cases, the steam is supplied by a steam supply company. In this way a number of establishments will report their engines and power, but no steam-boilers.

Table II gives the statistics, by state and territory totals, for the following selected industries, viz: Agricultural implements; boots and shoes (factory); carpets; carriages and wagons; clothing, men's; cotton goods; felt goods; flouring- and grist-mill products; foundery and machine-shop products; hosiery and knit goods; iron and steel; lumber, sawed; paper; printing and publishing; salt; sash, doors, and blinds; silk and silk goods; sugar and molasses, refined; woolen goods; wool hats; and worsted goods; the statistics for all other industries being grouped.

Table III gives the statistics of power, by industries, for each state and territory.

These statistics are prefaced by an introduction containing certain comparisons with the statistics of power used in manufactures as returned at the Ninth Census, and showing by tables, diagrams, and maps the distribution and relation of steam- and water-power used in manufactures as returned at the Tenth Census.

In conclusion, I desire to acknowledge my obligations to many of the officers and clerks of the Census Office for their valuable assistance in the compilation of these statistics. I wish especially to acknowledge my indebtedness to Mr. F. R. Williams, chief of the division of manufactures, and to my assistant, Mr. G. W. Clapp.

I am, sir, very respectfully, your obedient servant.

HERMAN HOLLERITH,
Special Agent.

STEAM- AND WATER-POWER USED IN MANUFACTURES.

At the Tenth Census there were reported 85,923 establishments engaged in manufacture in the United States using either steam- or water-power or both. As shown in the statistics of manufactures, the total number of manufacturing establishments reported was 253,852. Of the total number of establishments in the United States engaged in manufactures 33.85 per cent., or just about one-third, are reported as using either steam- or water-power or both. The total amount of steam- and water-power was equivalent to 3,410,837 horse-power, or an average of 39.70 horse-power for each establishment using power. The total average number of hands employed in all industries, as shown in the statistics of manufactures, being 2,738,895, would give an average of 1.25 horse-power for each hand employed.

Of the total 3,410,837 horse-power reported, 1,225,379 horse-power, or 35.93 per cent., was water-power and 2,185,458 horse-power, or 64.07 per cent. was steam-power.

At the census of 1880 there were reported 55,404 water-wheels as used in manufactures, with a total power of 1,225,379 horse-power, being equivalent to an average of 22.12 horse-power per wheel; 72,304 steam-boilers and 56,483 steam-engines were reported as used, with a total power of 2,185,458 horse-power, equivalent to an average of 38.69 horse-power for each steam-engine, or of 30.23 horse-power for each steam-boiler.

At the Ninth Census there were reported in all 2,346,142 horse-power, both steam- and water-power; the total number of hands reported as employed in manufactures being 2,053,996, showing an average of 1.14 horse-power per hand employed.

Of the total 2,346,142 horse-power, steam- and water-power reported as used in manufactures in 1870, 1,130,431 horse-power, or 48.18 per cent., was water-power, and 1,215,711 horse-power, or 51.82 per cent., was steam-power.

At the census of 1870 there were reported 51,018 water-wheels as used in manufactures, with a total power of 1,130,431 horse-power, equivalent to an average of 22.16 horse-power per wheel, and 40,191 steam-engines, equivalent to 1,215,711 horse-power, or an average of 30.25 horse-power per steam-engine.

Comparing the statistics of power used in manufactures as returned at the census of 1870 and that of 1880, we have the following:

THE UNITED STATES.

	WATER-POWER.		STEAM-POWER.		Total steam- and water-power, horse-power.
	Number of water-wheels.	Horse-power.	Number of steam-engines.	Horse-power.	
1880	55, 404	1, 225, 379	56, 483	2, 185, 458	3, 410, 837
1870	51, 018	1, 130, 431	40, 191	1, 215, 711	2, 346, 142
Percentage of increase	8. 60	8. 40	40. 54	79. 77	45. 38

From this we see that the total amount of power used in manufactures, both steam and water, has increased during the decade 1,064,695 horse-power. Of this total increase, 94,948 horse-power, or 8.92 per cent., is due to the increase in the amount of water-power used, while 969,747 horse-power, or 91.08 per cent., is due to the increase in the amount of steam-power used.

From 1870 to 1880 the average amount of power used per hand employed has increased from 1.14 horse-power to 1.25 horse-power. The average power of the water-wheels reported has fallen off from 22.16 horse power in 1870 to 22.12 horse-power in 1880. This may be due largely to the introduction of various forms of small hydraulic motors for light work. These motors are practically small water-wheels, and have been counted as such. The average power of the steam-engines reported has increased from 30.27 horse-power in 1870 to 38.69 horse-power in 1880.

The total amount of power used in manufactures, as returned at the census of 1870 and that of 1880, is given in the following table, which also shows the percentage of increase in each state and territory. This, however, must be regarded as an approximate comparison only:

States and Territories.	1870. Total steam- and water-power.	1880. Total steam- and water-power.	Percentage of increase.
	H. P.	H. P.	
The United States	2,346,142	3,410,837	45.38
Alabama	18,751	27,576	47.06
Arizona	90	530	488.89
Arkansas	7,646	15,733	105.77
California	25,370	32,921	29.76
Colorado	2,225	5,802	160.76
Connecticut	80,374	118,232	47.10
Dakota	324	2,224	586.42
Delaware	8,533	15,428	80.80
District of Columbia	1,889	3,143	66.38
Florida	3,700	7,147	93.16
Georgia	38,243	51,169	33.80
Idaho	606	1,682	177.56
Illinois	86,044	144,288	67.69
Indiana	100,369	131,770	31.29
Iowa	39,547	54,221	37.11
Kansas	8,149	21,079	158.67
Kentucky	39,568	54,929	38.82
Louisiana *	25,066	11,346	....
Maine	79,573	100,476	26.27
Maryland	32,422	51,259	58.10
Massachusetts	184,356	309,759	68.02
Michigan	105,851	164,747	55.64
Minnesota	20,139	53,880	167.54
Mississippi	12,472	18,450	47.93
Missouri	55,062	80,749	46.65
Montana *	1,617	1,498	....
Nebraska	3,311	8,494	156.54
Nevada *	8,545	716	....
New Hampshire	77,078	87,750	13.85
New Jersey	58,139	99,858	71.76
New Mexico	911	1,359	49.18
New York	334,363	454,143	35.82
North Carolina	33,152	45,088	36.00
Ohio	174,323	261,143	49.80
Oregon	8,277	13,589	64.18
Pennsylvania	363,918	512,408	40.80
Rhode Island	42,027	63,575	51.27
South Carolina	14,932	25,868	73.24
Tennessee	37,981	51,952	36.78
Texas	13,044	30,534	134.08
Utah	2,500	4,689	87.56
Vermont	51,322	63,314	23.37
Virginia	49,612	57,174	15.24
Washington	2,823	4,395	55.69
West Virginia	27,331	37,910	38.71
Wisconsin	64,223	106,085	65.18
Wyoming	344	755	119.48

* Decrease.

In making this comparison, it must be noted that the classification adopted in the census of 1870 and that used in 1880 are not exactly alike. Thus it would appear that there was a falling off in the amount of power used in manufacture in the state of Louisiana from 25,066 horse-power in 1870 to 11,346 horse-power in 1880. This is due to the fact that in the census of 1870 the sugar made on the plantations direct from the raw cane was included as a product of manufacture, while in 1880 it is included with the products of agriculture. Thus, in order to make a comparison, we must deduct 18,296 horse-power used on the sugar plantations from the total 25,066 horse-power, and we would then have for the industries included in the census of 1880 an increase of from 6,770 horse-power in 1870 to 11,346 in 1880.

In the state of Nevada it would appear that there was a falling off from 8,545 horse-power in 1870 to 716 horse-power in 1880. In the census of 1870 we find that the following industries are included in statistics of manufactures: "Quartz milled," 7,174 horse-power, and "Lead, pig", 215 horse-power. These industries are included in the statistics, not of manufacture, but of mining, in the census of 1880; therefore, in order to make a comparison, we must deduct 7,389 horse-power from the total for 1870. This would still leave the amount of power reported in 1870 slightly in excess of that reported in 1880, owing probably to the very rapid development of mining in 1870 and the consequent demand for sawed lumber and other products of manufacture.

This table shows a decrease for Montana in the total amount of power reported as used in manufactures. If we deduct 780 horse-power for "Quartz milled" from the total for 1870, we would then have an increase from 837 horse-power in 1870 to 1,498 horse-power in 1880.

In the census of 1870 we find that the industry, "Quartz milled," is reported in California with 2,739 horse-power. This ought also strictly to be deducted before making a comparison. With these exceptions, the classification of industries in the census of 1870 and that used in 1880 are so nearly alike that a comparison can safely be made.

The following table shows the total amount of power available in some of the more important industries and the percentage of increase, the total number of hands employed in these industries, as reported in the statistics of manufactures, and the amount of power available per hand employed, according to the census of 1870 and that of 1880:

Industries.	1870.			1880.			Percentage of increase in total power.
	Total steam- and water-power.	Total number of hands employed.	Power per hand employed.	Total steam- and water-power.	Total number of hands employed.	Power per hand employed.	
	H. P.		*H. P.*	*H. P.*		*H. P.*	
Agricultural implements	26, 082	25, 249	1. 03	44, 731	39. 580	1. 13	71. 50
Boots and shoes (factory)	3, 055	91, 702	0. 03	11, 574	111. 152	0. 10	278. 85
Cotton goods *	146, 040	135. 519	1. 08	275, 504	185. 472	1. 49	88. 65
Flouring- and grist-mill products	576, 686	58, 448	9. 87	771, 201	58, 407	13. 20	33. 73
Iron and steel	170, 675	77, 555	2. 20	397, 247	140, 978	2. 82	132. 75
Lumber, sawed	641, 665	149, 997	4. 28	821, 928	147, 956	5. 56	28. 09
Paper	53,218	17, 910	2. 97	123, 912	24, 422	5. 07	132. 84
Printing and publishing	7, 840	30, 743	0. 26	16, 325	58, 478	0. 28	108. 23
Silk and silk goods	1, 911	6, 699	0. 29	8, 810	31, 337	0. 28	361. 02
Sugar and molasses, refined	9, 655	4, 597	2. 10	20, 522	5, 857	3. 50	112. 55
Woolen goods	85, 101	77, 870	1. 09	106, 507	86, 504	1. 23	25. 15
Worsted goods	8, 016	12, 920	0. 62	16, 437	18, 803	0. 87	105. 05

* Including both specific and special cotton-mills.

The following table shows the relative amount of steam- and of water-power used in some of the more important industries, as returned at the census of 1870 and that of 1880:

Industries.	1870.		1880.	
	Water-power.	Steam-power.	Water-power.	Steam-power.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Agricultural implements	39. 14	60. 86	28. 27	71. 73
Boots and shoes	5. 44	94. 56	3. 54	96. 46
Cotton goods *	67. 84	32. 16	53. 99	46. 01
Flouring- and grist-mill products	70. 74	29. 26	60. 94	39. 06
Iron and steel	9. 72	90. 28	4. 16	95. 84
Lumber, sawed	50. 93	49. 07	33. 91	66. 09
Paper	78. 25	21. 75	70. 70	29. 30
Silk and silk goods	41. 29	58. 71	17. 73	82. 27
Woolen goods	62. 17	37. 83	50. 33	49. 67
Worsted goods	57. 81	42. 19	38. 34	61. 66

* Includes both specific and special cotton-mills.

The percentage of the total steam- and water-power which was used in each of the leading industries in 1870 and 1880 is given in the following table. Only such industries as reported a total of over 100,000 horse-power in 1880 are given, all other industries being grouped:

Industries	Percentage of the total steam- and water-power.	
	1870.	1880.
Lumber, sawed	27. 35	24. 10
Flouring- and grist-mill products	24. 58	22. 61
Iron and steel	7. 28	11. 65
Cotton goods (specific and special)	6. 22	8. 08
Paper	2. 27	3. 63
Woolen goods	3. 63	3. 12
All other industries	28. 67	26. 84

The proportional amounts of steam- and of water-power used in manufactures in the different states and territories according to the census of 1870 and that of 1880 are shown in the following table:

States and Territories.	1870.		1880.	
	Water-power.	Steam-power.	Water-power.	Steam-power.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
The United States	48.18	51.82	35.93	64.07
Alabama	58.72	41.28	42.78	57.22
Arizona	11.11	88.89	30.19	69.81
Arkansas	20.21	79.79	12.86	87.14
California	27.11	72.89	14.73	85.27
Colorado	35.60	64.40	31.87	68.13
Connecticut	67.68	32.32	51.77	48.23
Dakota	23.46	76.54	36.11	63.89
Delaware	49.46	50.54	31.02	68.98
District of Columbia	58.23	41.77	28.00	72.00
Florida	14.27	85.73	13.14	86.86
Georgia	71.69	28.31	58.76	41.24
Idaho	48.68	51.32	67.54	32.46
Illinois	15.05	84.95	12 09	87.91
Indiana	23.43	76.57	16.55	83.45
Iowa	36.03	63.97	37.56	62.44
Kansas	21.95	78.05	36.11	63.89
Kentucky	19.31	80.69	16.41	83.59
Louisiana	0.57	99.43	0.79	99.21
Maine	88.11	11.89	79.34	20.66
Maryland	56.94	43.06	35.20	64.80
Massachusetts	57.42	42.58	44.67	55.33
Michigan	32.97	67.03	20.88	79.12
Minnesota	64.82	35.18	53.25	46.75
Mississippi	19.67	80.33	18.69	81.31
Missouri	12.07	87.93	10.11	89.89
Montana	49.17	50.83	63.68	36.32
Nebraska	43.67	56.33	64.69	35.31
Nevada	29.70	70.30	15.08	84.92
New Hampshire	88.60	11.40	78.81	21.19
New Jersey	44.43	55.57	27.10	72.90
New Mexico	72.34	27.66	68.58	31.42
New York	62.28	37.72	48.30	51.70
North Carolina	79.06	20.94	66.68	33.32
Ohio	25.67	74.33	14.80	85.20
Oregon	70.15	29.85	68.11	31.89
Pennsylvania	39.01	60.99	21.52	78.48
Rhode Island	43.97	56.03	34.98	65.02
South Carolina	69.62	30.38	53.63	46.37
Tennessee	51.38	48.62	35.73	64.27
Texas	14.03	85.97	8.21	91.79
Utah	86.76	13.24	75.39	24.61
Vermont	87.48	12.52	82.49	17.51
Virginia	83.05	16.95	65.53	34.47
Washington	50.02	49.98	26.96	73.04
West Virginia	37.30	62.70	24.94	75.06
Wisconsin	52.50	47.50	42.75	57.25
Wyoming	9.88	90.12	5.03	94.97

The percentage of the total amount of steam- and water-power, of the total amount of water-power, and of the total amount of steam-power, reported for each state and territory, is given in the following table. The rank of each state in the amount of power used is also given:

States and Territories.	Rank in total power.	Percentage of the total steam- and water-power.	Rank in water-power.	Percentage of the total water-power.	Rank in steam power.	Percentage of the total steam-power.
Alabama	27	0.81	23	0.96	25	0.72
Arizona	47	0.02	44	0.01	47	0.02
Arkansas	31	0.46	35	0.17	28	0.63
California	25	0.97	30	0.40	18	1.28
Colorado	37	0.17	36	0.15	36	0.18
Connecticut	8	3.47	6	4.99	11	2.61
Dakota	41	0.07	43	0.07	40	0.07
Delaware	32	0.45	31	0.39	33	0.49
District of Columbia	40	0.09	42	0.07	39	0.10
Florida	36	0.21	40	0.08	34	0.28
Georgia	22	1.50	12	2.45	21	0.97
Idaho	42	0.05	38	0.09	44	0.02
Illinois	6	4.23	21	1.42	6	5.80
Indiana	7	3.86	17	1.78	7	5.03
Iowa	18	1.59	18	1.66	14	1.55
Kansas	29	0.62	28	0.62	29	0.62
Kentucky	17	1.61	26	0.74	12	2.10
Louisiana	34	0.33	46	0.01	31	0.52
Maine	10	2.95	4	6.51	22	0.95
Maryland	21	1.50	20	1.47	16	1.52
Massachusetts	3	9.08	2	11.29	4	7.84
Michigan	5	4.83	11	2.81	5	5.96
Minnesota	19	1.58	14	2.34	20	1.15
Mississippi	30	0.54	33	0.28	27	0.69
Missouri	13	2.37	27	0.67	9	3.32
Montana	43	0.04	39	0.08	45	0.02
Nebraska	35	0.25	29	0.45	38	0.14
Nevada	46	0.02	45	0.01	43	0.03
New Hampshire	12	2.57	5	5.64	24	0.85
New Jersey	11	2.93	15	2.21	8	3.33
New Mexico	44	0.04	41	0.08	46	0.02
New York	2	13.31	1	17.90	2	10.74
North Carolina	23	1.32	13	2.45	26	0.69
Ohio	4	7.66	9	3.15	3	10.18
Oregon	33	0.40	25	0.76	35	0.20
Pennsylvania	1	15.02	3	9.00	1	18.40
Rhode Island	14	1.86	16	1.81	13	1.89
South Carolina	28	0.76	22	1.13	30	0.55
Tennessee	20	1.52	19	1.51	15	1.53
Texas	26	0.90	34	0.20	19	1.28
Utah	38	0.14	32	0.29	41	0.05
Vermont	15	1.86	7	4.26	32	0.51
Virginia	16	1.68	10	3.06	23	0.90
Washington	39	0.13	37	0.10	37	0.15
West Virginia	24	1.11	24	0.77	17	1.30
Wisconsin	9	3.11	8	3.70	10	2.78
Wyoming	45	0.02	47	(*)	42	0.03

* Less than 0.004 of 1 per cent.

From this table we see that Pennsylvania stands first in the total amount of power used in manufactures, with 15.02 per cent. of the total for the United States. New York is second, with 13.31 per cent.; Massachusetts third, with 9.08 per cent.; and Ohio fourth, with 7.66 per cent. of the total. In the amount of water-power used, New York is first, with 17.90 per cent.; Massachusetts second, with 11.29 per cent.; Pennsylvania third, with 9 per cent.; and Maine fourth, with 6.51 per cent. of the total amount of water-power used in the United States. For steam-power we again have Pennsylvania first, with 18.40 per cent.; New York second, with 10.74 per cent.; Ohio third, with 10.18 per cent.; and Massachusetts fourth, with 7.84 per cent. of the total amount used in the United States.

It is interesting to compare the amount of power used in each state and territory with the area of that state or territory. For this purpose the following table has been computed. In it the area of each state and territory is given, and the average amount of water- and steam-power, of water-power, and of steam-power per square mile:

States and Territories.	Area.	Total steam- and water-power per square mile.	Water-power per square mile.	Steam-power per square mile.
	Square miles.	*H. P.*	*H. P.*	*H. P.*
Alabama	51, 540	0. 54	0. 23	0. 31
Arizona	112, 920	0. 01	(*)	(*)
Arkansas	53, 045	0. 30	0. 04	0. 26
California	155, 980	0. 21	0. 03	0. 18
Colorado	103, 645	0. 06	0. 02	0. 04
Connecticut	4, 845	24. 40	12. 63	11. 77
Dakota	147, 700	0. 02	0. 01	0. 01
Delaware	1, 960	7. 87	2. 44	5. 43
District of Columbia	60	52. 38	14. 67	37. 72
Florida	54, 240	0. 13	0. 02	0. 11
Georgia	58, 980	0. 87	0. 51	0. 36
Idaho	84, 290	0. 02	0. 01	0. 01
Illinois	56, 000	2. 58	0. 31	2. 27
Indiana	35, 910	3. 67	0. 61	3. 06
Iowa	55, 475	0. 98	0. 37	0. 61
Kansas	81, 700	0. 26	0. 09	0. 16
Kentucky	40, 000	1. 37	0. 23	1. 15
Louisiana	45, 420	0. 25	(*)	0. 25
Maine	29, 895	3. 36	2. 67	0. 69
Maryland	9, 860	5. 20	1. 83	3. 37
Massachusetts	8, 040	38. 53	17. 21	21. 32
Michigan	57, 430	2. 87	0. 60	2. 27
Minnesota	79, 205	0. 68	0. 36	0. 32
Mississippi	46, 340	0. 40	0. 07	0. 32
Missouri	68, 735	1. 17	0. 12	1. 06
Montana	145, 310	0. 01	0. 01	(*)
Nebraska	76, 185	0. 11	0. 07	0. 04
Nevada	109, 740	0. 01	(*)	0. 01
New Hampshire	9, 005	9. 74	7. 68	2. 06
New Jersey	7, 455	13. 39	3. 63	9. 76
New Mexico	122, 460	0. 01	0. 01	(*)
New York	47, 620	9. 54	4. 61	4. 93
North Carolina	48, 580	0. 93	0. 62	0. 31
Ohio	40, 760	6. 41	0. 95	5. 46
Oregon	94, 560	0. 14	0. 10	0. 05
Pennsylvania	44, 985	11. 39	2. 45	8. 94
Rhode Island	1, 085	58. 59	20. 50	38. 10
South Carolina	30, 170	0. 86	0. 46	0. 40
Tennessee	41, 750	1. 24	0. 44	0. 80
Texas	262, 290	0. 12	9. 01	0. 11
Utah	82, 190	0. 06	0. 04	0. 01
Vermont	9, 135	6. 93	5. 72	1. 21
Virginia	40, 125	1. 42	0. 93	0. 49
Washington	66, 880	0. 07	0. 02	0. 05
West Virginia	24, 645	1. 54	0. 38	1. 15
Wisconsin	54, 450	1. 95	0. 83	1. 12
Wyoming	97, 575	0. 01	(*)	0. 01

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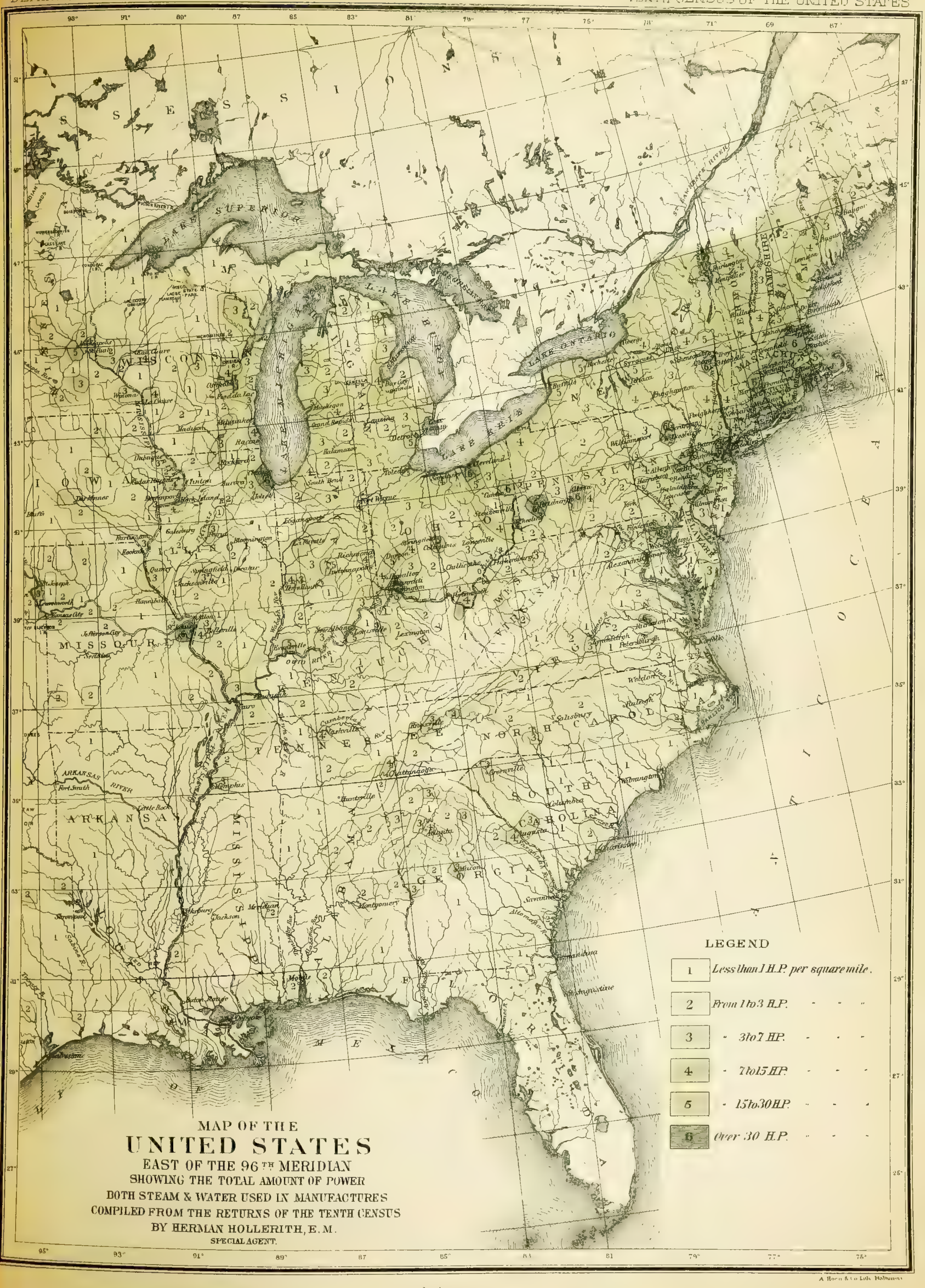
* Less than 0.005 horse-power per square mile.



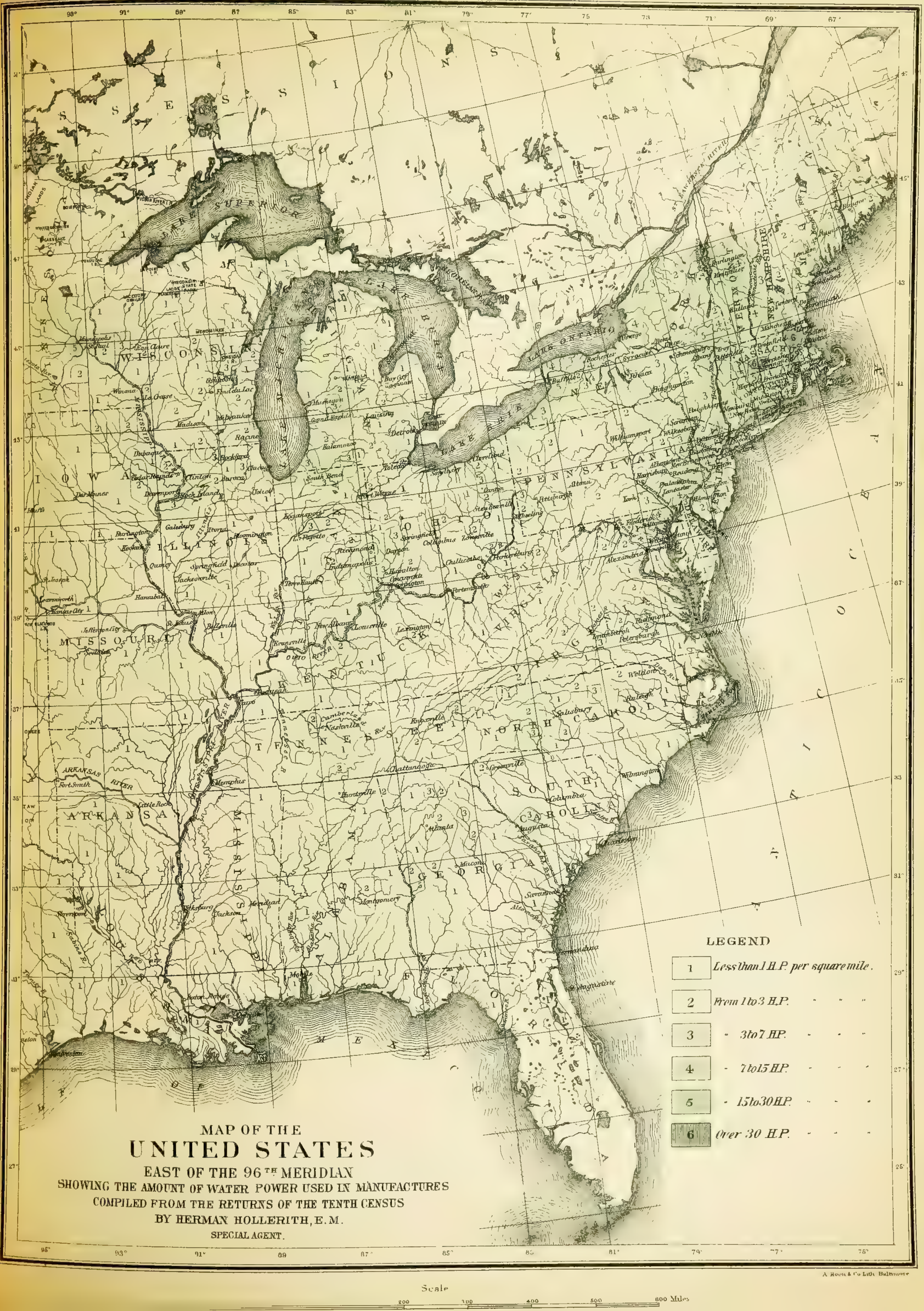
MAP OF THE
UNITED STATES
EAST OF THE 96TH MERIDIAN
SHOWING THE TOTAL AMOUNT OF POWER
BOTH STEAM & WATER USED IN MANUFACTURES
COMPILED FROM THE RETURNS OF THE TENTH CENSUS
BY HERMAN HOLLERITH, E.M.
SPECIAL AGENT.

A. Hoen & Co. Lith. Baltimore

DEPARTMENT OF THE INTERIOR.

No 2.

TENTH CENSUS OF THE UNITED STATES.



MAP OF THE UNITED STATES

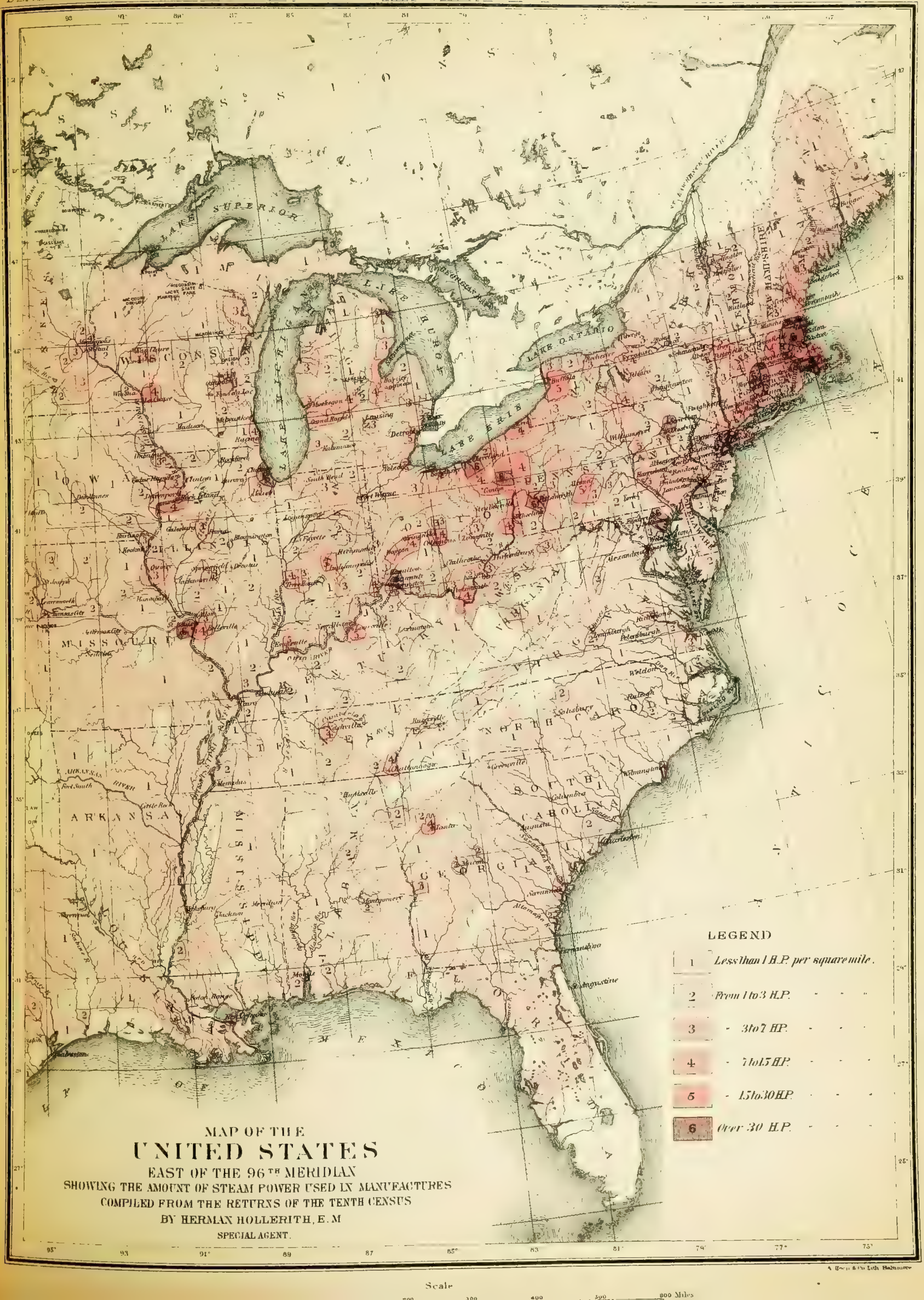
EAST OF THE 96TH MERIDIAN

SHOWING THE AMOUNT OF WATER POWER USED IN MANUFACTURES

COMPILED FROM THE RETURNS OF THE TENTH CENSUS

BY HERMAN HOLLERITH, E. M.

SPECIAL AGENT.



MAP OF THE
UNITED STATES
EAST OF THE 96TH MERIDIAN
SHOWING THE AMOUNT OF STEAM POWER USED IN MANUFACTURES
COMPILED FROM THE RETURNS OF THE TENTH CENSUS
BY HERMAN HOLLERITH, E. M
SPECIAL AGENT.

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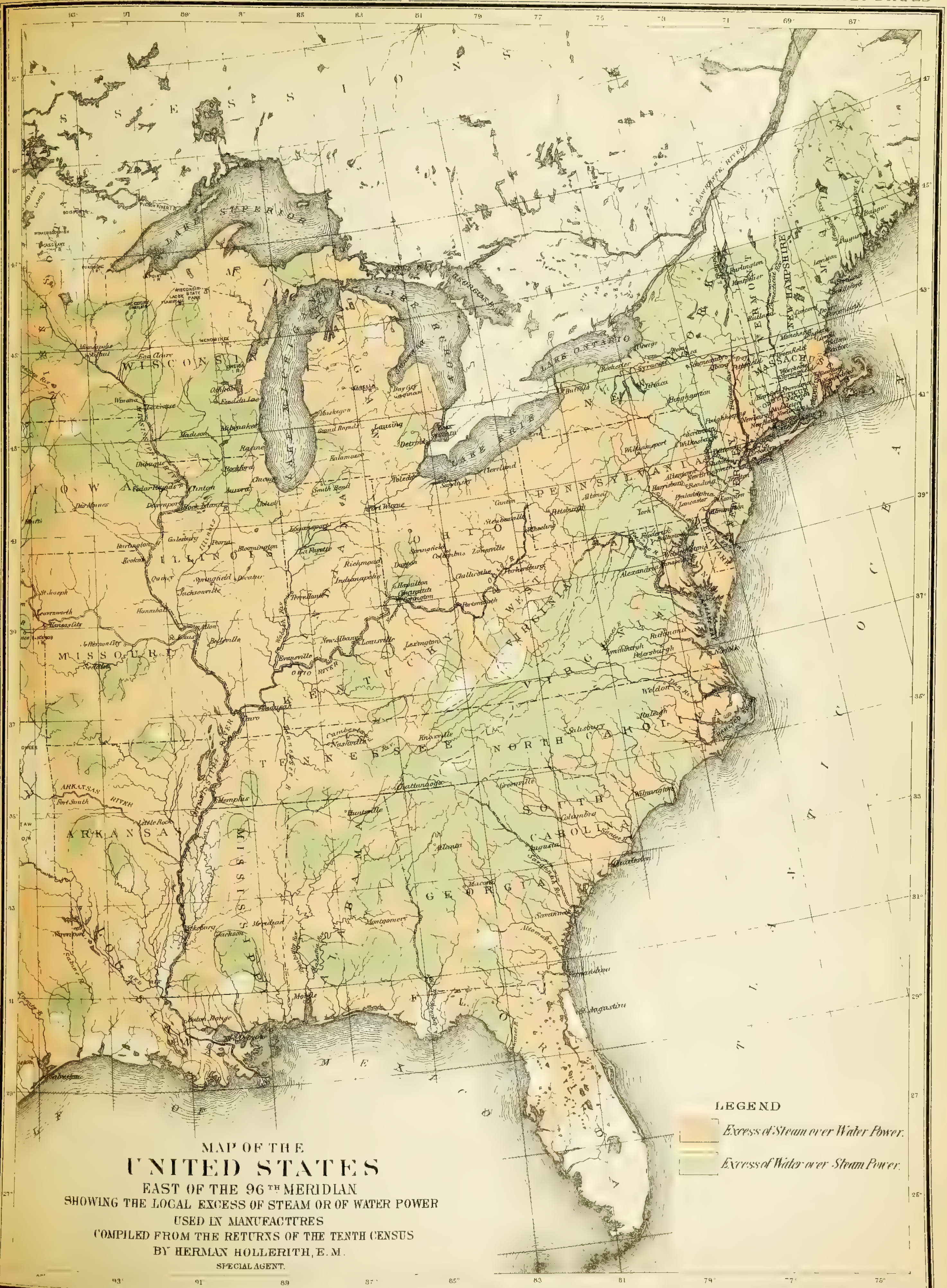

MAP OF THE
UNITED STATES
EAST OF THE 96TH MERIDIAN
SHOWING THE LOCAL EXCESS OF STEAM OR OF WATER POWER
USED IN MANUFACTURES
COMPILED FROM THE RETURNS OF THE TENTH CENSUS
BY HERMAN HOLLERITH, E.M.
SPECIAL AGENT.

LEGEND

🟧 Excess of Steam over Water Power.

🟩 Excess of Water over Steam Power.

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Scale

From this table it appears that Pennsylvania, which stands first in the total amount of power used, shows only an average of 11.39 horse-power per square mile; New York, which stands second, shows an average of only 9.54 horse-power per square mile; while Massachusetts, which stands third in the total amount of power used, has an average of 38.53 horse-power per square mile. The highest average is in Rhode Island, where we find 58.59 horse-power (steam and water) per square mile.

Again, New York, which stands first in the total amount of water-power used, shows only an average of 4.61 horse-power per square mile, while Massachusetts, which stands second in the total amount of water-power used, shows an average of 17.21 horse-power per square mile.

The territory of the United States can be divided into five sections, as follows: The Northern Atlantic states; the Southern Atlantic; the Northern Central, or Middle; the Southern Central, or Middle; and the Western. In the Northern Atlantic States are included all the states along the Atlantic coast from Maine to Pennsylvania and New Jersey. The Southern Atlantic includes all the states along the coast from Delaware, Maryland, and West Virginia to Georgia and Florida. The Western division includes all the western territory from Montana, Wyoming, Colorado, and New Mexico. The remaining central or middle territory is divided by a line along the northern boundary of Texas, Indian Territory, Arkansas, and Kentucky into the Northern and Southern Central or Middle divisions respectively.

The distribution of power used in manufactures in these sections is shown in the following table, which gives the total amount of power (steam and water), the total amount of water-power, and the total amount of steam-power used in each of these five divisions:

Divisions.	Total steam- and water-power.	Water-power.	Steam-power.
	H. P.	*H. P.*	*H. P.*
United States	3,410,837	1,225,379	2,185,458
Northern Atlantic	1,809,515	779,595	1,029,920
Southern Atlantic	294,186	145,568	148,618
Northern Central	1,028,680	228,770	799,910
Southern Central	210,520	47,444	163,076
Western	67,936	24,002	43,934

The following table gives the percentage of the total steam and water-power, of the total water-power, and of the total steam-power used in each of these five divisions:

Divisions.	Percentage of the total steam- and water-power.	Percentage of the total water-power.	Percentage of the total steam-power.
Northern Atlantic	53.05	63.62	47.13
Southern Atlantic	8.63	11.88	6.80
Northern Central	30.16	18.67	36.60
Southern Central	6.17	3.87	7.46
Western	1.99	1.96	2.01

From this we see that 53.05 per cent., or over one-half of all the power reported, is in the North Atlantic states. The Northern Central reports 30.16 per cent., or nearly one-third of the total amount used in the United States; that is, 83.21 per cent. of all the power used in manufactures is in the Northern Atlantic and Northern Central states.

Of the total amount of water-power used 63.62 per cent., or nearly two-thirds, is reported in the Northern Atlantic states. The New England states report in all 34.51 per cent. of the total water-power. The Atlantic states (Northern and Southern) report 74.50, or nearly three-fourths of all the water-power used in manufactures.

The relative importance of steam- and water-power in the various sections of the country is shown in the following table:

Divisions.	Water-power.	Steam-power.
	Per cent.	*Per cent.*
United States	35.93	64.07
Northern Atlantic	43.08	56.92
Southern Atlantic	49.48	50.52
Northern Central	22.24	77.76
Southern Central	22.54	77.46
Western	35.33	64.67

A comparison between the amount of power reported in various sections of the country and the extent of territory is given in the following table, based upon areas as computed by Mr. Gannett, geographer to the Tenth Census:

Divisions.	Area in square miles.	Average power per square mile (steam and water).	Average water-power per square mile.	Average steam-power per square mile.
		H. P.	*H. P.*	*H. P.*
United States	* 2, 900, 170	1. 18	0. 42	0. 75
Northern Atlantic	162, 065	11. 16	4. 81	6. 35
Southern Atlantic	268, 620	1. 09	0. 54	0. 55
Northern Central	753, 550	1. 36	0. 30	1. 06
Southern Central	* 540, 385	0. 39	0. 09	0. 30
Western	1, 175, 550	0. 06	0. 02	0. 04

* Exclusive of Indian and unorganized territory.

In the accompanying maps and diagrams some of the leading facts of these statistics have been graphically illustrated.

Plate I is a graphical comparison of the statistics of power used in manufactures as returned at the Tenth Census, with similar statistics as returned at the Ninth Census. The plate shows the relation of steam- and water-power, and the distribution of the total amount of power among certain leading industries in 1870 and in 1880.

Plate II shows the distribution of power by states and territories, and the relative importance of steam- and water-power in each, as returned at the census of 1880.

Plate III is a comparison of the statistics of power used in certain leading industries as returned at the census of 1870 and that of 1880.

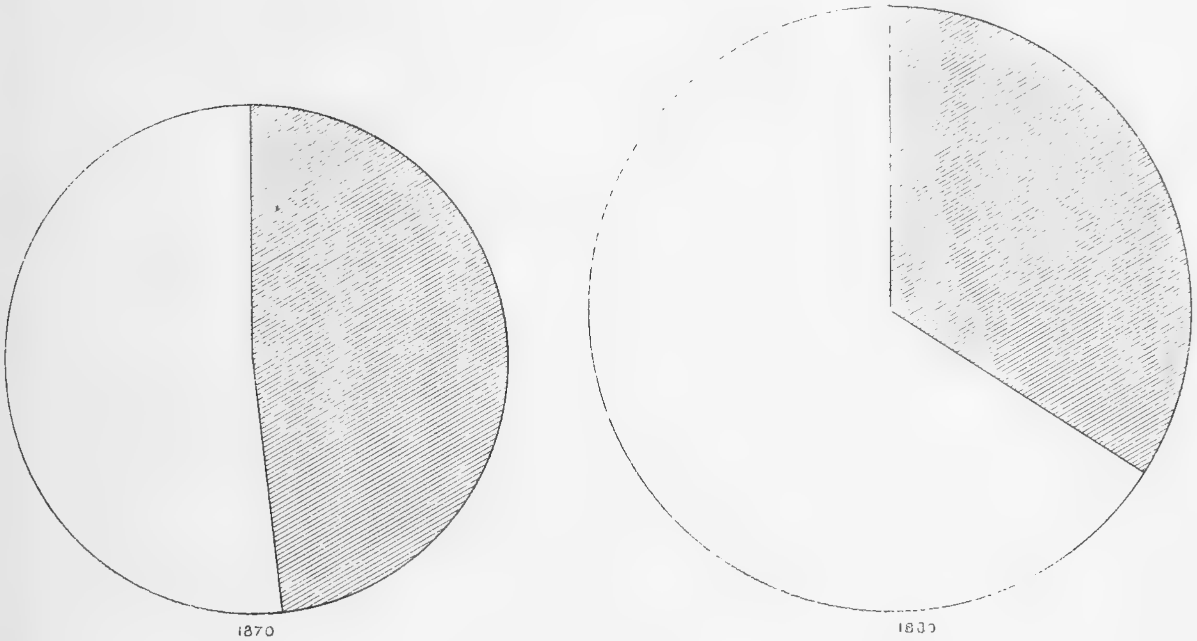
The distribution of power used in manufactures, or, if it may be so called, the density of power, is shown in the accompanying maps; one showing the distribution or density of the total power, the other of water-power, and the third of steam-power.

In the compilation of these maps the county was taken as the unit, the average amount of power per square mile was computed for each county, and that county ranked from I to VI, as shown in the legend of the maps. These maps were not carried west of the 99th meridian, the amount of power reported as compared with the extent of the territory being so small that this would have been of no particular interest, and might have been misleading.

The fourth map shows the relative importance of steam- and water-power in various sections of the country. The county, in the compilation of this map, was likewise taken for the unit, curves being drawn dividing the territory where there was an excess of steam-power from that which reported an excess of water-power.

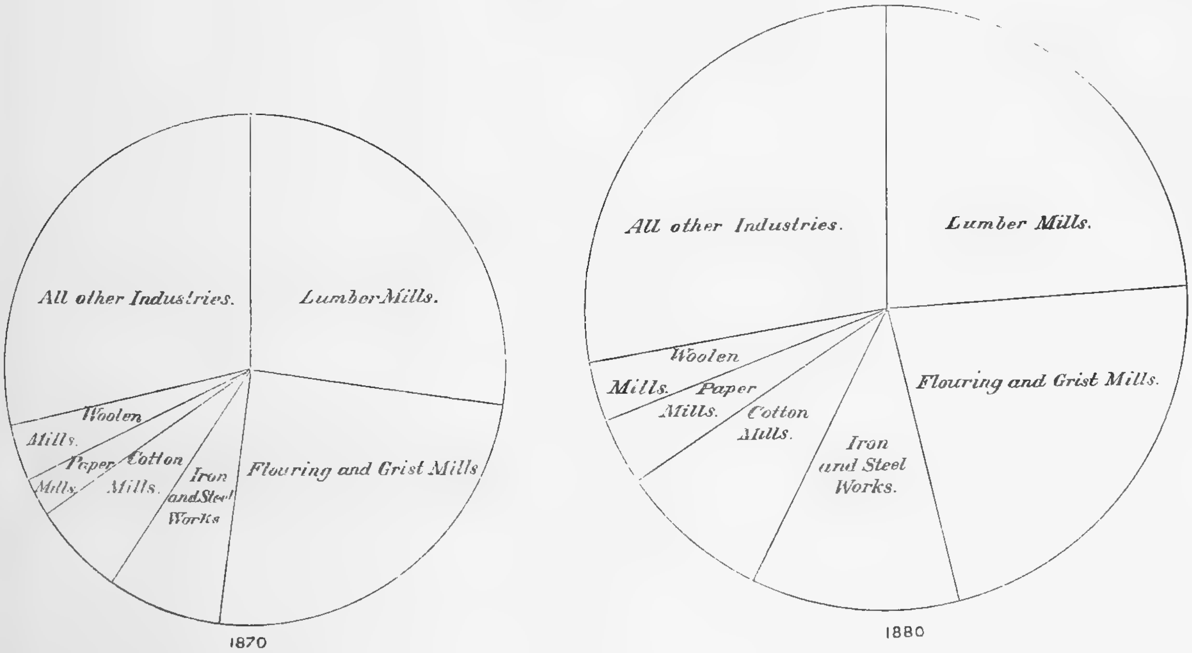
POWER USED IN MANUFACTURES.

Areas of circles proportional to total amount of power.



PROPORTION OF STEAM AND WATER-POWER.

Shaded segments proportional to water-power:
Blank segments proportional to steam-power.



DISTRIBUTION OF POWER BY INDUSTRIES.

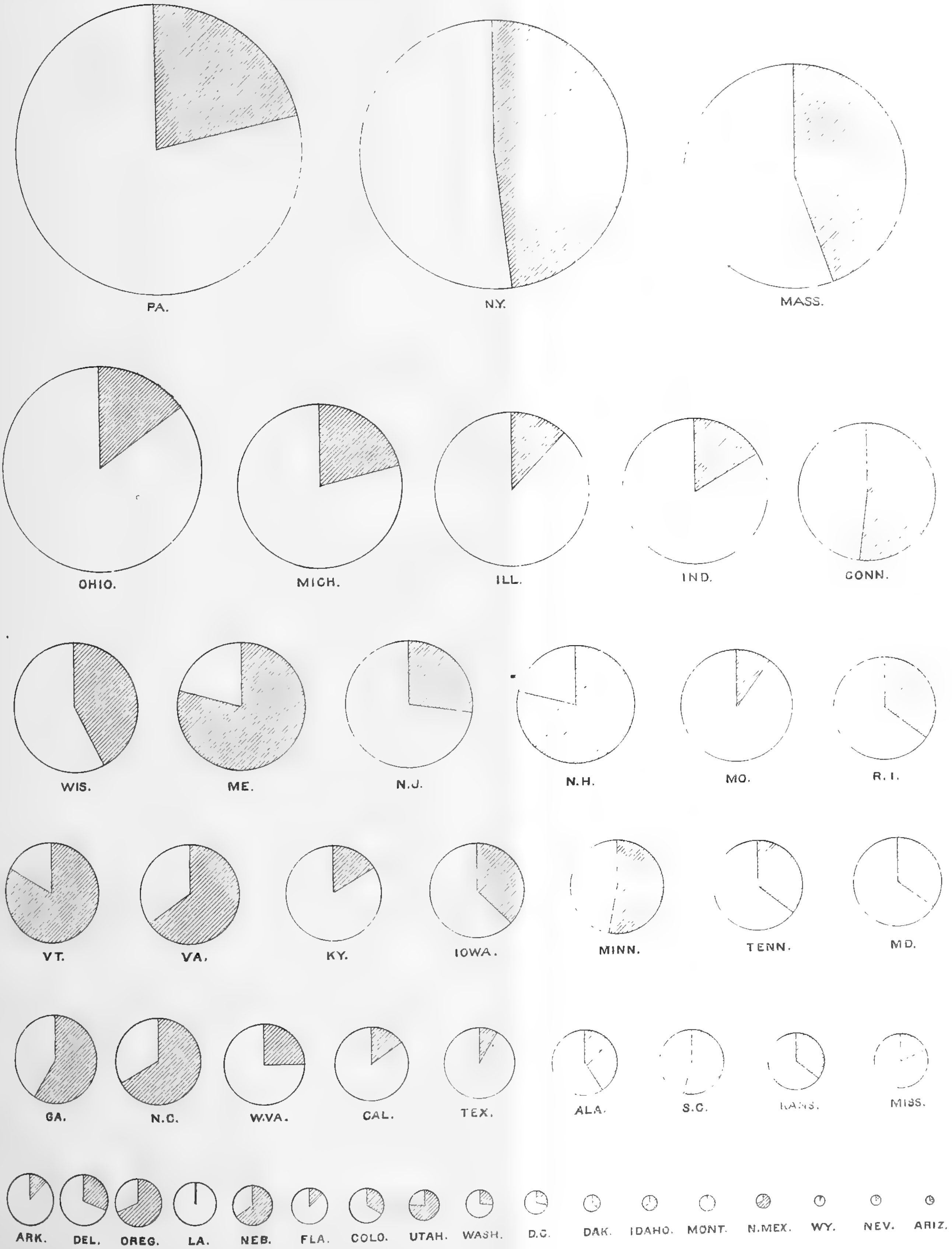
Areas of segments proportional to the total amount of power used in the respective industries.

1 sq. inch = 430,400 H. P.

POWER USED IN MANUFACTURES

DISTRIBUTION BY STATES AND TERRITORIES: 1880.

Areas of circles proportional to total amount of power.
Shaded segments proportional to water-power.
Blank segments proportional to steam-power.

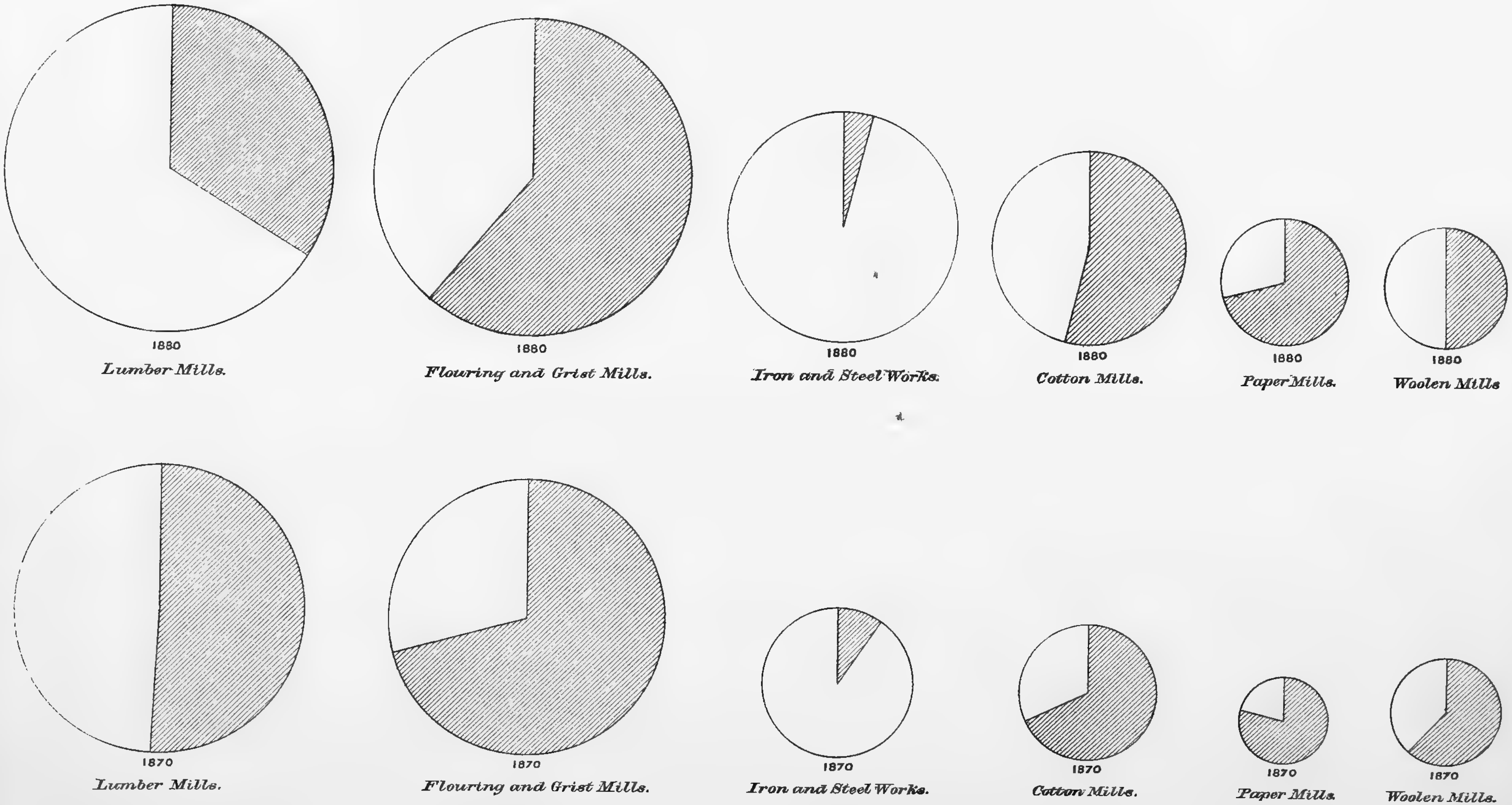


1 sq. inch = 169.256 H. P.

POWER USED IN MANUFACTURES.

DISTRIBUTION BY INDUSTRIES: 1880 AND 1870.

Area of circles proportional to the total amount of power used.
Area of shaded segment proportional to amount of water-power.
Blank segment proportional to steam-power.



1 sq. inch = 240.936 H. P.

TABLE I.—POWER USED IN MANUFACTURES IN THE UNITED STATES: 1880.

A—BY STATES AND TERRITORIES.

States and Territories.	No. of establishments.	WATER POWER.		STEAM POWER.			Total steam- and water-power. (*H. P.*)
		No. of wheels.	Horse-power.	No. of boilers.	No. of engines.	Horse-power.	
The United States	85, 923	55, 404	1, 225, 379	72, 304	56, 483	2, 185, 458	3, 410, 837
Alabama	1, 257	931	11, 797	616	551	15, 779	27, 576
Arizona	21	8	160	15	14	370	530
Arkansas	729	149	2, 024	555	545	13, 709	15, 733
California	1, 000	205	4, 850	990	779	28, 071	32, 921
Colorado	181	52	1, 849	158	152	3, 953	5, 802
Connecticut	2, 028	1, 784	61, 205	1, 670	1, 124	57, 027	118, 232
Dakota	79	36	803	56	55	1, 421	2, 224
Delaware	317	232	4, 785	365	254	10, 643	15, 428
District of Columbia	115	15	880	127	118	2, 263	3, 143
Florida	244	70	939	291	193	6, 208	7, 147
Georgia	2, 074	1, 917	30, 067	948	799	21, 102	51, 169
Idaho	67	48	1, 136	23	22	546	1, 682
Illinois	3, 722	751	17, 445	4, 143	3, 445	126, 843	144, 288
Indiana	4, 066	1, 143	21, 810	3, 889	3, 634	109, 960	131, 770
Iowa	1, 546	1, 093	20, 363	1, 229	1, 068	33, 858	54, 221
Kansas	578	299	7, 611	426	396	13, 468	21, 079
Kentucky	1, 767	653	9, 012	1, 636	1, 494	45, 917	54, 929
Louisiana	402	13	90	491	430	11, 256	11, 346
Maine	1, 918	2, 887	79, 717	747	511	20, 759	100, 476
Maryland	1, 532	1, 004	18, 043	1, 202	914	33, 216	51, 259
Massachusetts	5, 173	3, 046	138, 362	5, 105	3, 096	171, 397	309, 759
Michigan	3, 581	1, 746	34, 395	4, 109	3, 085	130, 352	164, 747
Minnesota	964	650	28, 689	760	569	25, 191	53, 880
Mississippi	893	301	3, 449	676	635	15, 001	18, 450
Missouri	2, 428	537	8, 162	2, 448	2, 128	72, 587	80, 749
Montana	63	39	954	31	31	544	1, 498
Nebraska	262	245	5, 495	128	126	2, 999	8, 494
Nevada	26	6	108	27	23	608	716
New Hampshire	1, 653	2. 122	69, 155	598	456	18, 595	87, 750
New Jersey	2, 226	1, 213	27, 066	2, 253	1, 619	72, 792	99, 858
New Mexico	78	69	932	19	19	427	1, 359
New York	11, 776	9, 752	219, 348	8, 101	6, 672	234, 795	454, 143
North Carolina	2, 323	2, 370	30, 063	699	616	15, 025	45, 088
Ohio	6, 684	2, 080	38, 641	7, 081	6, 215	222, 502	261, 143
Oregon	443	373	9, 255	196	176	4, 334	13, 589
Pennsylvania	10, 581	7, 075	110, 276	12, 095	7, 913	402, 132	512, 408
Rhode Island	608	386	22, 240	1, 164	476	41, 335	63, 575
South Carolina	1, 259	1, 057	13, 873	592	509	11, 995	25, 868
Tennessee	2, 108	1, 382	18, 564	1, 074	967	33, 388	51, 952
Texas	1, 334	174	2, 508	1, 229	1, 167	28, 026	30, 534
Utah	243	214	3, 535	55	55	1, 154	4, 689
Vermont	1, 582	2, 138	52, 226	378	272	11, 088	63, 314
Virginia	2, 768	2, 399	37, 464	982	899	19, 710	57, 174
Washington	70	46	1, 185	96	61	3, 210	4, 395
West Virginia	1, 190	670	9, 454	934	816	28, 456	37, 910
Wisconsin	2, 154	2, 022	45, 356	1, 879	1, 366	60, 729	106, 085
Wyoming	10	2	38	18	18	717	755

Table I.—POWER USED IN MANUFACTURES IN THE UNITED STATES: 1880.

B—BY INDUSTRIES.

Industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	1, 281	519	12, 645	1, 160	1, 014	32, 086	44, 731
Boots and shoes (factory)	741	23	410	602	527	11, 164	11, 574
Carpets	59	16	2, 151	244	81	8, 340	10, 491
Carriages and wagons	353	68	1. 447	327	282	9, 366	10, 813
Clothing, men's	140	3	11	123	142	1, 660	1, 671
Cotton goods (*a*)	956	1, 265	148, 754	2, 584	786	126, 750	275, 504
Felt goods	26	18	1, 141	52	29	1, 490	2, 631
Flouring- and grist-mill products	24, 258	29, 026	469, 987	9, 448	8, 445	301, 214	771, 201
Foundery and machine-shop products	4, 209	611	15, 364	3, 745	3, 639	84, 786	100, 150
Hosiery and knit goods	226	118	5, 492	224	163	6, 069	11, 561
Iron and steel	781	360	16, 506	7, 237	3, 205	380, 741	397, 247
Lumber, sawed	25, 680	14, 639	278, 686	20. 418	17. 268	543, 242	821, 928
Paper	692	1, 856	87, 611	1, 018	673	36, 301	123, 912
Printing and publishing	1, 548	59	335	1, 206	1, 179	15, 990	16, 325
Salt (*b*)	202	7	108	267	412	8, 368	8, 476
Silk and silk goods	197	54	1, 562	219	156	7, 248	8, 810
Sash, doors, and blinds (*c*)	1, 132	284	6, 505	993	842	31, 391	37, 896
Sugar and molasses, refined	49	....	....	422	301	20, 522	20, 522
Woolen goods	1, 984	1, 505	53, 610	1, 676	986	52, 897	106, 507
Wool hats	43	7	672	102	47	3, 320	3, 992
Worsted goods	76	52	6, 302	203	100	10, 135	16, 437
All other industries	21, 290	5, 293	124, 571	21, 046	17, 144	519, 993	644, 564
Gross total	85, 923	55, 783	1, 233, 870	73, 316	57, 421	2, 213, 073	3, 446, 943
Deduct duplicates	....	379	8, 491	1, 012	938	27, 615	36, 106
Total	85, 923	55, 404	1, 225, 379	72, 304	56, 483	2, 185, 458	3, 410, 837

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a Including both specific and special cotton mills.

b The manufacture of salt in Michigan is conducted largely in connection with the manufacture of lumber. In many such cases the steam used in the salt works is supplied from the boilers of the saw-mills, which are therefore not included with the statistics of salt works.

c Exclusive of power used in manufacturing sash, doors, and blinds in combination with planing mills.

TABLE II.—POWER USED IN MANUFACTURES IN CERTAIN INDUSTRIES, BY STATES AND TERRITORIES: 1880.

AGRICULTURAL IMPLEMENTS.

States and Territories.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Alabama	1			1	1	9	9
Arkansas	2			2	2	27	27
California	7			8	8	106	106
Connecticut	17	27	1,041	7	6	305	1,346
Delaware	6	1	15	6	6	66	81
Georgia	9	2	10	8	8	251	261
Illinois	133	35	1,392	159	124	5,396	6,788
Indiana	56	3	147	67	56	2,304	2,451
Iowa	35	1	20	46	35	851	871
Kansas	5			6	6	97	97
Kentucky	13			19	17	803	803
Maine	23	48	1,484	5	5	52	1,536
Maryland	20	9	82	14	13	218	300
Massachusetts	24	41	652	17	12	813	1,465
Michigan	104	20	408	96	90	1,931	2,339
Minnesota	22	1	37	29	22	1,230	1,267
Mississippi	3			3	3	70	70
Missouri	21			21	22	493	493
Nebraska	4			4	4	55	55
New Hampshire	16	18	428	2	2	67	495
New Jersey	18	9	112	14	12	166	278
New York	238	144	3,971	171	152	4,232	8,203
North Carolina	25	10	128	16	16	203	331
Ohio	126	11	299	158	126	5,922	6,221
Oregon	3	4	154	1	1	5	159
Pennsylvania	174	61	672	154	137	3,640	4,312
Rhode Island	4	2	36	2	2	35	71
South Carolina	2			3	2	42	42
Tennessee	13	3	27	10	10	151	178
Texas	7			7	7	63	63
Utah	1	1	12				12
Vermont	33	40	912	8	8	146	1,058
Virginia	39	16	250	26	26	511	761
West Virginia	5			5	5	120	120
Wisconsin	72	12	356	71	65	1,706	2,062
Total	1,281	519	12,645	1,160	1,014	32,086	44,731

BOOTS AND SHOES (FACTORY).

States and Territories.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
California	9			8	8	88	88
Connecticut	10	1	5	12	11	136	141
Georgia	3	1	6	2	2	32	38
Illinois	8			16	12	258	258
Indiana	1			1	1	12	12
Iowa	2			2	2	15	15
Kentucky	9			9	9	75	75
Louisiana	1			1	1	2	2
Maine	36	4	73	38	30	608	681
Maryland	8			7	8	121	121
Massachusetts	471	13	93	345	294	6,933	7,026
Michigan	2			2	2	27	27
Minnesota	2			2	2	50	50
Mississippi	3	1	8	1	1	10	18
Missouri	5			5	5	102	102
New Hampshire	30	2	30	33	28	511	541
New Jersey	24			20	18	319	319
New York	69	1	191	54	52	1,006	1,197
Ohio	16			13	13	253	253
Oregon	1			1	1	20	20
Pennsylvania	24			23	21	389	389
Rhode Island	1		*a* 4				4
Vermont	1			1	1	15	15
Virginia	2			2	2	17	17
West Virginia	1			1	1	40	40
Wisconsin	3			3	2	125	125
Total	741	23	410	602	527	11,164	11,574

a Power rented.

CARPETS.

States and Territories.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Connecticut	2			28	8	960	960
Maine	1			1	1	4	4
Massachusetts	7	4	705	81	10	1,420	2,125
New Jersey	1	2	260				260
New York	9	10	1,186	44	15	3,408	4,594
Pennsylvania	39			90	47	2,548	2,548
Total	59	16	2,151	244	81	8,340	10,491

TABLE II.—POWER USED IN MANUFACTURES IN CERTAIN INDUSTRIES, ETC.: 1880.

CARRIAGES AND WAGONS.

States and Territories.	No. of establishments.	WATER-POWER. Number of wheels.	WATER-POWER. Horse-power.	STEAM-POWER. Number of boilers.	STEAM-POWER. Number of engines.	STEAM-POWER. Horse-power.	Total steam- and water-power. (*H. P.*)
Alabama	1			1	1	6	6
Arkansas	2			2	2	40	40
California	4			3	3	50	50
Colorado	1			1	1	20	20
Connecticut	17	12	176	8	7	201	377
Dakota (*a*)	1					4	4
Delaware	1			1	1	40	40
District of Columbia	1			1	1	15	15
Georgia	7	1	15	5	5	52	67
Illinois	30	4	90	34	28	953	1,043
Indiana	19	1	200	26	18	1,331	1,531
Iowa	11	1	20	9	9	246	266
Kansas	3			3	2	162	162
Kentucky	2			4	3	250	250
Louisiana	1			1	1	4	4
Maine	9	6	79	4	4	36	115
Massachusetts	30	2	125	20	21	369	494
Michigan	25	4	32	21	19	622	654
Minnesota	4			4	4	60	60
Mississippi	3			3	3	105	105
Missouri	8			8	9	260	260
New Hampshire	10	7	203	6	4	153	356
New Jersey	10	2	37	7	8	102	139
New York	55	18	303	43	38	975	1,278
North Carolina	2	1	10	1	2	30	40
Ohio	35			39	33	1,376	1,376
Pennsylvania	18	1	60	19	16	361	421
Rhode Island (*a*)	2		2	1	1	12	14
South Carolina	3	1	8	2	2	33	41
Tennessee	3			7	4	150	150
Texas	2			2	2	25	25
Vermont	7	6	70	2	2	12	82
Virginia	4			4	4	73	73
West Virginia	3			6	4	222	222
Wisconsin	19	1	17	29	20	1,016	1,033
Total	353	68	1,447	327	282	9,366	10,813

a Power rented.

CLOTHING, MEN'S.

States and Territories.	No. of establishments.	WATER-POWER. Number of wheels.	WATER-POWER. Horse-power.	STEAM-POWER. Number of boilers.	STEAM-POWER. Number of engines.	STEAM-POWER. Horse-power.	Total steam- and water-power. (*H. P.*)
California	2			1	2	65	65
Connecticut	1			1	1	10	10
Illinois	19			25	21	393	393
Indiana	2			2	2	36	36
Iowa	3	1	5	1	1	10	15
Kentucky	1			1	1	24	24
Louisiana	1			1	1	16	16
Maryland	1			1	1	6	6
Massachusetts	15			15	16	172	172
Michigan	1			1	1	10	10
Minnesota (*a*)	1					10	10
Missouri	3			3	3	17	17
New Hampshire	1	1	5				5
New Jersey	2			2	3	23	23
New York	46	1	1	34	49	461	462
Ohio	18			17	17	180	180
Pennsylvania	18			17	18	196	196
Virginia	1			1	1	4	4
Wisconsin (*b*)	4				4	27	27
Total	140	3	11	123	142	1,660	1,671

a Power rented. *b* Steam furnished by steam-supply company.

COTTON GOODS.

States and Territories.	No. of establishments.	WATER-POWER. Number of wheels.	WATER-POWER. Horse-power.	STEAM-POWER. Number of boilers.	STEAM-POWER. Number of engines.	STEAM-POWER. Horse-power.	Total steam- and water-power. (*H. P.*)
Alabama	16	9	1,307	19	9	510	1,817
Arkansas	2	1	48	2	1	80	128
Connecticut	90	170	17,631	117	51	6,616	24,247
Delaware	10	9	445	27	7	959	1,404
Florida	1			1	1	35	35
Georgia	41	59	7,300	33	18	1,457	8,757
Illinois	4	3	80	4	2	290	370
Indiana	4	2	80	29	10	1,370	1,450
Kentucky	4	1	53	8	4	448	501
Louisiana	2			5	3	250	270
Maine	23	91	13,586	30	9	1,875	15,461
Maryland	20	25	2,538	65	19	4,717	7,255
Massachusetts	194	338	48,452	1,006	228	55,458	103,910
Michigan	2			2	1	140	140
Minnesota	1	1	28				28
Mississippi	7	3	172	14	7	763	935
Missouri	4			12	5	680	680
New Hampshire	36	105	20,140	78	21	4,569	24,709
New Jersey	23	19	1,485	77	28	3,404	4,889
New York	52	74	9,189	81	30	3,991	13,180

TABLE II.—POWER USED IN MANUFACTURES IN CERTAIN INDUSTRIES, ETC.: 1880.

COTTON GOODS—Continued.

States and Territories.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
North Carolina	48	51	3,046	17	10	582	3,628
Ohio	6	3	90	13	6	360	450
Pennsylvania	185	35	1,783	434	182	14,408	16,191
Rhode Island	129	200	15,969	463	114	21,433	37,402
South Carolina	14	23	2,398	6	3	425	2,823
Tennessee	19	14	462	17	7	810	1,272
Texas	2			4	2	205	205
Utah	1	1	26				26
Vermont	8	11	1,076	14	5	570	1,646
Virginia	7	13	1,190	3	2	165	1,355
Wisconsin	1	4	180	3	1	180	360
Total	956	1,265	148,754	2,584	786	126,750	275,504

FELT GOODS.

States and Territories.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Connecticut	2	3	261	7	4	275	536
Maine	1	1	65	3	1	65	130
Massachusetts	11	8	480	23	14	670	1,150
New Hampshire	1	1	60				60
New Jersey	6	3	110	10	4	170	280
New York	4	2	165	3	3	210	375
Pennsylvania	1			6	3	100	100
Total	26	18	1,141	52	29	1,490	2,631

FLOURING- AND GRIST-MILL PRODUCTS.

States and Territories.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Alabama	807	759	7,992	256	252	5,670	13,662
Arizona	8	6	134	3	3	90	224
Arkansas	350	118	1,535	261	261	5,671	7,206
California	149	69	1,672	145	97	5,769	7,441
Colorado	34	37	1,475	7	7	440	1,915
Connecticut	233	318	5,821	32	30	874	6,695
Dakota	30	33	717	12	11	404	1,121
Delaware	81	121	2,046	18	12	421	2,467
District of Columbia	9	12	778				778
Florida	94	49	530	50	50	764	1,294
Georgia	1,132	1,481	17,622	156	149	3,733	21,355
Idaho	16	17	468	1	1	30	498
Illinois	1,012	524	10,298	1,002	832	38,292	48,590
Indiana	996	837	13,547	713	656	25,251	38,798
Iowa	713	1,002	18,145	320	287	11,654	29,799
Kansas	319	269	6,846	182	169	6,858	13,704
Kentucky	651	508	7,101	424	395	12,905	20,006
Louisiana	79	6	39	73	72	1,346	1,385
Maine	261	516	8,497	29	20	962	9,459
Maryland	546	673	10,344	93	72	2,446	12,790
Massachusetts	344	444	9,688	95	74	3,352	13,040
Michigan	706	1,115	18,570	362	327	14,461	33,031
Minnesota	434	555	22,482	180	144	8,979	31,461
Mississippi	525	242	2,596	309	306	5,814	8,410
Missouri	872	456	6,807	701	617	25,087	31,894
Montana	15	18	502				502
Nebraska	169	233	5,276	31	31	1,157	6,433
Nevada	7	6	108	2	2	61	169
New Hampshire	181	432	7,052	20	18	660	7,712
New Jersey	479	660	12,183	61	55	1,852	14,035
New Mexico	51	56	698	4	4	78	776
New York	1,766	3,593	66,491	370	357	15,998	82,489
North Carolina	1,294	1,776	18,842	170	152	3,515	22,357
Ohio	1,380	1,461	25,634	858	777	31,648	57,282
Oregon	106	135	4,072	14	14	415	4,487
Pennsylvania	2,873	4,251	59,966	773	593	19,345	79,311
Rhode Island	46	38	970	29	12	1,001	1,971
South Carolina	719	803	8,457	175	170	2,721	11,178
Tennessee	989	933	12,699	288	273	8,741	21,440
Texas	900	146	2,210	799	783	16,392	18,602
Utah	85	94	1,674	3	3	90	1,764
Vermont	227	587	9,686	10	8	323	10,009
Virginia	1,385	1,786	25,765	55	51	1,335	27,100
Washington	9	7	131	2	2	24	155
West Virginia	472	491	6,996	168	150	4,642	11,638
Wisconsin	703	1,372	24,875	192	146	9,943	34,818
Wyoming	1	1	30				30
Total	24,258	29,026	469,987	9,448	8,445	301,214	771,201

FOUNDERY AND MACHINE-SHOP PRODUCTS.

States and Territories.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Alabama	11	1	80	10	11	215	295
Arkansas	6			6	6	89	89
California	85	6	119	70	77	1,831	1,950
Colorado	16			15	15	227	227
Connecticut	155	39	1,193	116	101	3,244	4,437

TABLE II.—POWER USED IN MANUFACTURES IN CERTAIN INDUSTRIES, ETC.: 1880.

FOUNDERY AND MACHINE-SHOP PRODUCTS—Continued.

States and Territories.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Dakota	4			4	4	78	78
Delaware	14	1	12	16	15	332	344
District of Columbia	10			11	11	121	121
Georgia	34	2	32	33	36	620	652
Idaho	1			2	1	16	16
Illinois	248	22	510	203	202	4, 768	5, 278
Indiana	104	8	258	107	104	2, 526	2, 784
Iowa	77	2	40	78	77	1, 155	1, 195
Kansas	22	3	62	19	19	330	392
Kentucky	44			53	69	1, 262	1, 262
Louisiana	21			27	32	567	567
Maine	69	35	741	39	32	745	1, 486
Maryland	78	3	19	84	82	1, 629	1, 648
Massachusetts	499	80	2, 650	324	293	7, 254	9, 904
Michigan	153	18	303	138	136	2, 490	2, 793
Minnesota	52	3	45	44	43	649	694
Mississippi	12			10	10	137	137
Missouri	80			86	86	2, 675	2, 675
Montana	5	1	6	5	5	64	70
Nebraska	8			9	9	84	84
Nevada	3			3	3	52	52
New Hampshire	67	29	634	31	32	827	1, 461
New Jersey	182	25	958	172	162	4, 251	5, 209
New York	738	104	4, 657	563	559	14, 990	19, 647
North Carolina	28	10	120	22	22	311	43
Ohio	369	30	476	341	356	8, 997	9, 473
Oregon	15	1	90	14	14	281	371
Pennsylvania	625	44	517	721	679	14, 934	15, 451
Rhode Island	71	6	229	91	59	1, 899	2, 128
South Carolina	14			17	17	214	214
Tennessee	38	4	42	34	36	644	686
Texas	18			21	22	392	392
Utah	7	2	20	5	5	47	67
Vermont	41	39	840	21	16	277	1, 117
Virginia	53	21	447	37	39	689	1, 136
Washington	3			4	7	75	75
West Virginia	31	1	6	34	32	814	820
Wisconsin	118	11	258	105	103	1, 984	2, 242
Total	4, 209	611	15, 364	3, 745	3, 639	84, 786	100, 150

HOSIERY AND KNIT GOODS.

States and Territories.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Connecticut	14	13	479	22	12	795	1, 274
Illinois	6	1	50	3	3	30	80
Indiana	2			2	2	13	13
Massachusetts	22	7	380	25	18	681	1, 061
Michigan	6	1	30	3	3	83	113
Missouri	2	1	2			2	4
New Hampshire	23	24	949	2	2	50	999
New Jersey	5	1	12	11	5	494	506
New York	67	61	3, 372	55	37	1, 839	5, 211
Ohio	2			2	2	27	27
Pennsylvania	70	1	10	80	72	1, 830	1, 840
Rhode Island	1			2	1	5	5
Vermont	6	8	208	7	6	220	428
Total	226	118	5, 492	224	163	6, 069	11, 561

IRON AND STEEL.

States and Territories.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Alabama	8			44	20	2, 400	2, 400
California	1			43	16	600	600
Colorado	1			7	4	315	315
Connecticut	17	14	918	46	22	2, 145	3, 063
Delaware	7	2	189	63	32	2, 370	2, 559
District of Columbia	1			3	2	135	135
Georgia	9	4	53	34	15	1, 546	1, 599
Illinois	16			198	127	17, 852	17, 852
Indiana	10			77	60	4, 495	4, 495
Kansas	2			21	12	1, 900	1, 900
Kentucky	18			146	76	6, 400	6, 400
Maine	3	6	785	33	10	1, 100	1, 885
Maryland	18	11	670	145	69	5, 276	5, 946
Massachusetts	24	39	1, 650	328	112	13, 821	15, 471
Michigan	15	2	45	92	63	5, 195	5, 240
Missouri	10			118	60	5, 915	5, 915
Nebraska	1			5	5	300	300
New Hampshire	2			30	11	755	755
New Jersey	36	26	1, 196	331	133	13, 739	14, 935
New York	74	82	4, 709	626	241	25, 138	29, 847
North Carolina	6	13	253				253
Ohio	103	1	100	859	439	50, 870	50, 970
Oregon	1	1	147				147
Pennsylvania	321	101	3, 713	3, 689	1, 506	197, 569	201, 282
Rhode Island	1			14	5	420	420

TABLE II.—POWER USED IN MANUFACTURES IN CERTAIN INDUSTRIES, ETC: 1880.

IRON AND STEEL—Continued.

States and Territories.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Tennessee	29	22	293	75	41	6, 045	6, 338
Texas	1			1	1	60	60
Vermont	2	1	25	10	1	350	375
Virginia	19	29	1, 596	18	9	375	1, 971
West Virginia	16			103	50	8, 600	8, 600
Wisconsin	8	6	164	68	53	4, 600	4, 764
Wyoming	1			10	10	455	455
Total	781	360	16, 506	7, 237	3, 205	380, 741	397, 247

LUMBER, SAWED.

States and Territories.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Alabama	354	157	2, 354	277	249	6, 880	9, 234
Arizona	13	2	26	12	11	280	306
Arkansas	319	27	445	317	310	8, 586	9, 031
California	251	90	2, 229	285	211	8, 763	10, 992
Colorado	96	13	279	94	92	2, 214	2, 493
Connecticut	300	328	5, 880	41	38	1, 105	6, 985
Dakota	38	2	66	37	37	928	994
Delaware	86	46	689	78	60	1, 558	2, 247
District of Columbia	1			2	1	200	200
Florida	135	25	482	235	140	5, 393	5, 875
Georgia	655	308	4, 345	557	455	10, 955	15, 300
Idaho	48	31	748	19	19	490	1, 238
Illinois	640	18	190	724	673	17, 891	18, 081
Indiana	2, 018	171	2, 688	2, 012	1, 986	51, 638	54, 326
Iowa	328	48	837	412	220	13, 655	14, 492
Kansas	145	21	463	129	126	3, 352	3, 815
Kentucky	668	104	1, 148	660	650	16, 439	17, 587
Louisiana	174	6	52	212	187	5, 076	5, 128
Maine	848	1, 609	35, 127	196	115	7, 484	42, 611
Maryland	369	216	2, 386	257	208	5, 078	7, 464
Massachusetts	606	707	14, 366	150	115	4, 573	18, 939
Michigan	1, 649	418	9, 149	2, 584	1, 584	81, 297	90, 446
Minnesota	234	94	5, 194	326	199	10, 109	15, 303
Mississippi	295	51	658	314	292	7, 608	8, 266
Missouri	881	63	1, 139	895	853	22, 143	23, 282
Montana	36	18	430	20	20	420	850
Nebraska	38	7	154	33	35	821	975
Nevada	9			14	11	409	409
New Hampshire	680	920	19, 584	161	142	5, 526	25, 110
New Jersey	284	289	3, 903	96	83	2, 465	6, 368
New Mexico	26	13	234	14	14	319	553
New York	2, 822	3, 380	62, 569	1, 131	1, 007	31, 213	93, 782
North Carolina	774	461	6, 828	451	395	10, 067	16, 895
Ohio	2, 347	318	4, 872	2, 244	2, 216	57, 419	62, 291
Oregon	227	157	3, 959	119	99	2, 875	6, 834
Pennsylvania	2, 826	1, 875	30, 724	2, 036	1, 630	48, 922	79, 646
Rhode Island	49	50	915	9	10	230	1, 145
South Carolina	420	216	2, 935	300	254	6, 181	9, 116
Tennessee	755	349	4, 165	718	494	13, 734	17, 899
Texas	317	28	386	351	313	9, 836	10, 222
Utah	107	86	1, 303	33	33	703	2, 006
Vermont	688	871	21, 799	99	87	3, 821	25, 620
Virginia	907	465	6, 877	562	517	11, 214	18, 091
Washington	37	27	804	82	44	2, 967	3, 771
West Virginia	469	136	1, 921	394	374	9, 560	11, 481
Wisconsin	704	424	13, 376	919	552	30, 613	43, 989
Wyoming	7	1	8	7	7	232	240
Total	25, 680	14, 639	278, 686	20, 418	17, 268	543, 242	821, 928

PAPER.

States and Territories.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
California	6	5	225	17	11	610	835
Colorado	1	1	70	1	1	15	85
Connecticut	65	154	6, 221	60	41	2, 250	8, 471
Delaware	4	9	589	26	10	1, 098	1, 687
District of Columbia	1	2	95	2	1	20	115
Georgia	7	10	367	8	8	350	717
Illinois	23	73	2, 383	29	16	839	3, 222
Indiana	19	42	2, 469	19	17	593	3, 062
Iowa	4	8	532	12	8	470	1, 002
Kansas	1	2	45				45
Kentucky	2			18	9	925	925
Maine	12	84	4, 958	14	6	435	5, 393
Maryland	25	45	1, 235	29	21	786	2, 021
Massachusetts	96	368	21, 045	175	123	6, 361	27, 406
Michigan	21	55	2, 363	19	9	489	2, 852
Minnesota	2	5	650				650
Nebraska	1	5	65				65
New Hampshire	25	80	4, 931	9	7	308	5, 239
New Jersey	32	57	2, 321	57	32	2, 180	4, 501
New York	168	499	21, 831	111	90	4, 474	26, 305

TABLE II.—POWER USED IN MANUFACTURES IN CERTAIN INDUSTRIES, ETC.: 1880.

PAPER—Continued.

States and Territories.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
North Carolina	4	11	698	1	1	15	713
Ohio	60	99	4,228	181	111	6,868	11,096
Oregon	1	6	80				80
Pennsylvania	78	108	2,766	202	134	6,668	9,434
Tennessee	1	1	40	2	1	15	55
Utah	1	1	35	1	1	50	85
Vermont	13	53	4,613	5	4	82	4,695
Virginia	3	4	195	4	2	100	295
West Virginia	3	1	10	15	8	255	265
Wisconsin	13	68	2,551	1	1	45	2,596
Total	692	1,856	87,611	1,018	673	36,301	123,912

PRINTING AND PUBLISHING.

States and Territories.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Alabama	2			3	3	20	20
Arkansas	1			1	1	6	6
California	53			20	20	374	374
Colorado	3			3	3	43	43
Connecticut	51	7	33	42	40	278	311
District of Columbia	18			19	19	320	320
Georgia	13			15	15	86	86
Illinois	112		*b* 5	88	82	1,382	1,387
Indiana	44	3	7	39	38	394	401
Iowa	35	2	5	30	31	226	231
Kansas	13			11	11	103	103
Kentucky	19	1	5	19	21	309	314
Louisiana	13			13	13	140	140
Maine	34	5	22	19	23	257	279
Maryland	36	1	5	33	36	266	271
Massachusetts	163	2	13	110	109	1,258	1,271
Michigan	29	1	13	22	22	197	210
Minnesota	24			22	20	187	187
Mississippi	4			4	4	18	18
Missouri	43			42	39	777	777
Montana (*a*)	1		6				6
Nebraska	7			7	7	80	80
Nevada	2			2	2	8	8
New Hampshire	20	3	20	13	12	76	96
New Jersey	45	5	9	43	41	344	353
New York	322	11	143	210	203	4,401	4,544
North Carolina	2			2	2	7	7
Ohio	122	2	9	105	99	1,639	1,648
Oregon	4			4	4	42	42
Pennsylvania	199	8	18	159	154	1,943	1,961
Rhode Island	20		*b* 4	18	17	107	111
South Carolina	6			6	6	38	38
Tennessee	10	1	3	11	11	131	134
Texas	11	4	6	9	9	56	62
Utah	4	3	9	2	2	16	25
Vermont	10			8	8	51	51
Virginia	20			20	20	122	122
Washington	1			1	1	2	2
West Virginia	4			4	4	32	32
Wisconsin	28			27	27	254	254
Total	1,548	59	335	1,206	1,179	15,990	16,325

a Power rented.

SALT.

States and Territories.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
California	6	4	17	3	3	32	49
Kansas	1			1	1	10	10
Kentucky	2			3	3	22	22
Louisiana	1			1	1	30	30
Maine	1			1	1	25	25
Michigan (*a*)	81			56	202	5,000	5,000
Nevada	2			2	2	18	18
New York	52	1	75	70	66	1,313	1,388
Ohio	23			52	53	812	812
Pennsylvania	16			21	21	269	269
Utah	2	2	16				16
Virginia	1			2	2	40	40
West Virginia	14			55	57	797	797
Total	202	7	108	267	412	8,368	8,476

a The manufacture of salt in Michigan is conducted largely in connection with the manufacture of lumber. In many such cases the steam used in the salt works is supplied from the boilers of the saw-mills, which are therefore not included with the statistics of salt works.

SASH, DOORS, AND BLINDS.

States and Territories.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Alabama	7	2	95	6	5	127	222
California	30	3	52	28	21	1,076	1,128
Colorado	1			1	1	40	40
Connecticut	30	15	476	22	14	682	1,158
Dakota	4	1	20	3	3	50	70

TABLE II.—POWER USED IN MANUFACTURES IN CERTAIN INDUSTRIES, ETC.: 1880.

SASH, DOORS, AND BLINDS—Continued.

States and Territories.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (H. P.)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Florida	1			2	1	18	18
Georgia	10			11	10	326	326
Illinois	63	3	118	72	57	2,857	2,975
Indiana	39	4	144	39	35	1,530	1,674
Iowa	26	2	112	23	20	765	877
Kansas	3			4	3	52	52
Kentucky	3			3	3	98	98
Louisiana	7			8	7	188	188
Maine	29	25	630	8	6	173	803
Maryland	16			23	15	645	645
Massachusetts	49	12	250	24	19	933	1,183
Michigan	104	23	510	90	86	2,667	3,177
Minnesota	29	1	9	26	25	1,012	1,021
Mississippi	2			2	2	40	40
Missouri	14			19	13	834	834
Nevada	1			1	1	50	59
New Hampshire	24	19	404	12	9	350	754
New Jersey	60	2	30	51	47	1,179	1,209
New York	192	91	1,848	125	114	3,752	5,600
North Carolina	12			11	11	263	263
Ohio	92	6	102	98	89	3,927	4,029
Oregon	20	8	176	13	13	290	466
Pennsylvania	102	13	225	119	94	3,169	3,394
Rhode Island	8	1	4	11	7	283	287
South Carolina	1			1	1	10	10
Tennessee	7	1	30	6	5	175	205
Texas	8			9	8	230	230
Utah	5	5	74	1	1	30	104
Vermont	32	25	673	8	8	421	1,094
Virginia	14	6	160	12	11	241	401
Washington	5	3	53	2	2	60	113
West Virginia	3			4	3	90	90
Wisconsin	78	13	305	94	71	2,728	3,033
Wyoming	1			1	1	30	30
Total	1,132	284	6,505	993	842	31,391	37,896
SILK AND SILK GOODS.							
California	2			3	2	52	52
Connecticut	27	17	310	35	21	1,168	1,478
Illinois	2			1	1	17	17
Maine	1	1	30				30
Massachusetts	17	11	362	24	16	357	719
New Hampshire	1	1	10				10
New Jersey	78	18	619	92	66	3,628	4,247
New York	44	5	223	36	31	1,352	1,575
Pennsylvania	23			27	18	666	666
Rhode Island	1			1	1	8	8
Vermont	1	1	8				8
Total	197	54	1,562	219	156	7,248	8,810
SUGAR AND MOLASSES, REFINED.							
California	2			24	9	450	450
Louisiana	4			17	12	230	230
Maine	2			9	14	340	340
Maryland	3			9	6	515	515
Massachusetts	5			43	19	3,200	3,200
Missouri	1			71	12	400	400
New Jersey	4			38	44	4,034	4,034
New York	17			151	135	6,623	6,623
Pennsylvania	11			60	50	4,730	4,730
Total	49			422	301	20,522	20,522
WOOLEN GOODS.							
Alabama	14	7	183	4	4	86	269
Arkansas	23	4	31	11	10	268	299
California	9	3	115	17	9	610	725
Connecticut	78	98	5,224	99	52	3,780	9,004
Delaware	5	6	224	2	2	60	284
Georgia	32	33	356	2	2	31	387
Illinois	53	8	191	54	43	1,407	1,598
Indiana	81	27	577	69	59	2,171	2,748
Iowa	34	22	550	18	16	377	927
Kansas	5	3	153	3	2	65	218
Kentucky	95	35	564	69	63	1,527	2,091
Maine	93	86	3,406	12	8	404	3,810
Maryland	14	16	322	5	3	120	442
Massachusetts	167	262	16,845	349	150	11,880	28,725
Michigan	39	26	460	13	10	295	755
Minnesota	13	7	302	5	5	61	363
Mississippi	8	2	66	6	5	154	220
Missouri	97	18	225	64	61	1,680	1,905
New Hampshire	58	86	4,179	27	17	767	4,946
New Jersey	27	24	1,114	53	25	2,541	3,655

TABLE II.—POWER USED IN MANUFACTURES IN CERTAIN INDUSTRIES, ETC.: 1880.

WOOLEN GOODS—Continued.

States and Territories.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
New York	159	172	4,917	84	42	2,795	7,712
North Carolina	49	29	516	9	8	205	721
Ohio	122	48	851	91	84	2,043	2,894
Oregon	10	10	384				384
Pennsylvania	324	155	2,749	422	204	12,437	15,186
Rhode Island	50	69	3,291	114	45	4,702	7,993
South Carolina	11	10	104	1	1	6	110
Tennessee	106	58	640	18	18	470	1,110
Texas	1			1	1	45	45
Utah	11	11	315				315
Vermont	44	49	2,636	21	8	1,008	3,644
Virginia	48	43	667	1	1	50	717
Washington	1	1	35				35
West Virginia	55	43	576	21	19	591	1,167
Wisconsin	48	44	842	11	9	261	1,103
Total	1,984	1,505	53,610	1,676	986	52,897	106,507

WOOL HATS.

States and Territories.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Connecticut	3			9	4	350	350
Maine	1			2	1	100	100
Massachusetts	6			13	5	490	490
New York	10	3	600	39	14	1,660	2,260
Pennsylvania	23	4	72	39	23	720	792
Total	43	7	672	102	47	3,320	3,992

WORSTED GOODS.

States and Territories.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Connecticut	3	6	331	8	3	165	496
Massachusetts	23	24	3,011	51	20	2,365	5,376
New Hampshire	2	3	1,065	8	9	182	1,247
New Jersey	2	1	20	2	1	60	80
New York	6	11	1,360	8	12	521	1,881
Ohio	1	1	80				80
Pennsylvania	28	2	70	72	38	3,657	3,727
Rhode Island	11	4	365	54	17	3,185	3,550
Total	76	52	6,302	203	100	10,135	16,437

ALL OTHER INDUSTRIES.

States and Territories.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Alabama	36	14	127	27	27	675	802
Arkansas	24	1	20	31	28	962	982
California	384	27	486	322	287	7,746	8,232
Colorado	28	1	25	30	29	714	739
Connecticut	933	577	15,564	959	659	31,713	47,277
Dakota	2			2	2	17	17
Delaware	103	37	576	132	111	3,804	4,380
District of Columbia	74	1	27	89	83	1,452	1,479
Florida	13	3	17	12	10	231	248
Georgia	122	35	326	109	99	2,179	2,505
Idaho	2	1	10	1	1	10	20
Illinois	1,353	60	2,138	1,583	1,272	35,647	37,785
Indiana	671	46	1,708	766	669	18,647	20,355
Iowa	278	13	324	301	278	4,966	5,290
Kansas	59	3	97	62	57	989	1,086
Kentucky	236	6	175	278	249	6,569	6,744
Louisiana	98	2	7	155	123	3,963	3,970
Maine	471	376	10,510	312	230	6,349	16,859
Maryland	378	23	758	467	381	11,957	12,715
Massachusetts	2,400	715	18,394	1,902	1,440	49,572	67,966
Michigan	644	66	2,580	634	555	16,442	19,022
Minnesota	146	9	198	131	114	3,101	3,299
Mississippi	32	3	24	41	33	1,046	1,070
Missouri	387		*a* 5	491	426	14,090	14,095
Montana	6	2	10	6	6	60	70
Nebraska	34	1	20	39	35	502	522
Nevada	2			3	2	10	10
New Hampshire	476	398	9,658	171	144	3,954	13,612
New Jersey	908	114	2,769	1,123	857	32,031	34,800
New Mexico	1			1	1	30	30
New York	4,866	1,148	32,231	4,129	3,460	105,986	138,217
North Carolina	79	32	288	68	56	1,287	1,575
Ohio	1,862	106	2,014	2,047	1,832	51,340	53,354
Oregon	55	26	401	31	31	446	847
Pennsylvania	2,403	448	7,556	2,954	2,299	64,329	71,885
Rhode Island	214	18	501	355	185	8,015	8,516
South Carolina	69	20	251	128	95	3,371	3,622
Tennessee	138	34	450	141	118	3,801	4,251
Texas	67	2	17	74	68	1,929	1,946
Utah	19	10	71	10	10	218	289
Vermont	469	455	9,941	168	112	3,982	13,923
Virginia	265	78	1,623	253	229	5,210	6,833
Washington	14	9	187	5	5	82	269
West Virginia	114	4	20	137	120	3,031	3,051
Wisconsin	355	69	2,467	366	316	7,538	10,005
Total	21,290	5,293	124,571	21,046	17,144	519,993	644,564

a Power rented.

TABLE III.—POWER USED IN MANUFACTURES IN EACH STATE AND TERRITORY, IN CERTAIN SELECTED INDUSTRIES: 1880.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
ALABAMA.							
Agricultural implements	1			1	1	9	9
Carriages and wagons	1			1	1	6	6
Cotton goods	16	9	1,307	19	9	510	1,817
Flouring- and grist-mill products	807	759	7,992	256	252	5,670	13,662
Foundery and machine-shop products	11	1	80	10	11	215	295
Iron and steel	8			44	20	2,400	2,400
Lumber, sawed	354	157	2,354	277	249	6,880	9,234
Printing and publishing	2			3	3	20	20
Sash, doors, and blinds	7	2	95	6	5	127	222
Woolen goods	14	7	183	4	4	86	269
All other industries	36	14	127	27	27	675	802
Gross total	1,257	949	12,138	648	582	16,598	28,736
Less duplicates		18	341	32	31	819	1,160
Total	1,257	931	11,797	616	551	15,779	27,576
ARIZONA TERRITORY.							
Flouring- and grist-mill products	8	6	134	3	3	90	224
Lumber, sawed	13	2	26	12	11	280	306
Total	21	8	160	15	14	370	530
ARKANSAS.							
Agricultural implements	2			2	2	27	27
Carriages and wagons	2			2	2	40	40
Cotton goods	2	1	48	2	1	80	128
Flouring- and grist-mill products	350	118	1,535	261	261	5,671	7,206
Foundery and machine-shop products	6			6	6	89	89
Lumber, sawed	319	27	445	317	310	8,586	9,031
Printing and publishing	1			1	1	6	6
Woolen goods	23	4	31	11	10	268	299
All other industries	24	1	20	31	28	962	982
Gross total	729	151	2,079	633	621	15,729	17,808
Less duplicates		2	55	78	76	2,020	2,075
Total	729	149	2,024	555	545	13,709	15,733
CALIFORNIA.							
Agricultural implements	7			8	8	106	106
Boots and shoes (factory)	9			8	8	88	88
Carriages and wagons	4			3	3	50	50
Clothing, men's	2			1	2	65	65
Flouring- and grist-mill products	149	69	1,672	145	97	5,769	7,441
Foundery and machine-shop products	85	6	119	70	77	1,831	1,950
Iron and steel	1			43	16	600	600
Lumber, sawed	251	90	2,229	285	211	8,763	10,992
Paper	6	5	225	17	11	610	835
Printing and publishing	53			20	20	374	374
Salt	6	4	17	3	3	32	49
Sash, doors, and blinds	30	3	52	28	21	1,076	1,128
Silk and silk goods	2			3	2	52	52
Sugar and molasses, refined	2			24	9	450	450
Woolen goods	9	3	115	17	9	610	725
All other industries	384	27	486	322	287	7,746	8,232
Gross total	1,000	207	4,915	997	784	28,222	33,137
Less duplicates		2	65	7	5	151	216
Total	1,000	205	4,850	990	779	28,071	32,921
COLORADO.							
Carriages and wagons	1			1	1	20	20
Flouring- and grist-mill products	34	37	1,475	7	7	440	1,915
Foundery and machine-shop products	16			15	15	227	227
Iron and steel	1			7	4	315	315
Lumber, sawed	96	13	279	94	92	2,214	2,493
Paper	1	1	70	1	1	15	85
Printing and publishing	3			3	3	43	43
Sash, doors, and blinds	1			1	1	40	40
All other industries	28	1	25	30	29	714	739
Gross total	181	52	1,849	159	153	4,028	5,877
Less duplicates				1	1	75	75
Total	181	52	1,849	158	152	3,953	5,802

TABLE III.—POWER USED IN MANUFACTURES IN EACH STATE AND TERRITORY, ETC.: 1880.

CONNECTICUT.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	17	27	1, 041	7	6	305	1, 346
Boots and shoes (factory)	10	1	5	12	11	136	141
Carpets	2			28	8	960	960
Carriages and wagons	17	12	176	8	7	201	377
Clothing, men's	1			1	1	10	10
Cotton goods	90	170	17, 631	117	51	6, 616	24, 247
Felt goods	2	3	261	7	4	275	536
Flouring- and grist-mill products	233	318	5, 821	32	30	874	6, 695
Foundery and machine-shop products	135	39	1, 193	116	101	3, 244	4, 437
Hosiery and knit goods	14	13	479	22	12	795	1, 274
Iron and steel	17	14	918	46	22	2, 145	3, 063
Lumber, sawed	300	328	5, 880	41	38	1, 105	6, 985
Paper	65	154	6, 221	60	41	2, 250	8, 471
Printing and publishing	51	7	33	42	40	278	311
Sash, doors, and blinds	30	15	476	22	14	682	1, 158
Silk and silk goods	27	17	310	35	21	1, 168	1, 478
Woolen goods	78	98	5, 224	99	52	3, 780	9, 004
Wool hats	3			9	4	350	350
Worsted goods	3	6	331	8	3	165	496
All other industries	933	577	15, 564	959	659	31, 713	47, 277
Gross total	2, 028	1, 799	61, 564	1, 671	1, 125	57, 052	118, 616
Less duplicates		15	359	1	1	25	384
Total	2, 028	1, 784	61, 205	1, 670	1, 124	57, 027	118, 232

DAKOTA TERRITORY.

Carriages and wagons (*a*)	1					4	4
Flouring- and grist-mill products	30	33	717	12	11	404	1, 121
Foundery and machine-shop products	4			4	4	78	78
Lumber, sawed	38	2	66	37	37	928	994
Sash, doors, and blinds	4	1	20	3	3	50	70
All other industries	2			2	2	17	17
Gross total	79	36	803	58	57	1, 481	2, 284
Less duplicates				2	2	60	60
Total	79	36	803	56	55	1, 421	2, 224

a Power rented.

DELAWARE.

Agricultural implements	6	1	15	6	6	66	81
Carriages and wagons	1			1	1	40	40
Cotton goods	10	9	445	27	7	959	1, 404
Flouring- and grist-mill products	81	121	2, 046	18	12	421	2, 467
Foundery and machine-shop products	14	1	12	16	15	332	344
Iron and steel	7	2	189	63	32	2, 370	2, 559
Lumber, sawed	86	46	689	78	60	1, 558	2, 247
Paper	4	9	589	26	10	1, 098	1, 687
Woolen goods	5	6	224	2	2	60	284
All other industries	103	37	576	132	111	3, 804	4, 380
Gross total	317	232	4, 785	369	256	10, 708	15, 493
Less duplicates				4	2	65	65
Total	317	232	4, 785	365	254	10, 643	15, 428

DISTRICT OF COLUMBIA.

Carriages and wagons	1			1	1	15	15
Flouring- and grist-mill products	9	12	758				758
Foundery and machine-shop products	10			11	11	121	121
Iron and steel	1			3	2	135	135
Lumber, sawed	1			2	1	200	200
Paper	1	2	95	2	1	20	115
Printing and publishing	18			19	19	320	320
All other industries	74	1	27	89	83	1, 452	1, 479
Total	115	15	880	127	118	2, 263	3, 143

FLORIDA.

Cotton goods	1			1	1	35	35
Flouring- and grist-mill products	94	49	530	50	50	764	1, 294
Lumber, sawed	135	25	482	235	140	5, 393	5, 875
Sash, doors, and blinds	1			2	1	18	18
All other industries	13	3	17	12	10	231	248
Gross total	244	77	1, 029	300	202	6, 441	7, 470
Less duplicates		7	90	9	9	233	323
Total	244	70	939	291	193	6, 208	7, 147

TABLE III.—POWER USED IN MANUFACTURES IN EACH STATE AND TERRITORY, ETC.: 1880.

GEORGIA.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines	Horse-power.	
Agricultural implements	9	2	10	8	8	251	261
Boots and shoes (factory)	3	1	6	2	2	32	38
Carriages and wagons	7	1	15	5	5	52	67
Cotton goods	41	59	7, 300	33	18	1, 457	8, 757
Flouring- and grist-mill products	1, 132	1, 481	17, 622	156	149	3, 733	21, 355
Foundery and machine-shop products	34	2	32	33	36	620	652
Iron and steel	9	4	53	34	15	1, 546	1, 599
Lumber, sawed	655	308	4, 345	557	455	10, 955	15, 300
Paper	7	10	367	8	8	350	717
Printing and publishing	13			15	15	86	86
Sash, doors, and blinds	10			11	10	326	326
Woolen goods	32	33	356	2	2	31	387
All other industries	122	35	326	109	99	2, 179	2, 505
Gross total	2, 074	1, 936	30, 432	973	822	21, 618	52, 050
Less duplicates		19	365	25	23	516	881
Total	2, 074	1, 917	30, 067	948	799	21, 102	51, 169

IDAHO TERRITORY.

Flouring- and grist-mill products	16	17	408	1	1	30	438
Foundery and machine-shop products	1			2	1	16	16
Lumber, sawed	48	31	748	19	19	490	1, 238
All other industries	2	1	10	1	1	10	20
Gross total	67	49	1, 166	23	22	546	1, 712
Less duplicates		1	30				30
Total	67	48	1, 136	23	22	546	1, 682

ILLINOIS.

Agricultural implements	133	35	1, 392	159	124	5, 396	6, 788
Boots and shoes (factory)	8			16	12	258	258
Carriages and wagons	30	4	90	34	28	953	1, 043
Clothing, men's	19			25	21	393	393
Cotton goods	4	3	80	4	2	290	370
Flouring- and grist-mill products	1, 012	524	10, 298	1, 002	832	38, 292	48, 590
Foundery- and machine-shop products	248	22	510	203	202	4, 768	5, 278
Hosiery and knit goods	[illegible]	1	50	3	3	30	80
Iron and steel	16			198	127	17, 852	17, 852
Lumber, sawed	640	18	190	724	673	17, 891	18, 081
Paper	23	73	2, 383	29	16	839	3, 222
Printing and publishing	112		5	88	82	1, 382	1, 387
Sash, doors, and blinds	63	3	118	72	57	2, 857	2, 975
Silk and silk goods	2			1	1	17	17
Woolen goods	53	8	191	54	43	1, 407	1, 598
All other industries	1, 353	60	2, 138	1, 583	1, 272	35, 647	37, 785
Gross total	3, 722	751	17, 445	4, 195	3, 495	128, 272	145, 717
Less duplicates				52	50	1, 429	1, 429
Total	3, 722	751	17, 445	4, 143	3, 445	126, 843	144, 288

INDIANA.

Agricultural implements	56	3	147	67	56	2, 304	2, 451
Boots and shoes (factory)	1			1	1	12	12
Carriages and wagons	19	1	200	26	18	1, 331	1, 531
Clothing, men's	2			2	2	36	36
Cotton goods	4	2	80	29	10	1, 370	1, 450
Flouring- and grist-mill products	996	837	13, 547	713	656	25, 251	38, 798
Foundery and machine-shop products	104	8	258	107	104	2, 526	2, 784
Hosiery and knit goods	2			2	2	13	13
Iron and steel	10			77	60	4, 495	4, 495
Lumber, sawed	2, 018	171	2, 688	2, 012	1, 986	51, 638	54, 326
Paper	19	42	2, 469	19	17	593	3, 062
Printing and publishing	44	3	7	39	38	394	401
Sash, doors, and blinds	39	4	144	39	35	1, 530	1, 674
Woolen goods	81	27	577	69	59	2, 171	2, 748
All other industries	671	46	1, 708	766	669	18, 647	20, 355
Gross total	4, 066	1, 144	21, 825	3, 968	3, 713	112, 311	134, 136
Less duplicates		1	15	79	79	2, 351	2, 366
Total	4, 066	1, 143	21, 810	3, 889	3, 634	109, 960	131, 770

Table III.—POWER USED IN MANUFACTURES IN EACH STATE AND TERRITORY, ETC.: 1880.

IOWA.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	35	1	20	40	35	851	871
Boots and shoes (factory)	2	....	....	2	2	15	15
Carriages and wagons	11	1	20	9	9	246	266
Clothing, men's	3	1	5	1	1	10	15
Flouring- and grist-mill products	713	1,002	18,145	320	287	11,654	29,799
Foundery and machine-shop products	77	2	40	78	77	1,155	1,195
Lumber, sawed	328	48	837	412	320	13,655	14,492
Paper	4	8	532	12	8	470	1,002
Printing and publishing	35	2	5	30	31	226	231
Sash, doors, and blinds	26	2	112	23	20	765	877
Woolen goods	34	22	550	18	16	377	927
All other industries	278	13	324	301	278	4,966	5,290
Gross total	1,546	1,102	20,590	1,246	1,084	34,390	54,980
Less duplicates	....	9	227	17	16	532	759
Total	1,546	1,093	20,363	1,229	1,068	33,858	54,221

KANSAS.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	5	....	....	6	6	97	97
Carriages and wagons	3	....	....	3	2	162	162
Flouring- and grist-mill products	319	269	6,846	182	169	6,858	13,704
Foundery and machine-shop products	22	3	62	19	19	330	392
Iron and steel	2	....	....	21	12	1,900	1,900
Lumber, sawed	145	21	463	129	126	3,352	3,815
Paper	1	2	45	....	....	....	45
Printing and publishing	13	....	....	11	11	103	103
Salt	1	....	....	1	1	10	10
Sash, doors, and blinds	3	....	....	4	3	52	52
Woolen goods	5	3	153	3	2	65	218
All other industries	59	3	97	62	57	989	1,086
Gross total	578	301	7,666	441	408	13,918	21,584
Less duplicates	....	2	55	15	12	450	505
Total	578	299	7,611	426	396	13,468	21,079

KENTUCKY.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	13	....	....	19	17	803	803
Boots and shoes (factory)	9	....	....	9	9	75	75
Carriages and wagons	2	....	....	4	[illegible]	250	250
Clothing, men's	1	....	....	1	1	24	24
Cotton goods	4	1	53	8	4	448	501
Flouring- and grist-mill products	651	508	7,101	424	395	12,905	20,006
Foundery and machine-shop products	44	....	....	53	69	1,262	1,262
Iron and steel	18	....	....	146	76	6,400	6,400
Lumber, sawed	668	104	1,148	660	650	16,439	17,587
Paper	2	....	....	18	9	925	925
Printing and publishing	19	1	5	19	21	309	314
Salt	2	....	....	3	3	22	22
Sash, doors, and blinds	3	....	....	3	3	98	98
Woolen goods	95	35	564	69	63	1,527	2,091
All other industries	236	6	175	278	249	6,569	6,744
Gross total	1,767	655	9,046	1,714	1,572	48,056	57,102
Less duplicates	....	2	34	78	78	2,139	2,173
Total	1,767	653	9,012	1,636	1,494	45,917	54,929

LOUISIANA.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Boots and shoes (factory)	1	....	....	1	1	2	2
Carriages and wagons	1	....	....	1	1	4	4
Clothing, men's	1	....	....	1	1	16	16
Cotton goods	2	....	....	5	3	250	250
Flouring- and grist-mill products	79	6	39	73	72	1,346	1,385
Foundery and machine-shop products	21	....	....	27	32	567	567
Lumber, sawed	174	6	52	212	187	5,076	5,128
Printing and publishing	13	....	....	13	13	140	140
Salt	1	....	....	1	1	30	30
Sash, doors, and blinds	7	....	....	8	7	188	188
Sugar and molasses, refined	4	....	....	17	12	230	230
All other industries	98	2	7	155	123	3,963	3,970
Gross total	402	14	98	514	453	11,812	11,910
Less duplicates	....	1	8	23	23	556	564
Total	402	13	90	491	430	11,256	11,346

TABLE III.—POWER USED IN MANUFACTURES IN EACH STATE AND TERRITORY, ETC.: 1880.

MAINE.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	23	48	1,484	5	5	52	1,536
Boots and shoes (factory)	36	4	73	38	30	608	681
Carpets	1	....	....	1	1	4	4
Carriages and wagons	9	6	79	4	4	36	115
Cotton goods	23	91	13,586	30	9	1,875	15,461
Felt goods	1	1	65	3	1	65	130
Flouring- and grist-mill products	261	516	8,497	29	20	962	9,459
Foundery and machine-shop products	69	35	741	39	32	745	1,486
Iron and steel	3	6	785	33	10	1,100	1,885
Lumber, sawed	848	1,609	35,127	196	115	7,484	42,611
Paper	12	84	4,958	14	6	435	5,393
Printing and publishing	34	5	22	19	23	257	279
Salt	1	....	....	1	1	25	25
Sash, doors, and blinds	29	25	630	8	6	173	803
Silk and silk goods	1	1	30	....	....	....	30
Sugar and molasses, refined	2	....	....	9	14	340	340
Woolen goods	93	86	3,406	12	8	404	3,810
Wool hats	1	....	....	2	1	100	100
All other industries	471	376	10,510	312	230	6,349	16,859
Gross total	1,918	2,893	79,993	755	516	21,014	101,007
Less duplicates	....	6	276	8	5	255	531
Total	1,918	2,887	79,717	747	511	20,759	100,476

MARYLAND.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	20	9	82	14	13	218	300
Boots and shoes (factory)	8	....	....	7	8	121	121
Clothing, men's	1	....	....	1	1	6	6
Cotton goods	20	25	2,538	65	19	4,717	7,255
Flouring- and grist-mill products	546	673	10,344	93	72	2,446	12,790
Foundery and machine-shop products	78	3	19	84	82	1,629	1,648
Iron and steel	18	11	670	145	69	5,276	5,946
Lumber, sawed	369	216	2,386	257	208	5,078	7,464
Paper	25	45	1,235	29	21	786	2,021
Printing and publishing	36	1	5	33	36	266	271
Sash, doors, and blinds	16	....	....	23	15	645	645
Sugar and molasses, refined	3	....	....	9	6	515	515
Woolen goods	14	16	322	5	3	120	442
All other industries	378	23	758	467	381	11,957	12,715
Gross total	1,532	1,022	18,359	1,232	934	33,780	52,139
Less duplicates	....	18	316	30	20	564	880
Total	1,532	1,004	18,043	1,202	914	33,216	51,259

MASSACHUSETTS.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	24	41	652	17	12	813	1,465
Boots and shoes (factory)	471	13	93	345	294	6,933	7,026
Carpets	7	4	705	81	10	1,420	2,125
Carriages and wagons	30	2	125	20	21	369	494
Clothing, men's	15	....	....	15	16	172	172
Cotton goods	194	338	48,452	1,006	228	55,458	103,910
Felt goods	11	8	480	23	14	670	1,150
Flouring- and grist-mill products	344	444	9,688	95	74	3,352	13,040
Foundery and machine-shop products	499	80	2,650	324	293	7,254	9,904
Hosiery and knit goods	22	7	380	25	18	681	1,061
Iron and steel	24	39	1,650	328	112	13,821	15,471
Lumber, sawed	606	707	14,366	150	115	4,573	18,939
Paper	96	368	21,045	175	123	6,361	27,406
Printing and publishing	163	2	13	110	109	1,258	1,271
Sash, doors, and blinds	49	12	250	24	19	933	1,183
Silk and silk goods	17	11	362	24	16	357	719
Sugar and molasses, refined	5	....	....	43	19	3,200	3,200
Woolen goods	167	262	16,845	349	150	11,880	28,725
Wool hats	6	....	....	13	5	490	490
Worsted goods	23	24	3,011	51	20	2,365	5,376
All other industries	2,400	715	18,394	1,902	1,440	49,572	67,966
Gross total	5,173	3,077	139,161	5,120	3,108	171,932	311,093
Less duplicates	....	31	799	15	12	535	1,334
Total	5,173	3,046	138,362	5,105	3,096	171,397	309,759

TABLE III.—POWER USED IN MANUFACTURES IN EACH STATE AND TERRITORY, ETC.: 1880.

MICHIGAN.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	104	20	408	96	90	1,931	2,339
Boots and shoes	2			2	2	27	27
Carriages and wagons	25	4	32	21	19	622	654
Clothing, men's	1			1	1	10	10
Cotton goods	2			2	1	140	140
Flouring and grist-mill products	706	1,115	18,570	362	327	14,461	33,031
Foundery and machine shop products	153	18	303	138	136	2,490	2,793
Hosiery and knit goods	6	1	30	3	3	83	113
Iron and steel	15	2	45	92	63	5,195	5,240
Lumber, sawed	1,649	418	9,149	2,584	1,584	81,297	90,446
Paper	21	55	2,363	19	9	489	2,852
Printing and publishing	29	1	13	22	22	197	210
Salt	81			56	202	5,000	5,000
Sash, doors, and blinds	104	23	510	90	86	2,667	3,177
Woolen goods	39	26	460	13	10	295	755
All other industries	644	66	2,580	634	555	16,442	19,022
Gross total	3,581	1,749	34,463	4,135	3,110	131,346	165,809
Less duplicates		3	68	26	25	994	1,062
Total	3,581	1,746	34,395	4,109	3,085	130,352	164,747

MINNESOTA.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	22	1	37	29	22	1,230	1,267
Boots and shoes (factory)	2			2	2	50	50
Carriages and wagons	4			4	4	60	60
Clothing, men's	1					10	10
Cotton goods	1	1	28				28
Flouring- and grist-mill products	434	535	22,482	180	144	8,979	31,461
Foundery and machine-shop products	52	3	45	44	43	649	694
Lumber, sawed	234	94	5,194	326	199	10,109	15,303
Paper	2	5	650				650
Printing and publishing	24			22	20	187	187
Sash, doors, and blinds	29	1	9	26	25	1,012	1,021
Woolen goods	13	7	302	5	5	61	363
All other industries	146	9	198	131	114	3,101	3,299
Gross total	964	656	28,945	769	578	25,448	54,393
Less duplicates		6	256	9	9	257	513
Total	964	650	28,689	760	569	25,191	53,880

MISSISSIPPI.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	3			3	3	70	70
Boots and shoes (factory)	2	1	8	1	1	10	18
Carriages and wagons	3			3	3	105	105
Cotton goods	7	3	172	14	7	763	935
Flouring- and grist-mill products	525	242	2,596	309	306	5,814	8,410
Foundery and machine-shop products	12			10	10	137	137
Lumber, sawed	295	54	658	314	292	7,608	8,266
Printing and publishing	4			4	4	18	18
Sash, doors, and blinds	2			2	2	40	40
Woolen goods	8	2	66	6	5	154	220
All other industries	32	3	24	41	33	1,046	1,070
Gross total	893	305	3,524	707	666	15,765	19,289
Less duplicates		4	75	31	31	764	839
Total	893	301	3,449	676	635	15,001	18,450

MISSOURI.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	21			21	22	493	493
Boots and shoes (factory)	5			5	5	102	102
Carriages and wagons	8			8	9	260	260
Clothing, men's	3			3	3	17	17
Cotton goods	4			12	5	680	680
Flouring- and grist-mill products	872	456	6,807	701	617	25,087	31,894
Foundery and machine-shop products	80			86	86	2,675	2,675
Hosiery and knit goods	2	1	2			[illegible]	4
Iron and steel	10			118	60	5,915	5,915
Lumber, sawed	881	63	1,139	895	853	22,143	23,282
Printing and publishing	43			42	39	777	777
Sash, doors, and blinds	14			19	13	834	834
Sugar and molasses, refined	1			71	12	400	400
Woolen goods	97	18	225	64	61	1,680	1,905
All other industries	387		5	491	426	14,090	14,095
Gross total	2,428	538	8,178	2,536	2,211	75,155	83,333
Less duplicates		1	16	88	83	2,568	2,584
Total	2,428	537	8,162	2,448	2,128	72,587	80,749

TABLE III.—POWER USED IN MANUFACTURES IN EACH STATE AND TERRITORY, ETC: 1880.

MONTANA TERRITORY.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Flouring- and grist-mill products	15	18	502				502
Foundery and machine-shop products	5	1	6	5	5	64	70
Lumber, sawed	36	18	430	20	20	420	850
Printing and publishing	1		6				6
All other industries	6	2	10	6	6	60	70
Total	63	39	954	31	31	544	1, 498

NEBRASKA.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	4			4	4	55	55
Flouring- and grist-mill products	169	233	5, 276	31	31	1, 157	6, 433
Foundery and machine-shop products	8			9	9	84	84
Iron and steel	1			5	5	300	300
Lumber, sawed	38	7	154	33	35	821	975
Paper	1	5	65				65
Printing and publishing	7			7	7	80	80
All other industries	34	1	20	39	35	502	522
Gross total	262	246	5, 515	128	126	2, 999	8, 514
Less duplicates		1	20				20
Total	262	245	5, 495	128	126	2, 999	8, 494

NEVADA.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Flouring- and grist-mill products	7	6	108	2	2	61	169
Foundery and machine-shop products	3			3	3	52	52
Lumber, sawed	9			14	11	409	409
Printing and publishing	2			2	2	8	[illegible]
Salt	2			2	2	18	18
Sash, doors, and blinds	1			1	1	50	50
All other industries	2			3	2	10	10
Total	26	6	108	27	23	608	716

NEW HAMPSHIRE.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	16	18	428	2	2	67	495
Boots and shoes (factory)	30	2	30	33	28	511	541
Carriages and wagons	10	7	203	6	4	153	356
Clothing, men's	1	1	5				5
Cotton goods	36	105	20, 140	78	21	4, 569	24, 709
Felt goods	1	1	60				60
Flouring- and grist-mill products	181	432	7, 052	20	18	660	7, 712
Foundery and machine-shop products	67	29	634	31	32	827	1, 461
Hosiery and knit goods	23	24	949	2	2	50	999
Iron and steel	2			30	11	755	755
Lumber, sawed	680	920	19, 584	161	142	5, 526	25, 110
Paper	25	80	4, 931	9	7	308	5, 239
Printing and publishing	20	3	20	13	12	76	96
Sash, doors, and blinds	24	19	404	12	9	350	754
Silk and silk goods	1	1	10				10
Woolen goods	58	86	4, 179	27	17	767	4, 946
Worsted goods	2	3	1, 065	8	9	182	1, 247
All other industries	476	398	9, 658	171	144	3, 954	13, 612
Gross total	1, 653	2, 129	69, 352	603	458	18, 755	88, 107
Less duplicates		7	197	5	2	160	357
Total	1, 653	2, 122	69, 155	598	456	18, 595	87, 750

NEW JERSEY.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	18	9	112	14	12	166	278
Boots and shoes (factory)	24			20	18	319	319
Carpets	1	2	260				260
Carriages and wagons	10	2	37	7	8	102	139
Clothing, men's	2			2	3	23	23
Cotton goods	23	19	1, 485	77	28	3, 404	4, 889
Felt goods	6	3	110	10	4	170	280
Flouring- and grist-mill products	479	660	12, 183	61	55	1, 852	14, 035
Foundery and machine-shop products	182	25	958	172	162	4, 251	5, 209
Hosiery and knit goods	5	1	12	11	5	494	506
Iron and steel	36	26	1, 196	331	133	13, 739	14, 935
Lumber, sawed	284	249	3, 903	96	83	2, 465	6, 368
Paper	32	57	2, 321	57	32	2, 180	4, 501
Printing and publishing	45	5	9	43	41	344	353
Sash, doors, and blinds	60	2	30	51	47	1, 179	1, 209

TABLE III.—POWER USED IN MANUFACTURES IN EACH STATE AND TERRITORY, ETC.: 1880.

NEW JERSEY—Continued.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Silk and silk goods	78	18	619	92	66	3, 628	4, 247
Sugar and molasses, refined	4	....	....	38	44	4, 034	4, 034
Woolen goods	27	24	1, 114	53	25	2, 541	3, 655
Worsted goods	2	1	20	2	1	60	80
All other industries	908	114	2, 769	1, 123	857	32, 031	34, 800
Gross total	2, 226	1, 217	27, 138	2, 260	1, 624	72, 982	100, 120
Less duplicates	....	4	72	7	5	190	262
Total	2, 226	1, 213	27, 066	2, 253	1, 619	72, 792	99, 858

NEW MEXICO TERRITORY.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Flouring- and grist-mill products	51	56	698	4	4	78	776
Lumber, sawed	26	13	234	14	14	319	553
All other industries	1	....	....	1	1	30	30
Total	78	69	932	19	19	427	1, 359

NEW YORK.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	238	144	3, 971	171	152	4, 232	8, 203
Boots and shoes	69	1	191	54	52	1, 006	1, 197
Carpets	9	10	1, 186	44	15	3, 408	4, 594
Carriages and wagons	55	18	303	43	38	975	1, 278
Clothing, men's	46	1	1	34	49	461	462
Cotton goods	52	74	9, 189	81	30	3, 991	13, 180
Felt goods	4	2	165	3	3	210	375
Flouring- and grist-mill products	1, 766	3, 593	66, 491	370	357	15, 998	82, 489
Foundery and machine-shop products	738	164	4, 657	563	559	14, 990	19, 647
Hosiery and knit goods	67	61	3, 372	55	37	1, 839	5, 211
Iron and steel	74	82	4, 709	626	241	25, 138	29, 847
Lumber, sawed	2, 822	3, 380	62, 569	1, 131	1, 007	31, 213	93, 782
Paper	168	499	21, 831	111	90	4, 474	26, 305
Printing and publishing	322	11	143	210	203	4, 401	4, 544
Salt	52	1	75	70	66	1, 313	1, 388
Sash, doors, and blinds	192	91	1, 848	125	114	3, 752	5, 600
Silk and silk goods	44	5	223	36	31	1, 352	1, 575
Sugar and molasses, refined	17	....	....	151	135	6, 623	6, 623
Woolen goods	159	172	4, 917	84	42	2, 795	7, 712
Wool hats	10	3	600	39	14	1, 660	2, 260
Worsted goods	6	11	1, 360	8	12	521	1, 881
All other industries	4, 866	1, 448	32, 231	4, 129	3, 460	105, 986	138, 217
Gross total	11, 776	9, 771	220, 032	8, 138	6, 707	236, 338	456, 370
Less duplicates	....	19	684	37	35	1, 543	2, 227
Total	11, 776	9, 752	219, 348	8, 101	6, 672	234, 795	454, 143

NORTH CAROLINA.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	25	10	128	16	16	203	331
Carriages and wagons	2	1	10	1	2	30	40
Cotton goods	48	51	3, 046	17	10	582	3, 628
Flouring- and grist-mill products	1, 294	1, 776	18, 842	170	152	3, 515	22, 357
Foundery and machine-shop products	28	10	120	22	22	311	431
Iron and steel	6	13	253	....	....	....	253
Lumber, sawed	774	461	6, 828	451	395	10, 067	16, 895
Paper	4	11	698	1	1	15	713
Printing and publishing	2	....	....	2	2	7	7
Sash, doors, and blinds	12	....	....	11	11	263	263
Woolen goods	49	39	516	9	8	205	721
All other industries	79	32	288	68	56	1, 287	1, 575
Gross total	2, 323	2, 404	30, 729	768	675	16, 485	47, 214
Less duplicates	....	34	666	69	59	1, 460	2, 126
Total	2, 323	2, 370	30, 063	699	616	15, 025	45, 088

OHIO.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	126	11	299	158	126	5, 922	6, 221
Boots and shoes	16	....	....	13	13	253	253
Carriages and wagons	35	....	....	39	33	1, 376	1, 376
Clothing, men's	18	....	....	17	17	180	180
Cotton goods	6	3	90	13	6	360	450
Flouring- and grist-mill products	1, 380	1, 461	25, 634	858	777	31, 648	57, 282
Foundery and machine-shop products	369	30	476	341	356	8, 997	9, 473
Hosiery and knit goods	2	....	....	2	2	27	27
Iron and steel	103	1	100	859	439	50, 870	50, 970
Lumber, sawed	2, 347	318	4, 872	2, 244	2, 216	57, 419	62, 291

TABLE III.—POWER USED IN MANUFACTURES IN EACH STATE AND TERRITORY, ETC.: 1880.

OHIO—Continued.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Paper	60	99	4,228	181	111	6,868	11,096
Printing and publishing	122	2	9	105	99	1,639	1,648
Salt	23			52	53	812	812
Sash, doors, and blinds	92	6	102	98	89	3,927	4,029
Woolen goods	122	48	851	91	84	2,043	2,894
Worsted goods	1	1	80				80
All other industries	1,862	106	2,014	2,047	1,832	51,340	53,354
Gross total	6,684	2,086	38,755	7,118	6,253	223,681	262,436
Less duplicates		6	114	37	38	1,179	1,293
Total	6,684	2,080	38,641	7,081	6,215	222,502	261,143

OREGON.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	3	4	154	1	1	5	159
Boots and shoes (factory)	1			1	1	20	20
Flouring- and grist-mill products	106	135	4,072	14	14	415	4,487
Foundery and machine-shop products	15	1	90	14	14	281	371
Iron and steel	1	1	147				147
Lumber, sawed	227	187	3,959	119	99	2,875	6,834
Paper	1	6	80				80
Printing and publishing	4			4	4	42	42
Sash, doors, and blinds	20	8	176	13	13	290	466
Woolen goods	10	10	384				384
All other industries	55	26	401	31	31	446	847
Gross total	443	378	9,463	197	177	4,374	13,837
Less duplicates		5	208	1	1	40	248
Total	443	373	9,255	196	176	4,334	13,589

PENNSYLVANIA.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	174	61	672	154	137	3,640	4,312
Boots and shoes (factory)	24			23	21	389	389
Carpets	39			90	47	2,548	2,548
Carriages and wagons	18	1	60	19	16	361	421
Clothing, men's	18			17	18	196	196
Cotton goods	185	35	1,783	434	182	14,408	16,191
Felt goods	1			6	3	100	100
Flouring- and grist-mill products	2,873	4,251	59,966	773	593	19,345	79,311
Foundery and machine-shop products	625	44	517	721	679	14,934	15,451
Hosiery and knit goods	70	1	10	90	72	1,830	1,840
Iron and steel	321	101	3,713	3,689	1,506	197,569	201,282
Lumber, sawed	2,826	1,875	30,724	2,036	1,630	48,922	79,646
Paper	78	108	2,766	202	134	6,668	9,434
Printing and publishing	199	8	18	159	154	1,943	1,961
Salt	16			21	21	269	269
Sash, doors, and blinds	102	13	225	119	94	3,169	3,394
Silk and silk goods	23			27	18	666	666
Sugar and molasses, refined	11			60	50	4,730	4,730
Woolen goods	324	155	2,749	422	204	12,437	15,186
Wool hats	23	4	72	39	23	720	792
Worsted goods	28	2	70	72	38	3,657	3,727
All other industries	2,403	448	7,556	2,954	2,299	64,329	71,885
Gross total	10,381	7,107	110,901	12,127	7,939	402,830	513,731
Less duplicates		32	625	32	26	698	1,323
Total	10,381	7,075	110,276	12,095	7,913	402,132	512,408

RHODE ISLAND.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	4	2	36	2	2	35	71
Boots and shoes (factory) (*a*)	1		4				4
Carriages and wagons (*a*)	2		2	1	1	12	14
Cotton goods	129	200	15,969	463	114	21,433	37,402
Flouring- and grist-mill products	46	38	970	29	12	1,001	1,971
Foundery and machine-shop products	71	6	229	91	59	1,899	2,128
Hosiery and knit goods	1			2	1	5	5
Iron and steel	1			14	5	420	420
Lumber, sawed	49	50	915	9	10	230	1,145
Printing and publishing (*a*)	20		4	18	17	107	111
Sash, doors, and blinds	8	1	4	11	7	283	287
Silk and silk goods	1			1	1	8	8
Woolen goods	50	69	3,291	114	45	4,702	7,993
Worsted goods	11	4	365	54	17	3,185	3,550
All other industries	214	18	501	355	185	8,015	8,516
Gross total	608	388	22,290	1,164	476	41,335	63,625
Less duplicates		2	50				50
Total	608	386	22,240	1,164	476	41,335	63,575

a Power rented.

TABLE III.—POWER USED IN MANUFACTURES IN EACH STATE AND TERRITORY, ETC.: 1880.

SOUTH CAROLINA.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	2	....	....	3	2	42	42
Carriages and wagons	3	1	8	2	2	33	41
Cotton goods	14	23	2, 398	6	3	425	2, 823
Flouring- and grist-mill products	719	803	8, 457	175	170	2, 721	11, 178
Foundery and machine-shop products	14	....	....	17	17	214	214
Lumber, sawed	420	216	2, 935	300	254	6, 181	9, 116
Printing and publishing	6	....	....	6	6	38	38
Sash, doors, and blinds	1	....	....	1	1	10	10
Woolen goods	11	10	104	1	1	6	110
All other industries	69	20	251	128	95	3, 371	3, 622
Gross total	1, 259	1, 073	14, 153	639	551	13, 041	27, 194
Less duplicates	....	16	280	47	42	1, 046	1, 326
Total	1, 259	1, 057	13, 873	592	509	11, 995	25, 868

TENNESSEE.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	13	3	27	10	10	151	178
Carriages and wagons	3	....	....	7	4	150	150
Cotton goods	19	14	462	17	7	810	1, 272
Flouring- and grist-mill products	989	933	12, 699	288	273	8, 741	21, 440
Foundery and machine-shop products	38	4	42	34	36	644	686
Iron and steel	29	22	293	75	41	6, 045	6, 338
Lumber, sawed	755	349	4, 165	518	494	13, 734	17, 899
Paper	1	1	40	2	1	15	55
Printing and publishing	10	1	3	11	11	131	134
Sash, doors, and blinds	7	1	30	6	5	175	205
Woolen goods	106	38	640	18	18	470	1, 110
All other industries	138	34	450	141	118	3, 801	4, 251
Gross total	2, 108	1, 400	18, 851	1, 127	1, 018	34, 867	53, 718
Less duplicates	....	18	287	53	51	1, 479	1, 766
Total	2, 108	1, 382	18, 564	1, 074	967	33, 388	51, 952

TEXAS.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	7	....	....	7	7	63	63
Carriages and wagons	2	....	....	2	2	25	25
Cotton goods	2	....	....	4	2	205	205
Flouring- and grist-mill products	900	146	2, 210	799	783	16, 392	18, 602
Foundery and machine-shop products	18	....	....	21	22	392	392
Iron and steel	1	....	....	1	1	60	60
Lumber, sawed	317	28	386	351	313	9, 836	10, 222
Printing and publishing	11	4	6	9	9	56	62
Sash, doors, and blinds	8	....	....	9	8	230	230
Woolen goods	1	....	....	1	1	45	45
All other industries	67	2	17	74	68	1, 929	1, 946
Gross total	1, 334	180	2, 619	1, 278	1, 216	29, 233	31, 852
Less duplicates	....	6	111	49	49	1, 207	1, 318
Total	1, 334	174	2, 508	1, 229	1, 167	28, 026	30, 534

UTAH TERRITORY.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	1	1	12				12
Cotton goods	1	1	26	....	....	....	26
Flouring- and grist-mill products	85	94	1, 674	3	3	90	1, 764
Foundery and machine-shop products	7	2	20	5	5	47	67
Lumber, sawed	107	86	1, 303	33	33	703	2, 006
Paper	1	1	35	1	1	50	85
Printing and publishing	4	3	9	2	2	16	25
Salt	2	2	16	....	....	....	16
Sash, doors, and blinds	5	5	74	1	1	30	104
Woolen goods	11	11	315	....	....	....	315
All other industries	19	10	71	10	10	218	289
Gross total	243	216	3, 555	55	55	1, 154	4, 709
Less duplicates	....	2	20	....	....	....	20
Total	243	214	3, 535	55	55	1, 154	4, 689

VERMONT.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	33	40	912	8	8	146	1, 058
Boots and shoes	1	....	....	1	1	15	15
Carriages and wagons	7	6	70	2	2	12	82
Cotton goods	8	11	1, 076	14	5	570	1, 646
Flouring- and grist-mill products	227	587	9, 686	10	8	323	10, 009

TABLE III.—POWER USED IN MANUFACTURES IN EACH STATE AND TERRITORY, ETC.: 1880.

VERMONT—Continued.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Foundery and machine-shop products	41	39	840	21	16	277	1, 117
Hosiery and knit goods	6	8	208	7	6	220	428
Iron and steel	2	1	25	10	1	350	375
Lumber, sawed	688	871	21, 799	99	87	3, 821	25, 620
Paper	13	53	4, 613	5	4	82	4, 695
Printing and publishing	10			8	8	51	51
Sash, doors, and blinds	32	25	678	8	8	421	1, 099
Silk and silk goods	1	1	8				8
Woolen goods	44	49	2, 636	21	8	1, 008	3, 644
All other industries	469	455	9, 941	168	112	3, 982	13, 923
Gross total	1, 582	2, 146	52, 492	382	274	11, 278	63, 770
Less duplicates		8	266	4	2	190	456
Total	1, 582	2, 138	52, 226	378	272	11, 088	63, 314

VIRGINIA.

Selected industries.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Agricultural implements	39	16	250	26	26	511	761
Boots and shoes (factory)	2			2	2	17	17
Carriages and wagons	4			4	4	73	73
Clothing, men's	1			1	1	4	4
Cotton goods	7	13	1, 190	3	2	165	1, 355
Flouring- and grist-mill products	1, 385	1, 786	25, 765	55	51	1, 335	27, 100
Foundery and machine-shop products	53	21	447	37	39	689	1, 136
Iron and steel	19	29	1, 596	18	9	375	1, 971
Lumber, sawed	907	465	6, 877	562	517	11, 214	18, 091
Paper	3	4	195	4	2	100	295
Printing and publishing	20			20	20	122	122
Salt	1			2	2	40	40
Sash, doors, and blinds	14	6	160	12	11	241	401
Woolen goods	48	43	667	1	1	50	717
All other industries	265	78	1, 623	253	229	5, 210	6, 833
Gross total	2, 768	2, 461	38, 770	1, 000	916	20, 146	58, 916
Less duplicates		62	1, 306	18	17	436	1, 742
Total	2, 768	2, 399	37, 464	982	899	19, 710	57, 174

WASHINGTON TERRITORY.

Selected industries.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Flouring- and grist-mill products	9	7	131	2	2	24	155
Foundery and machine-shop products	3			4	7	75	75
Lumber, sawed	37	27	804	82	44	2, 967	3, 771
Printing and publishing	1			1	1	2	2
Sash, doors, and blinds	5	3	53	2	2	60	113
Woolen goods	1	1	35				35
All other industries	14	9	187	5	5	82	269
Gross total	70	47	1, 210	96	61	3, 210	4, 420
Less duplicates		1	25				25
Total	70	46	1, 185	96	61	3, 210	4, 395

WEST VIRGINIA.

Selected industries.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Agricultural implements	5			5	5	120	120
Boots and shoes (factory)	1			1	1	40	40
Carriages and wagons	3			6	4	222	222
Flouring- and grist-mill products	472	491	6, 996	168	150	4, 642	11, 638
Foundery and machine-shop products	31	1	6	34	32	814	820
Iron and steel	16			103	50	8, 600	8, 600
Lumber, sawed	469	136	1, 921	394	374	9, 560	11, 481
Paper	3	1	10	15	8	255	265
Printing and publishing	4			4	4	32	32
Salt	14			55	57	797	797
Sash, doors, and blinds	3			4	3	90	90
Woolen goods	55	43	576	21	19	591	1, 167
All other industries	114	4	20	137	120	3, 031	3, 051
Gross total	1, 190	676	9, 529	947	827	28, 794	38, 323
Less duplicates		6	75	13	11	338	413
Total	1, 190	670	9, 454	934	816	28, 456	37, 910

TABLE III.—POWER USED IN MANUFACTURES IN EACH STATE AND TERRITORY, ETC.: 1880.

WISCONSIN.

Selected industries.	No. of establishments.	WATER-POWER.		STEAM-POWER.			Total steam- and water-power. (*H. P.*)
		Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	
Agricultural implements	72	12	356	71	68	1,706	2,062
Boots and shoes (factory)	3			3	2	125	125
Carriages and wagons	19	1	17	29	20	1,016	1,033
Clothing, men's (*a*)	4				4	27	27
Cotton goods	1	4	180	3	1	180	360
Flouring- and grist-mill products	703	1,372	24,875	192	146	9,943	34,818
Foundery and machine-shop products	118	11	258	105	103	1,984	2,242
Iron and steel	8	6	164	68	53	4,600	4,764
Lumber, sawed	704	424	13,376	919	552	30,613	43,989
Paper	13	68	2,551	1	1	45	2,596
Printing and publishing	28			27	27	254	254
Sash, doors, and blinds	78	13	305	94	71	2,728	3,033
Woolen goods	48	44	842	11	[illegible]	261	1,103
All other industries	355	69	2,467	366	316	7,538	10,005
Gross total	2,154	2,024	45,391	1,889	1,373	61,020	106,411
Less duplicates		2	35	10	7	291	326
Total	2,154	2,022	45,356	1,879	1,366	60,729	106,085

WYOMING TERRITORY.

Selected industries.	No. of establishments.	Number of wheels.	Horse-power.	Number of boilers.	Number of engines.	Horse-power.	Total steam- and water-power. (*H. P.*)
Flouring- and grist-mill products	1	1	30				30
Iron and steel	1			10	10	455	455
Lumber, sawed	7	1	8	7	7	232	240
Sash, doors, and blinds	1			1	1	30	30
Total	10	2	38	18	18	717	755

a Steam furnished by Steam-Supply Company.

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REPORT

ON THE

FACTORY SYSTEM OF THE UNITED STATES.

BY

CARROLL D. WRIGHT,
SPECIAL AGENT.

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LETTER OF TRANSMITTAL.

BOSTON, MASS., *November* 25, 1882.

HON. C. W. SEATON,
Superintendent of Census.

SIR: I have the honor to transmit herewith a report upon the factory system of the United States. In accordance with the original plan approved by your predecessor, I have considered briefly the history of the system, not only as to its institution and growth in this country, but as to its origin and growth in Great Britain.

I have endeavored, as far as possible, to present illustrations of the results, benefits, advantages, and disadvantages of the system, drawn from personal observations in the principal factory towns of Europe during the summer of 1881.

While many statements made in this report cannot be given in tabular form, they are, as a rule, the results of careful investigation, and should be accepted in their text form as statistical matter.

I wish to thank you, as well as your predecessor, for the very generous support you have given me in conducting the investigation intrusted to me.

I desire also to express my obligations to Alexander Redgrave, esq., C. B., chief factory inspector of Great Britain, and Messrs. Coles, of Manchester, and Henderson, of Glasgow, superintendents of inspectors of factories, for their very valuable personal services in securing for me every facility for the examination of British mills.

Respectfully, yours,

CARROLL D. WRIGHT,
Special Agent.

THE FACTORY SYSTEM OF THE UNITED STATES.

During the years immediately preceding the independence of the colonies, and while the important events which led to their consolidation into one nation were transpiring, the factory system was being developed in England as a new industrial system which was to influence the growth and development and civilization of the new as well as of the old nation. Nor was the independence of the colonies without its direct influence in enabling the manufacturers of England successfully to establish the system; indeed, the loss of the colonies was a potent factor in the firm establishment of the factory system in England. So the early and English history of the system is as legitimate in this report as the account of its planting and growth in the United States.

THE ORIGIN OF THE FACTORY SYSTEM.

The influences which led to the institution of the factory system were almost as diverse in their nature as the ramifications of the system itself. These influences are clearly defined, although some of them have never been recognized in the connection in which I place them; their power, however, not only abstractly but concretely, is fully recognizable in the origin of the system, which is of comparatively recent date, and is entirely the result of the influences existing or coming into existence during the last half of the eighteenth century. These influences were both direct and subtle in their character, but all important in their place and combination. As a great fact the system originated in no preconceived plan; on the contrary, it was formed and shaped by the inevitable force of circumstances. Those who were called the fathers of the system were men of great intelligence and enterprise. (*a*)

In its origin the factory system was applied to the textile trades of England, and indeed it did not till recent years embrace other industries; so that the history of the system becomes the history of the textile industries.

A factory is an establishment where several workmen are collected for the purpose of obtaining greater and cheaper conveniences for labor than they could procure individually at their homes; for producing results by their combined efforts which they could not accomplish separately; and for preventing the loss occasioned by carrying articles from place to place during the several processes necessary to complete their manufacture. The principle of a factory is that each laborer, working separately, is controlled by some associating principle which directs his producing powers to effect a common result, which it is the object of all collectively to attain. Factories are therefore the legitimate outgrowth of the universal tendency to association which is inherent in our nature, and by the development of which all industrial success has been gained; and from this principle springs the necessity for subdivision of labor, without which the factory system would have met with but feeble growth. The more the principle of association appears prominent in any species of production the more rigidly does it become entitled to the name of factory and the more generally does it receive the name in common parlance.

It is entirely unnecessary to dwell upon the advantages that have resulted from the division of labor, but in considering the definition of the factory system it must be borne in mind that the minute subdivision of labor requires an equally extensive power of combination to unite the several parts so that their aggregate shall produce one harmonious result. The type-founder is never allowed to forget that he is working for the compositor; the compositor has constant reference to the pressman; the pressman to the folder; and the folder to the binder. The man who cuts the wire for pins fits them for the operative who points them, and he turns them out of hand ready for the person who heads them.

The factory is, therefore, in broad terms, an association of separate occupations conducted in one establishment, in order to facilitate the combination of the processes into which most branches of manufactures are divided. (*b*)

The first force which tended to create this system was that of invention, and the stimulus to this grew out of the difficulty which the weavers experienced in obtaining a sufficient supply of yarn to keep their looms in operation.

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a *Factories and the Factory System.* W. Cooke Taylor, LL. D. London, 1844.

b *Ibid.*

Prior to 1767 all yarn used in the manufacture of textiles of all kinds was spun in single threads, by the fingers of the spinsters, upon the domestic spinning-wheel. For a generation prior to this period various attempts had been made to increase the product. The machines in use for weaving as well as for spinning were nearly as simple as those in use in India.

The processes of spinning and of weaving were generally performed in the same cottage, the weaver continually pressing upon the spinner for a supply of weft or warp, but the weaver's own family could not respond with a sufficient quantity, and he had much difficulty in collecting it from neighboring spinsters. In consequence much time was wasted, and the weaver often subjected to high demands for the yarn, for which, as the demand exceeded the supply, the spinster could put her own price. Indeed, as Dr. Aiken, in his *History of Manchester*, has related, "the weavers, in a scarcity of spinning, have sometimes been paid less for the weft than they paid the spinner, but durst not complain, much less abate the spinner, lest their looms should be unemployed."

The cotton manufacture of England at this time, though rapidly increasing, could never have received such impetus as to have become of great national importance without the discovery of some method for producing a greater quantity and a better quality of yarn with the same expenditure of muscular labor; (*a*) for, while a high and sustained price for yarn would indeed have attracted new hands to the employment, such high price would of itself have tended to keep down the rising industry, by making the goods too costly for general consumption.

Invention, paradoxical as it may seem, had really aggravated the difficulty by a device for facilitating the process of weaving. I have reference to the fly-shuttle, invented, in 1738, by John Kay. By this device one man alone was enabled to weave the widest cloth, while prior to Kay's invention two persons were required. One can readily see how this increased the difficulty of obtaining a supply of yarn; for the one-thread wheel, though turning from morning till night in thousands of cottages, could not keep pace either with the weaver's shuttle or with the demand of the merchant. (*b*) In 1738, however, John Wyatt invented an elementary mechanical contrivance whereby a single pair of hands could spin twenty, a hundred, or, on a perfected machine, even one thousand threads. I need not occupy space with the details relating to the various inventions which culminated in a grand constellation of mechanical devices which have influenced the world in a deeper sense than any other, save printing.

The invention for spinning, already referred to, and which really embodied the method of spinning by rollers, was made by John Wyatt, of Birmingham, for which royal letters-patent were granted in 1738, in the name of Lewis Paul. The specification of this patent describes the very principle of spinning by rollers which distinguished the spinning-machine brought into use thirty years later by Sir Richard Arkwright, and which was universally adopted, and of which Sir Richard is generally supposed, even at the present day, to have been the inventor. It has been quite clearly proven, however, that Wyatt was the inventor. It is true he did not succeed in making his fortune, or even in introducing his machine into use; he lacked the pecuniary means, and could not hold out long enough to realize the success his genius merited; but, more than all, he lacked the time and attendant circumstances, with all their subtle influences, which accompanied the train of inventions a generation or so later. Wyatt's invention slumbered for thirty years, till it was either rediscovered, or, what is just as probable, till its principles came accidentally to the knowledge of Arkwright, who, previous to 1769, had been a barber at Preston. He was possessed of a keen sagacity, which enabled him to appreciate the value of his invention, and his perseverance, talent, and good fortune served him by its means to enrich himself and his country.

In every mode of spinning, whether by the rude teak-wood wheel used in India or by the present ring spinning-frame, "the ends to be accomplished are, to draw out the loose fibers of the cotton in a regular and continuous line, and, after reducing the fleecy roll to the requisite tenuity, to twist it into a thread." The roll or sliver, previously prepared by the process of carding, must be drawn out to a considerably greater fineness before it is of the proper thickness to be twisted; this is accomplished by two or more rollers, placed horizontally, revolving in contact; the sliver of cotton, being put between the first pair of rollers, is by their revolution drawn through and compressed; while still passing between these rollers the cotton is caught by another pair, immediately in front, which revolve with much greater velocity than the first, and which therefore draw out the sliver to a much greater length and degree of fineness; after passing through successive pairs of rollers the reduced sliver is attached to a spindle and fly, the rapid revolutions of which twist it into a thread and at the same time wind it upon a bobbin.

Such is the admirable contrivance by which a machine is made to do what was formerly effected by the fingers of the spinner. And this is the invention ascribed to Sir Richard Arkwright, and on which his renown for mechanical genius rests, but which was clearly described in principle, as I have related, by John Wyatt, thirty years before Arkwright knew anything of cotton-spinning. Under Wyatt's invention, a mill for spinning was built at Birmingham in 1741 or 1742, which was turned by two asses walking round an axis, and ten girls were employed in attending the work. This establishment was unsuccessful, and in 1743 was broken up. Some years later a work upon a larger scale, but under Wyatt's invention, was built upon a stream of water at Northampton; but this did not prosper, and in 1764 it passed into use in other directions.

Arkwright labored under great difficulties in perfecting his invention, and it was only through the assistance rendered him by his friend, Mr. John Smally, of Preston, a liquor merchant and painter, that he was able to carry

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a Baines' *History of Cotton Manufacture*, p. 115. *b Ibid.*, p. 117.

on his experiments. In consequence of the machinery riots at Blackburn, on account of Hargreaves' invention of the spinning-jenny, Arkwright, in 1767, went to Nottingham, whither Hargreaves had already repaired. Arkwright finally formed a copartnership with Jedediah Strutt, of Derby. The significance of this alliance, so far as America is concerned, was great indeed, as I shall show; its direct results were to terminate the pecuniary difficulties of Arkwright, and he soon made his machine practicable, and in 1769 introduced it to the public, taking letters-patent therefor.

During Arkwright's experiments James Hargreaves, a weaver of Stand-Hill, near Blackburn, invented an admirable machine called a spinning-jenny, by which one spinner could spin many threads at a time. The evidence goes to show that Hargreaves conceived his invention and began to embody it as early as 1764. Though illiterate and humble, he must be regarded as one of the greatest inventors in the cotton manufacture, and entitled, along with Arkwright, to the renown associated with the inauguration of the era of machinery. In fact, by some Mr. Hargreaves is considered to have preceded Arkwright, for the date of his invention was some years before Arkwright obtained his patent for his water-power frame for spinning. Hargreaves' machine differed so completely from Wyatt's description and from Arkwright's embodiment that there can be no doubt of its being a perfectly original invention.

Hargreaves' jenny, like Arkwright's machine, was intended to spin the roving into yarn; but it was not, like Arkwright's, capable of being applied to the preparation of the roving itself. Hargreaves is said to have conceived his idea one day when several children at play in his cottage overturned a single-thread machine while in operation; he observed that while in a horizontal position the wheel continued to revolve, and also the spindle. The idea occurred to him then that if a number of spindles were placed upright, side by side, several threads could be spun at once, all the spindles being actuated by the same wheel. He therefore constructed a frame embodying this principle, and with it, though it was rudely made, he and his family spun weft for his own weaving. It soon, however, became the subject of rumor that Hargreaves could by some unknown power spin more threads than any one else, and so his invention, instead of gaining him admiration and gratitude, excited the suspicions of the spinners, who raised an outcry that it would throw multitudes out of employment, and a mob broke into his house and destroyed not only his jenny but most of his furniture. Hargreaves was so thoroughly persecuted that he left his native county and went to Nottingham. At this place he was furnished with means, and was enabled to perfect his invention, taking out letters-patent in 1770, one year after Arkwright's patent was granted.

The machine of Arkwright was most particularly applicable to the production of warp, while the jenny invented by Hargreaves was chiefly employed in spinning the woof or filling. For some years all the warp and woof used in the kingdom was spun on machines made from these models.

The mule spinning-machine, which Samuel Crompton invented in 1776, was a combination of the principles of the jenny and the water-frame, and entirely superseded the use of the jenny.

The machines of Hargreaves and Arkwright broke down the barrier which had so long obstructed the advance of the cotton manufacture, and the breaking down of this barrier inaugurated the factory system, which really dates from this period. Many minor improvements were made, not only in the methods of spinning, but in the processes necessary for the proper preparation of cotton for spinning; but, although I have dwelt quite at length upon the principal inventions, I need not discuss either those which followed as of course or the struggles through which all, inventors and capitalists, had to pass in their efforts to supply new and pressing demands. It is true that when this admirable series of machines was made known, and by their means yarns were produced far superior in quality to any before spun in England, as well as lower in price, a mighty impulse was given to the cotton manufacture. It was only an impulse, however, and the inventions would not have brought their fullest fruition without powerful influences which have not usually been considered in this connection, but which occupy as legitimate a place in the evolution of industrial forces as the inventions themselves, which are simply the initiatory outgrowth of such evolution.

While the processes of production had become in England more efficient through the invention of spinning-machines, whereby the weavers were kept busy and allowed no rest, it was only where a stream gave force to turn a mill-wheel that the spinner or the wool worker could establish his factory, while even if this difficulty had not existed the inefficiency of distribution would have rendered useless, to a large degree, a greatly augmented production.

Mr. Green, in his *History of the English People*, speaking of the decade beginning with 1760, remarks:

> The older main roads, which had lasted fairly through the middle ages, had broken down in later times before the growth of traffic and the increase of wagons and carriages. The new lines of trade lay often along mere country lanes which had never been more than horse-tracks, and to drive heavy wains through lanes like these was all but impossible. Much of the woolen trade, therefore, had to be carried on by means of long trains of pack-horses. * * * In the case of yet heavier goods, such as coal, distribution was almost impracticable, save along the greater rivers or in districts accessible from the sea. But at the time when Hargreaves and Arkwright were struggling to make their inventions available the enterprise of a duke and the ingenuity of a millwright not only solved the problem of distribution which the trade of the country was forcing upon England, and which improved cotton machinery was sure to complicate, but they paved the way by constructing canals for the greatest application of the steam-engine, which could not have played its part in establishing the factory system without means of distributing coal, and the system itself, without the steam-engine, would have been a feeble institution.

Francis, Duke of Bridgewater, was a shy, dreamy man, whom disappointment in love drove into a life of seclusion on his estates in the north. He was the possessor of collieries at Worsley whose value depended on their finding a market at the neighboring town of Manchester; and it was to bring his coal to this market that he resolved to drive a canal from the mine to the river Irwell. With singular good luck he found the means of carrying out his design in a self-taught mechanic, James Brindley. But in Brindley's mind the scheme widened far beyond the plans of the duke. Canals, as he conceived them, were no longer to serve as mere adjuncts to rivers; (*a*) for, as it is related of him, when under examination before a committee of the house of commons, and being jocularly asked for what he supposed rivers to have been created, he replied: "Undoubtedly to feed navigable canals."

What Brindley had discovered was in fact the water-road, a means of carrying heavy goods with the least resistance, and therefore the least cost, from the point of production to the point of sale. England at once seized on this discovery to free itself from the bondage in which it had been held.

From the year 1767, when Brindley completed his enterprise, a net-work of such water-roads was flung over the country; and before the movement had spent its force Great Britain alone was traversed in every direction by three thousand miles of navigable canals. (*b*)

The free and cheap distribution of coal and iron at once became an important factor, in fact the chief element in the development of the factory system, and now, for the first time in the history of civilization, a new motive power became indispensable to growth, for "what was needed to turn England into a manufacturing country was some means of transforming the force" of the sun "stored up in coal into a labor force; and it was this transformation which was brought about through the agency of steam".

Crude engines, in which steam was used as a means of draining mines, had long been in use; but the power relied on was mainly that of the weight of the air pressing on a piston, beneath which a vacuum had been created by the condensation of steam. There were many obstacles to the economical use of the engine, but these were overcome by the ingenuity of James Watt, a working engineer at Glasgow.

It would seem that the spirit of invention, of new thought in many directions, was in the very air after 1760 set in. Watt, in 1765, conceived the idea that, as steam was an elastic body, it would rush into a vacuum, and if a communication were made between the cylinder and an exhausted vessel it would rush into it, and might then be condensed without cooling the cylinder.

On the breaking out of the American war the steam-engine passed beyond its use in draining mines, and was rapidly adopted for all kinds of manufacturing industry. The location of mills upon streams of water was no longer a physical necessity; they could be built and run near large towns, whose crowded population could supply their operatives. The influence of this change of location has been the cause of most of the so-called factory evils. But one more generic invention, so far as textile machinery was concerned, was needed to establish the factory system; this was the power-loom. This, however, did not come till after the close of the American war. In 1785 Dr. Edward Cartwright invented the first power-loom. This was improved upon by various inventors till 1806, when power-looms began to be used in factories. Prior to this all the yarn spun by power-machines had been woven into cloth by hand-loom weavers, and of course the introduction of the power-loom caused a repetition of the scenes of riot which followed the introduction of spinning-machines. The power-loom closed the catalogue of machines essential to the inauguration of the era of mechanical supremacy. What inventions will come during the continuance of that era cannot be predicted, for we are still at the beginning of the age of invention. The wonderful results of its first twenty years of life are sufficient to indicate something of the future.

When the period of which I have spoken, the score of years from 1765 to 1785, had closed, England possessed powers which needed only the support of the silent forces of the nation to carry her to the very highest point in industrial supremacy. It should be remembered that the inventions whose origin I have outlined were not confined in their application to one manufacture, but that they gave nearly the same facilities to the woolen, the worsted, the linen, the stocking, and the lace manufactures as to the cotton, and that they spread in time from England to the whole of Europe, to America, and to parts of Africa and Asia. These inventions, however, were the material forces, powerful indeed, as agents, in building the factory system. What were the inner, subtle, but also powerful agencies at work to render the material forces successful?

While the inventions of which I have spoken were being perfected, Adam Smith was working out his memorable *Inquiry into the Causes of the Wealth of Nations*. When he was lecturing with applause in Glasgow from the chair of moral philosophy, James Watt was selling mathematical instruments in an obscure shop within the precincts of the same university, and was working out his inquiry into the practicable methods of applying steam.

It may seem as if no two departments of human thought were more widely separated than those in which these two men were engaged. One was a region purely mental, the other purely physical. The one had reference to the laws of mind, the other to the laws of matter; and yet the work of Adam Smith and that of James Watt were inseparably connected, not only as involving analogous methods of investigation, but as showing in their result the blending and co-operation of mental and material laws. (*c*) Dr. Smith treated of the philosophy of trade, and by his philosophy prepared the English mind to receive for England's benefit the commercial results, not only of her inventions, but of her losses from the war with her colonies and the diversion of her slave-trade capital. Adam Smith published his work in 1776, and during the seven years of strife with this country his doctrines had taken silent and almost unobserved possession of the minds of the thinking men of England, so that at the close of the

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a Green's *History of the English People*, vol. iv, p. 279. *b* *Ibid.* *c* *Reign of Law.* Duke of Argyle, page 339.

war it was not difficult to turn the thoughts of manufacturers and merchants to the industrial possibilities of Great Britain. With the close of the war the industry of England was exerted to its fullest power in the task of supplying the world with cotton goods. Her pauper children were made to contribute to her industrial greatness; she flooded America with cheap goods, demoralized our merchants and our people, and actually drove them into a fever for foreign goods. The capital of England, released by the war, was free to engage in industrial and commercial enterprises, and well did the business brains of the country apply the doctrines of the Glasgow economist. But a stronger power than war or the pauperism of agricultural districts, from which the factories were largely supplied with cheap labor, was added to the combination of forces essential to the establishment of a new industrial order. This new influence took the shape of a great moral and religious power, which seemed to roll without obstacle over the land, changing the politics of the country and changing the directions of the employment of active capital.

The religious revival work of the Wesleys brought a nobler result than mere religious enthusiasm. A philanthropic impulse grew out of the Wesleyan impulse. The writings and the personal example of Hannah More drew the sympathy of England to the poverty and crime of agricultural laborers. A passionate impulse of human sympathy with the wronged and the oppressed grew with amazing strength, and under its influence the crusade against the iniquity of the slave-trade was sustained. So each and all who sought the elevation of the oppressed aimed a shot at the slave-trade, either directly or indirectly, for all helped to create the public sentiment which insisted upon its abolition.

> Half the wealth of Liverpool was drawn from the traffic of its merchants in human flesh. * * * As the spirit of humanity told upon the people, apathy disappeared. Philanthropy allied itself with the Wesleyan movement in an attack on the slave-trade. (*a*)

The first assaults were repulsed by the opposition of the merchants, who argued that the abolition of the trade meant their ruin. But the movement gathered strength from year to year, and the traffic was suppressed; the vast amount of capital employed in it was forced into new channels, and naturally into commercial and industrial enterprises.

The philosophical bearing of these events in their relation to the establishment of the factory system cannot be denied. To be sure, invention alone would in time have succeeded in instituting the new system, but not for generations upon so enduring a basis. It required all the forces I have considered—physical, mental, commercial, and philanthropical—working in separate yet convergent lines, to lay the foundation of an entirely new system of manufactures; and these forces, coming into existence during the twenty years following the success of the efforts of Hargreaves and Arkwright, and extending in their wonderful influences over the earth wherever civilization has a foothold, constitute that period one of the most remarkable since the Christian era. In fact, no generation since has so completely stamped itself upon the affairs of the world.

England, at the close of the Revolution, held, as she supposed, the key to the industrial world of cotton manufacture; certainly she held the machinery, without which such manufacture could not be carried on in competition with her own mills. Parliament passed stringent laws prohibiting the exportation of machines, plans, and models of machines. Her policy began to shape itself with regard to trade outside the island, and that policy was to buy as little as possible and sell to everybody. England possessed all the raw material for a large list of products; cotton alone was wanting, but this she expected to receive from India. The American colonies she had destined for her food-raising department, and for an outlet, under her own control, for her surplus manufactures. This had been her expressed policy before the war, and this policy had stimulated her to the long-continued strife. By 14 Geo. III, c. 71, it was enacted that if any person exports any tools or utensils as are commonly used in the cotton or linen manufactures, or other goods wherein cotton or linen is used, or any parts of such tools or utensils, he shall not only forfeit the same, but also £200. Even the possession of such implements, with a view to exportation, made them liable to seizure and the possessor to arrest. (*b*) This law was passed in 1774, and related to the inventions of Arkwright and Hargreaves. This legislation on the part of England was contemporaneous with the non-importation resolutions of the colonies, nearly all of which, prior to the Revolution, took active steps to encourage manufactures.

ORIGIN OF THE FACTORY SYSTEM IN AMERICA.

At the time of the agitation of their independence the desire to plant the mechanic arts in this country became almost a passion—certainly a feature of the patriotism of the day. Hon. Edward Everett, in an address on American manufactures, in New York, in 1831, stated:

> The first measures of the patriots aimed to establish their independence on the basis of the productive industry and laborious arts of the country. They began with a non-importation agreement nearly two years before the Declaration of Independence. That agreement, * * * with the exception of the Address to the People of America and Great Britain, was the only positive act of the first Congress.

In this country, as well as in England, the germ of the textile factory existed in the fulling- and carding-mills; the former, dating earlier, being the mills for finishing the coarse cloths woven by hand in the homes of our ancestors; in the latter, the carding-mill, the wool was prepared for the hand-wheel. At the close of the Revolution the domestic system of manufactures prevailed throughout the states.

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a Green.

b Pope's *Laws of the Customs*.

The first attempts to secure the spinning machinery which had come into use in England were made in Philadelphia early in the year 1775, when probably the first spinning-jenny ever seen in America was exhibited in that city. During the war the manufacturers of Philadelphia extended their enterprises, and even built and run mills which writers often call factories, but they can hardly be classed under that term. Similar efforts, all preliminary to the establishment of the factory system, were made in Worcester, Massachusetts, in 1780. In 1781 the British parliament, determined that the textile machinery by which the manufactures of England were being rapidly extended, and which the continental producers were anxious to secure, should not be used by the people of America, re-enacted and enlarged the scope of the statute of 1774 against its exportation. By 21 Geo. III, c. 37, it was provided that any person who packed or put on board, or caused to be brought to any place in order to be put on any vessel for exportation, any machine, engine, tool, press, paper, utensil, or implement, or any part thereof, which now is or hereafter may be used in the woolen, cotton, linen, or silk manufacture of the kingdom, or goods wherein wool, cotton, linen, or silk are used, or any model or plan of such machinery, tool, engine, press, utensil, or implement, should forfeit every such machine, etc., and all goods packed therewith, and £200, and suffer imprisonment for one year. In 1782 a law was enacted which prohibited, under penalty of £500, the exportation or the attempt to export "blocks, plates, engines, tools, or utensils used in or which are proper for the preparing or finishing of the calico, cotton, muslin, or linen printing manufactures, or any part thereof". The same act prohibited the transportation of tools employed in the iron and steel manufactures. Acts were also passed interdicting the emigration of artificers. All these laws were enforced with great vigilance, and were of course serious obstacles to the institution of the new system of manufacture in America.

The manufacturers of this country were thus compelled either to smuggle or to invent their machinery. Both methods were practiced until most of the secrets of the manufacture of common goods were made available here.

The planting of the mechanic arts in this country became a necessity during the war of the Revolution, and afterward the spirit of American enterprise demanded that New England and the middle states should utilize the water-powers which they possessed, and by such utilization supply the people with home manufactures.

When the people of the states saw that the treaty of Paris had not brought industrial independence, a new form of expression of patriotism took the place of military service; and associations were formed the object of which was to discourage the use of British goods, and as the Articles of Confederation did not provide for the regulation of commerce the legislatures of the states were besought to protect home manufactures. The Constitution of 1789 remedied the defects of the articles in this respect, and gave Congress the power to legislate on commercial affairs. The Constitution was really the outcome of the industrial necessities of the people, because it was on account of the difficulties and the irritations growing out of the various commercial regulations of the individual states that a convention of commissioners from the various states was held in Annapolis in September, 1786, which convention recommended the one that framed the new or present Constitution of the United States.

Of course those industries whose products were called for by the necessities of the war were greatly stimulated, but with peace came reaction and the flooding of our markets with foreign goods.

The second act under the Constitution was passed July 4, 1789, with this preamble:

> Whereas it is necessary for the support of the government, for the discharge of the debts of the United States, and for the encouragement and the protection of manufactures, that duties be laid on goods, wares, and merchandise imported:
>
> *Be it enacted*, etc.

Patriotism and statute law thus paved the way for the importation of the factory system of industry, and so its institution here, as well as in England, was the result of both moral and economical forces.

As early as 1786, before the adoption of the Constitution of the United States, the legislature of Massachusetts offered encouragement for the introduction of machinery for carding and spinning by granting to Robert and Alexander Barr the sum of £200 to enable them to complete a roping-machine, and also to "construct such other machines as are necessary for the purpose of carding, roping, and spinning of sheep's wool, as well as of cotton wool". The next year these parties were granted six tickets in a land-lottery. Others engaged in the invention and construction of cotton-spinning machines at Bridgewater, being associated with the Barrs, who came to Massachusetts from Scotland at the invitation of Hon. Hugh Orr, of Bridgewater, and for the purpose of constructing spinning-machines. There is no doubt that the machinery built by them was the first in this country which included the Arkwright devices; the first factory, however, in America expressly for the manufacture of cotton goods was erected at Beverly, Massachusetts, in 1787. This enterprise was aided by the legislature. The factory at Beverly was built of brick, was driven by horse-power, and was continued in operation for several years, but its career as a cotton-mill was brief, and no great success attended it. About the same time other attempts had been made in Rhode Island, New York, and Pennsylvania, but principally in Rhode Island and that part of Massachusetts contiguous to Rhode Island.

The honor of the introduction of power-spinning machines in this country, and of their early use here, is shared by these last-named states; for while Massachusetts claims to have made the first experiments in embodying the principles of Arkwright's inventions and the first cotton factory in America, Rhode Island claims the first factory in which perfected machinery, made after the English models, was practically employed. This was the factory built by Samuel Slater, in 1790, in Pawtucket, Rhode Island, which still stands in the rear of Mill street in that city, and the hum of cotton machinery can still be heard within its walls. Previous to 1790 the common jenny and stock-card had been in operation upon a small scale in various parts of the United States, but principally in Pennsylvania, New York, Rhode Island, and Massachusetts; but every endeavor to introduce the system of spinning known as water-frame spinning, or Arkwright's method, had failed. The introduction of this system was the work of Slater, whom President Jackson designated "The father of American manufactures". Samuel Slater was born in Belper, Derbyshire, England, June 9, 1768, and at fourteen years of age was bound as an apprentice to Jedediah Strutt, esq., a manufacturer of cotton machinery at Milford, near Belper. Strutt was for several years a partner of Sir Richard Arkwright in the cotton-spinning business; so young Slater had every opportunity to master the details of the construction of the cotton machinery then in use in England, for during the last four or five years of his apprenticeship he served as general overseer, not only in making machinery, but in the manufacturing department of Strutt's factory. Near the close of his term his attention was drawn to the wants of the states by accidentally seeing a notice in an American paper of the efforts various states were making by way of offering bounties to parties for the production of cotton machinery. Slater knew well that under the laws of England he could carry neither machines nor models or plans of machines out of the country; so, after completing his full time with Mr. Strutt, he continued some time longer with him, superintending some new works Mr. Strutt was erecting. This he did that he might so perfect his knowledge of the business in every department that he could construct machinery from memory, without taking plans, models, or specifications. With this knowledge Slater embarked at London September 13, 1789, for New York, where he landed November 17, and at once sought parties interested in cotton manufactures. Finding the works of the New York Manufacturing Company, to whom he was introduced, unsatisfactory, he corresponded with Messrs. Brown and Almy, of Providence, who owned some crude spinning-machines, some of which came from the factory at Beverly, Massachusetts. In January, 1790, Slater made arrangements with Brown and Almy to construct machinery on the English plan. This he did at Pawtucket, making the machinery principally with his own hands, and on the 20th of December, 1790, he started three cards, drawing and roving, together with seventy-two spindles, working entirely on the Arkwright plan, and being the first of the kind ever operated in America.

It is generally supposed that the course of the progress of the manufacture of cotton goods in this country is quite clearly marked, yet a careful study of the subject seems rather to dissipate the line of advancement instead of bringing it into clearer view. Dr. Leander Bishop, in his exceedingly valuable work, *A History of American Manufactures*, in speaking of the clothing manufacture, states that a correspondent of the *American Museum*, writing from Charleston, South Carolina, in July, 1790, refers to a gentleman who—

> had completed and had in operation on the High Hills of the Santee, near Statesburg, ginning, carding, and other machines driven by water, and also spinning machines, with eighty-four spindles each, with every necessary article for manufacturing cotton. If this information be correct, the attempt to manufacture by machinery the cotton which they were then beginning to cultivate extensively was nearly as early as those of the northern states.

Certainly this bit of history of attempts in southern states, of the efforts of Samuel Wetherell, of Philadelphia, of the Beverly Company, in Massachusetts, of Moses Brown, at Providence, Rhode Island, all before Slater's coming, to introduce spinning by power, illustrates the difficulty of locating the origin of an institution when a country of such proportions as our own constitutes the field. It is safe, historically, to start with Slater as the first to erect cotton machinery on the English plan, and to give the factory system 1790 as its birthday.

The progress of the system has been uninterrupted from 1790, save by temporary causes and for brief periods; but these interruptions only gave an increased impetus to its growth.

In 1792, by the invention of the cotton-gin, an American, Eli Whitney, of Massachusetts, residing temporarily in Georgia, contributed as much toward the growth of the factory system as England had contributed by the splendid series of inventions which made the cotton-manufacturing machinery of the system.

The alarm of the people at the increase in the demand for foreign goods took shape again in 1794 and the decade following, and, by patriotic appeals to all classes, societies and clubs were formed pledged to wear only home-made goods. Congress was called upon to restrict importations. The result of all these efforts and influences stimulated the manufacture of cotton and other textiles. The water privileges of New England and the middle states offered to enterprising men the inducement to build factories for the spinning of yarn for the household manufacture of cloth. At the close of 1809, according to a report made by Mr. Albert Gallatin, Secretary of the Treasury in 1810, eighty-seven cotton factories had been erected in the United States, which, when in operation, would employ 80,000 spindles.

The perfect factory, the scientific arrangement of parts for the successive processes necessary for the manipulation of the raw material till it came out finished goods, had not yet been constructed. As I have said, the power-loom did not come into use in England till about 1806, while in this country it was not used at all till after the war of 1812. In England even it had not been used in the same factory with the spinning-machines. In fact, for many years the custom of spinning the yarn under one management and weaving the cloth under another has prevailed in England.

In 1811, Mr. Francis C. Lowell, of Boston, visited England, and spent much time in inspecting cotton factories, for the purpose of obtaining all possible information relative to cotton manufacture, with a view to the introduction of improved machinery in the United States. The power-loom was being introduced in Great Britain at this time, but its construction was kept very secret, and public opinion was not very favorable to its success. Mr. Lowell learned all he could regarding the new machine, and determined to perfect it himself. He returned to the states in 1814, and at once began his experiments on Broad street, Boston. His first move was to secure the skill of Paul Moody, of Amesbury, Massachusetts, a well-known mechanic. By and through the encouragement of Mr. Nathan Appleton, a company had been organized by Mr. Lowell and Mr. Patrick T. Jackson, with Mr. Appleton as one of its directors, for the establishment of a cotton manufactory, to be located in Waltham, Massachusetts, on a water privilege they had purchased. This factory was completed in the autumn of 1814, and in it was placed the loom perfected by Mr. Lowell, which differed much from the English looms. Mr. Lowell had neither plans nor models for his factory and looms, but in the year named the company set up a full set of machinery for weaving and spinning, there being 1,700 spindles, and this factory at Waltham was the first in the world, so far as record shows, in which all the processes involved in the manufacture of goods, from the raw material to the finished product, were carried on in one establishment by successive steps, mathematically considered, under one harmonious system. Mr. Francis C. Lowell, aided by Mr. Jackson, is unquestionably entitled to the credit of arranging this admirable system, and it is remarkable how few changes have been made in the arrangements established by him in this factory at Waltham.

So America furnished the stone which completed the industrial arch of the factory system of manufactures.

THE GROWTH OF THE FACTORY SYSTEM AS ILLUSTRATED BY THE COTTON MANUFACTURE.

After the success of the power-loom, the cotton manufacture took rapid strides, both in Europe and America. The hand-loom and the hand-weaver were rapidly displaced. Factories sprung up on all the streams of Yorkshire and Lancashire, in England, while in this country the activity of the promoters of the industry won them wealth, and won cities from barren pastures. They erected Lowell, Lawrence, Holyoke, Fall River, and many other thriving cities and towns, and now in this generation the industry is taking root upon the banks of southern streams. The progressive steps of this great trade are shown by the tables which follow. The facts for Great Britain for the year 1833 are taken from Baines' *History of Cotton Manufacture*, and have been corroborated as far as possible from other sources; they constitute the most reliable data obtainable for that period. For 1831, for the United States, we have the census returns and other sources, none of them very accurate, yet they give the best approximate figures. See p10

It will be observed that the number of cotton factories in this country was 801 in 1831, 1,240 in 1840, 1,074 in 1850, and that since 1850 there has been a constant decrease in the number of establishments. This is the result of consolidation and the establishment of large works, the smaller factories being closed or united with the large ones. (*a*) While the number of factories has decreased, the consumption of cotton and the production of goods has steadily increased. Perhaps the best gauge of the progress of the industry is to be found in the quantity of cotton consumed per capita of the population. In Great Britain, in 1831, the home consumption of cotton per capita (excluding the proportion for the export trade) was 6.62 pounds; in 1881 it was 7.75 pounds; in the United States, for 1830, it was 5.9 pounds; in 1880 it was 13.91 pounds. That is, the clothing of the people of this country in 1830 required 5.9 pounds of cotton per annum, and now it requires 13.91 pounds.

If we take the per capita consumption of the factories, including exports and home consumption, the proportion for Great Britain in 1831 was 16.15 pounds; in 1881, 40.8 pounds; for the United States, in 1831, it was, on this basis, 6.1 pounds; in 1880 it had risen to 14.96 pounds. The ratios given as to spindles to persons employed, capital to spindles, product to spindles, capital to product, product to persons employed, while in some sense fallacious, and more valuable to the expert than to the general reader, yet are true for the time given and the existing circumstances, and certainly show the change of circumstances. The ratio of consumption to spindles is of course influenced largely by the number of the yarn produced, and many of the British mills spin finer numbers than do the mills of this country; but whatever may be the cause, the ratio stands as given, and shows that the attendant circumstances, either of machinery or kind of product, or of some other matter, vary as to the two countries.

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a The number of cotton factories for 1880 should be increased by the number of mills engaged in working raw cotton, waste, or cotton yarn into hosiery, webbing, tapes, fancy fabrics, or mixed goods, or other fabrics which are not sold as specific manufactures of cotton or of wool; some of these work both fibers, but belong more in the class of cotton manufactures than in any other. These establishments, 249 in all, in 1880, have, without doubt, been included in the list of cotton-mills heretofore; so that now the total number, to correspond with the past, should be 1,005 cotton factories in the United States in 1880.

The following table shows the condition of the cotton manufactures of Great Britain and the United States in the years named:

Countries and years.		Number of establishments.	Capital invested.	Number of spinning spindles.	Number of looms.	Number of employés, including children.	Value of product.	Pounds of cotton consumed.
Great Britain	1833	1, 151	$170, 000, 000	9, 333, 000	100, 000	237, 000	$156, 693, 465	262, 700, 000
	1878	2, 671	374, 720, 500	39, 527, 920	514, 911	482, 903	474, 916, 368	1, 439, 393, 000
United States	1831	801	40, 612, 984	1, 246, 703	33, 433	57, 466	....	77, 457, 316
	1880	756	208, 280, 346	10, 653, 435	225, 759	172, 544	192, 090, 110	750, 343, 981

The following table shows the condition of the cotton-spinning and weaving industry of Great Britain and the United States in the years named:

Countries and years.		Ratio of spindles to persons employed.	Ratio of capital to spindles.	Ratio of product to spindles.	Ratio of capital to product.	Ratio of product to persons employed.	Years.	Total annual consumption of cotton.	Total average consumption of cotton per year per capita of total population.	Average consumption of cotton (exclusive of exports) per capita of total population.
								Pounds.	*Pounds.*	*Pounds.*
Great Britain	1833	39 to 1	$18 21 to 1	$16 79 to 1	$1 00 to $0 92	$661 15 to 1	1831	262, 700, 000	16. 15	6. 62
	1878	82 to 1	9 48 to 1	12 01 to 1	1 00 to 1 27	983 46 to 1	1881	1, 439, 393, 000	40. 80	7. 75
United States	1831	22 to 1	32 58 to 1	....	....	....	1830	77, 457, 316	6. 10	5. 90
	1880	62 to 1	19 55 to 1	18 03 to 1	1 00 to 0 92	1, 113 28 to 1	1880	750, 343, 981	14. 96	13. 91

COTTON INDUSTRY OF THE UNITED STATES: 1831-1880—NUMBER

	States and Territories.	NUMBER OF ESTABLISHMENTS.					NUMBER OF SPINDLES.					NUMBER OF LOOMS.				
		1831.	1850.	1860.	1870.	1880.	1831.	1850.	1860.	1870.	1880.	1831.	1850.	1860.	1870.	1880.
	The United States	801	1,094	1,091	956	756	1,246,703	......	5,235,727	7,132,415	10,653,435	33,433	......	126,313	157,310	225,759
	NEW ENGLAND STATES.															
1	Maine	8	12	19	23	24	6,500	......	281,056	459,772	695,924	91	......	6,877	9,902	15,971
2	New Hampshire	40	44	44	36	36	113,776	......	636,788	749,843	944,053	3,530	......	17,336	19,091	24,299
3	Vermont	17	9	8	8	7	12,392	......	17,600	28,768	55,081	352	......	362	628	1,180
4	Massachusetts	256	213	217	191	175	339,777	......	1,673,498	2,619,541	4,236,084	8,981	......	42,779	55,343	95,321
5	Rhode Island	116	158	153	139	115	235,753	......	814,554	1,043,242	1,764,569	5,773	......	17,315	18,075	29,669
6	Connecticut	94	128	129	111	82	115,528	......	435,466	597,142	936,376	2,609	......	8,675	11,943	18,261
	Total	531	564	570	508	439	823,726	......	3,858,962	5,498,308	8,632,087	21,336	......	93,344	114,982	184,701
	MIDDLE STATES.															
7	New York	112	86	79	81	36	157,316	......	348,584	492,573	561,658	3,653	......	7,885	17,218	12,403
8	New Jersey	51	21	44	27	17	62,979	......	123,548	200,580	232,221	815	......	1,567	2,176	3,180
9	Pennsylvania	67	208	185	138	59	120,810	......	476,979	434,246	425,391	6,301	......	12,994	12,862	8,488
10	Delaware	10	12	11	6	8	24,806	......	38,974	29,534	46,188	235	......	986	771	822
11	District of Columbia	......	1	1	......	......	......	......	2,560	......	......	......	......	83	......	......
12	Maryland	23	24	20	22	19	47,222	......	51,835	89,112	125,706	1,002	......	1,670	1,947	2,425
	Total	263	352	340	274	139	413,133	......	1,042,480	1,246,045	1,391,164	12,006	......	25,185	34,974	27,318
	SOUTHERN STATES.															
13	Virginia	7	27	16	11	8	9,844	......	49,440	77,116	44,340	91	......	2,160	1,310	1,322
14	North Carolina	......	28	39	33	49	......	......	41,884	39,897	92,385	......	......	761	618	1,790
15	South Carolina	......	18	17	12	14	......	......	30,890	34,940	82,334	......	......	525	745	1,676
16	Georgia	......	35	33	34	40	......	......	85,186	85,602	198,656	......	......	2,041	1,887	4,493
17	Florida	......	......	1	......	1	......	......	1,600	......	816	......	......	20	......	......
18	Alabama	......	12	14	13	16	......	......	35,740	28,046	49,432	......	......	623	632	863
19	Mississippi	......	2	4	5	8	......	......	6,344	3,526	18,568	......	......	90	152	644
20	Louisiana	......	......	2	4	2	......	......	6,725	13,084	6,096	......	......	150	292	120
21	Texas	......	......	1	4	2	......	......	2,700	8,878	2,648	......	......	100	235	71
22	Kentucky	......	8	6	5	3	......	......	8,192	7,734	9,022	......	......	76	72	78
23	Tennessee	......	33	30	28	16	......	......	29,850	27,923	35,736	......	......	243	313	818
24	Arkansas	......	3	2	2	2	......	......	......	1,125	2,015	......	......	......	......	28
	Total	7	166	165	151	161	9,844	......	298,551	327,871	542,048	91	......	6,789	6,256	11,898
	WESTERN STATES.															
25	Ohio	......	8	8	7	4	......	......	19,664	23,240	13,328	......	......	540	208	42
26	Indiana	......	2	2	4	4	......	......	11,000	17,360	33,396	......	......	375	448	776
27	Iowa	......	......	......	1	......	......	......	......	......	......	......	......	......	......	......
28	Illinois	......	......	3	5	2	......	......	......	1,856	4,860	......	......	......	16	24
29	Missouri	......	2	2	3	3	......	......	5,000	16,715	19,312	......	......	80	415	431
30	Michigan	......	......	......	......	1	......	......	......	......	5,100	......	......	......	......	131
31	Wisconsin	......	......	......	......	1	......	......	......	......	10,000	......	......	......	......	400
32	Minnesota	......	......	......	......	1	......	......	......	......	1,708	......	......	......	......	24
33	Utah territory	......	......	1	3	1	......	......	70	1,020	432	......	......	......	11	14
	Total	......	12	16	23	17	......	......	35,734	60,191	88,136	......	......	995	1,098	1,842

OF ESTABLISHMENTS, SPINDLES, LOOMS, AND EMPLOYÉS.

WHOLE NUMBER OF EMPLOYÉS.					NUMBER OF MALE EMPLOYÉS.					NUMBER OF FEMALE EMPLOYÉS.					NUMBER OF YOUTH AND CHILDREN.					
1831.	1850.	1860.	1870.	1880.	1831.	1850.	1860.	1870.	1880.	1831.	1850.	1860.	1870.	1880.	1831.	1850.	1860.	1870.	1880.	
62, 208	92, 286	122, 028	135, 369	172, 544	18, 590	33, 150	46, 859	42, 790	59, 685	38, 927	59, 136	75, 169	69, 637	84, 539	4, 691	......	......	22, 942	28, 320	
289	3, 739	6, 764	9, 439	11, 759	84	780	1, 828	2, 606	3, 858	205	2, 959	4, 936	6, 246	6, 481	......	......	......	587	1, 420	1
5, 025	12, 122	12,730	12, 542	16, 395	875	2, 911	3, 829	3, 752	5, 104	4, 090	9, 211	8, 901	7, 490	9, 594	60	......	......	1, 300	1, 697	2
484	241	379	451	721	102	94	157	125	200	363	147	222	242	350	19	......	......	84	171	3
13, 343	28, 730	38, 451	43, 512	61, 246	2, 665	9, 293	13, 691	13, 694	22, 180	10, 678	19, 437	24, 760	24, 065	31, 496	......	......	......	5, 753	7, 570	4
8, 500	10, 875	14, 077	16, 745	21, 174	1, 731	4, 959	6, 353	5, 583	8, 045	3, 297	5, 916	7, 724	8, 028	9, 199	3, 472	......	......	3, 134	3, 930	5
4, 315	6, 186	9, 002	12, 086	14, 484	1, 399	2, 708	4, 028	4, 443	6, 134	2, 477	3, 478	4, 974	4, 734	5, 434	439	......	......	2, 909	2, 916	6
31, 956	61, 893	81, 403	94, 775	125, 779	6, 856	20, 745	29, 886	30, 203	45, 521	21, 110	41, 148	51, 517	50, 805	62, 554	3, 990	......	......	13, 767	17, 704	
5, 510	6, 320	7, 659	9, 144	9, 227	1, 374	2, 632	3, 107	2, 608	2, 937	3, 652	3, 688	4, 552	4, 546	4, 201	484	......	......	1, 990	2, 089	7
5, 438	1, 712	2, 534	3, 514	4, 179	2, 151	616	1, 010	1, 086	1, 180	3, 070	1, 096	1, 524	1, 745	2, 291	217	......	......	683	708	8
14, 896	7, 663	14, 994	12, 730	9, 879	6, 545	3, 564	6, 412	3, 859	3, 339	8, 351	4, 099	8, 582	6, 097	4, 454	......	......	......	2, 774	2, 086	9
1, 373	838	1, 109	726	791	697	413	520	225	237	676	425	589	286	362	......	......	......	215	192	10
......	144	95	......	......	......	41	70	......	......	......	103	25	......	......	......	......	......	......	......	11
2, 617	3, 022	2, 687	2, 860	4, 042	824	1, 008	1, 093	688	1, 226	1, 793	2, 014	1, 594	1, 452	1, 877	......	......	......	720	939	12
29, 834	19, 699	29, 078	28, 974	28, 118	11, 591	8, 274	12, 212	8, 466	8, 919	17, 542	11, 425	16, 866	14, 126	13, 185	701	......	......	6, 382	6, 014	
418	2, 963	1, 441	1, 741	1, 085	143	1, 275	694	921	274	275	1, 688	747	507	530	......	......	......	313	281	13
......	1, 619	1, 755	1, 453	3, 232	......	442	440	258	764	......	1, 177	1, 315	916	1, 727	......	......	......	279	741	14
......	1, 019	891	1, 123	2, 018	......	399	342	289	661	......	620	549	508	772	......	......	......	326	585	15
......	2, 272	2, 813	2, 846	6, 215	......	873	1, 131	1, 147	1, 853	......	1, 399	1, 682	1, 080	2, 951	......	......	......	619	1, 411	16
......	95	65	......	31	......	28	40	......	19	......	67	25	......	2	......	......	......	......	10	17
......	715	1, 312	1, 032	1, 448	......	346	543	303	384	......	369	769	445	631	......	......	......	284	433	18
......	36	215	265	695	......	19	106	78	176	......	17	109	88	313	......	......	......	99	206	19
......	......	360	246	104	......	......	220	123	39	......	......	140	57	41	......	......	......	66	24	20
......	......	130	291	66	......	......	130	184	40	......	......	......	52	10	......	......	......	55	16	21
......	402	246	269	348	......	181	130	77	124	......	221	116	71	91	......	......	......	121	133	22
......	891	899	890	1, 015	......	310	323	252	283	......	581	576	463	502	......	......	......	175	230	23
......	31	25	17	60	......	13	14	8	16	......	18	11	3	17	......	......	......	6	27	24
418	10, 043	10, 152	10, 173	16, 317	143	3, 886	4, 113	3, 640	4, 633	275	6, 157	6, 039	4, 190	7, 587	......	......	......	2, 343	4, 097	
......	401	840	462	481	......	132	372	216	124	......	269	468	147	320	......	......	......	99	37	25
......	95	367	504	708	......	38	177	119	193	......	57	190	179	391	......	......	......	206	124	26
......	......	......	6	......	......	......	......	3	......	......	......	......	3	......	......	......	......	......	......	27
......	......	11	98	230	......	......	10	26	60	......	......	1	31	88	......	......	......	41	82	28
......	155	170	361	508	......	75	85	107	120	......	80	85	154	207	......	......	......	100	181	29
......	......	......	......	86	......	......	......	......	34	......	......	......	......	38	......	......	......	......	14	30
......	......	......	......	266	......	......	......	......	61	......	......	......	......	149	......	......	......	......	56	31
......	......	......	......	22	......	......	......	......	4	......	......	......	......	12	......	......	......	......	6	32
......	......	7	16	29	......	......	4	10	16	......	......	3	2	8	......	......	......	4	5	33
......	651	1, 395	1, 447	2, 330	......	245	648	481	612	......	406	747	516	1, 213	......	......	......	450	505	

COTTON INDUSTRY OF THE UNITED STATES: 1831-1880—

	States and Territories.	CAPITAL INVESTED.				
		1831.	1850.	1860.	1870.	1880.
	The United States	$40, 612, 984	$74, 500, 931	$98, 585, 269	$140, 706, 291	$208, 280, 346
	NEW ENGLAND STATES.					
1	Maine	765, 000	3, 329, 700	6, 018, 325	9, 839, 685	15, 292, 078
2	New Hampshire	5, 300, 000	10, 950, 500	12, 586, 880	13, 332, 710	19, 877, 084
3	Vermont	295, 500	202, 500	271, 200	670, 000	936, 096
4	Massachusetts	12, 891, 000	28, 455, 630	33, 704, 674	44, 714, 375	72, 291, 601
5	Rhode Island	6, 262, 340	6, 675, 000	10, 052, 200	18, 836, 300	28, 047, 331
6	Connecticut	2, 825, 600	4, 219, 100	6, 627, 000	12, 710, 700	20, 310, 500
	Total	28, 338, 840	53, 832, 430	69, 260, 279	100, 103, 770	156, 754, 690
	MIDDLE STATES.					
7	New York	3, 669, 500	4, 176, 920	5, 383, 479	8, 511, 336	11, 399, 638
8	New Jersey	2, 027, 644	1, 483, 500	1, 320, 550	2, 762, 000	3, 807, 750
9	Pennsylvania	3, 758, 500	4, 528, 925	9, 203, 040	12, 550, 720	10, 331, 985
10	Delaware	384, 500	460, 100	582, 500	1, 165, 000	874, 570
11	District of Columbia		85, 000	45, 000		
12	Maryland	2, 144, 000	2, 236, 000	2, 254, 500	2, 734, 250	4, 600, 816
	Total	11, 984, 144	12, 970, 445	18, 789, 069	27, 723, 306	31, 014, 759
	SOUTHERN STATES.					
13	Virginia	290, 000	1, 908, 900	1, 367, 543	1, 128, 000	1, 190, 100
14	North Carolina		1, 058, 800	1, 272, 750	1, 030, 900	2, 855, 800
15	South Carolina		857, 200	801, 825	1, 337, 000	2, 776, 100
16	Georgia		1, 736, 156	2, 126, 103	3, 433, 265	6, 348, 657
17	Florida		80, 000	30, 000		11, 000
18	Alabama		651, 900	1, 316, 000	931, 000	1, 246, 500
19	Mississippi		38, 000	230, 000	751, 500	1, 122, 140
20	Louisiana			1, 000, 000	592, 000	195, 000
21	Texas			450, 000	496, 000	50, 000
22	Kentucky		239, 000	244, 000	405, 000	360, 000
23	Tennessee		669, 600	965, 000	970, 650	1, 145, 600
24	Arkansas		16, 500	37, 000	13, 000	75, 000
	Total	290, 000	7, 256, 056	9, 840, 221	11, 088, 315	17, 375, 897
	WESTERN STATES.					
25	Ohio		297, 000	265, 000	555, 700	670, 000
26	Indiana		43, 000	251, 000	551, 500	1, 090, 000
27	Iowa				1, 500	
28	Illinois			4, 700	151, 000	240, 000
29	Missouri		102, 000	169, 000	489, 200	890, 000
30	Michigan					20, 000
31	Wisconsin					200, 000
32	Minnesota					5, 000
33	Utah territory			6, 000	42, 000	20, 000
	Total		442, 000	695, 700	1, 790, 900	3, 135, 000

CAPITAL INVESTED, WAGES PAID, AND COTTON CONSUMED.

WAGES OF OPERATIVES.					COTTON CONSUMED YEARLY—POUNDS.					
1831.	1850.	1860.	1870.	1880.	1831.	1850.	1860.	1870.	1880.	
....	....	$23, 940, 108	$39, 044, 132	$42, 040, 510	77, 457, 316	288, 558, 000	422, 704, 975	398, 308, 257	750, 343, 981	
....	....	1, 368, 888	2, 565, 197	2, 936, 640	588, 500	14, 188, 950	23, 733, 165	25, 887, 771	54, 185, 061	1
....	....	2, 883, 804	3, 989, 853	4, 290, 960	7, 845, 000	37, 361, 700	51, 002, 324	41, 469, 719	76, 386, 499	2
....	....	78, 468	125, 000	161, 748	760, 000	1, 009, 350	1, 447, 250	1, 235, 652	3, 562, 088	3
....	....	7, 798, 476	13, 589, 305	15, 828, 571	24, 871, 981	100, 623, 150	134, 012, 759	130, 654, 040	273, 718, 889	4
....	....	2, 847, 804	5, 224, 650	5, 320, 303	10, 414, 578	22, 820, 850	41, 614, 797	44, 630, 787	81, 137, 172	5
....	....	1, 743, 480	3, 246, 783	3, 632, 639	6, 777, 209	17, 767, 350	31, 891, 011	31, 747, 309	52, 384, 171	6
....	....	16, 720, 920	28, 740, 788	32, 170, 861	51, 257, 268	193, 771, 350	283, 701, 306	275, 625, 278	541, 373, 880	
....	....	1, 405, 292	2, 626, 131	1, 994, 755	7, 661, 670	17, 000, 100	23, 945, 627	24, 783, 351	31, 656, 594	7
....	....	468, 336	1, 009, 351	1, 156, 961	5, 832, 204	6, 496, 650	9, 094, 649	7, 920, 035	9, 950, 609	8
....	....	2, 768, 340	3, 496, 986	2, 502, 688	7, 111, 174	19, 872, 900	37, 496, 203	32, 953, 318	40, 311, 809	9
....	....	220, 224	190, 069	192, 727	1, 435, 000	2, 128, 500	3, 403, 600	2, 587, 615	3, 236, 184	10
....	....	19, 800	....	....	....	432, 000	294, 117	....	....	11
....	....	582, 780	671, 933	766, 129	3, 008, 000	10, 496, 250	12, 880, 119	12, 693, 647	24, 166, 232	12
....	....	5, 464, 772	7, 994, 470	6, 613, 260	25, 048, 048	56, 426, 400	87, 113, 715	80, 937, 966	109, 321, 428	
....	....	260, 856	229, 750	169, 789	1, 152, 000	8, 003, 250	7, 544, 297	4, 255, 383	5, 087, 519	13
....	....	189, 744	182, 951	439, 659	....	6, 127, 650	5, 540, 738	4, 238, 276	11, 832, 641	14
....	....	123, 300	257, 680	380, 844	....	4, 468, 050	3, 978, 061	4, 756, 823	15, 601, 005	15
....	....	415, 332	611, 868	1, 135, 184	....	9, 103, 500	13, 907, 904	10, 921, 176	33, 757, 199	16
....	....	7, 872	....	5, 000	....	270, 000	200, 000	....	166, 250	17
....	....	198, 408	216, 679	239, 998	....	2, 343, 600	5, 246, 800	3, 249, 523	7, 271, 791	18
....	....	36, 264	61, 833	133, 214	....	193, 500	698, 800	580, 764	2, 881, 853	19
....	....	49, 440	60, 600	12, 572	....	....	1, 995, 700	748, 525	644, 000	20
....	....	15, 600	68, 211	2, 466	....	....	588, 000	1, 077, 118	119, 986	21
....	....	41, 280	57, 951	63, 850	....	1, 692, 000	1, 826, 000	1, 584, 625	1, 882, 234	22
....	....	139, 180	178, 156	161, 071	....	2, 884, 950	4, 072, 710	2, 872, 582	4, 944, 279	23
....	....	4, 428	4, 100	7, 339	....	76, 500	187, 500	66, 400	340, 000	24
....	....	1, 481, 704	1, 929, 779	2, 750, 986	1, 152, 000	35, 163, 000	45, 786, 510	34, 351, 195	84, 528, 757	
....	....	151, 164	113, 520	104, 500	....	1, 921, 500	3, 192, 500	2, 226, 400	2, 506, 182	25
....	....	84, 888	113, 200	162, 829	....	303, 750	1, 813, 944	2, 070, 318	6, 364, 887	26
....	....	....	275	....	....	....	....	20, 000	....	27
....	....	2, 640	25, 500	47, 885	....	....	95, 000	857, 000	1, 099, 130	28
....	....	30, 600	120, 300	97, 680	....	972, 000	990, 000	2, 196, 600	3, 082, 132	29
....	....	....	....	16, 800	....	....	....	....	300, 000	30
....	....	....	....	67, 209	....	....	....	....	1, 541, 797	31
....	....	....	....	6, 400	....	....	....	....	200, 000	32
....	....	3, 420	6, 300	2, 100	....	....	12, 000	23, 500	25, 788	33
....	....	272, 712	379, 095	505, 403	....	3, 197, 250	6, 103, 444	7, 393, 818	15, 119, 916	

COTTON INDUSTRY OF THE UNITED STATES: 1831-1880—VALUE OF

	States and territories.	VALUE OF ALL MATERIALS.				
		1831.	1850.	1860.	1870.	1880.
	The United States	....	$34, 835, 056	$57, 285, 534	$111, 736, 936	$102, 206, 347
	NEW ENGLAND STATES.					
1	Maine	....	1, 573, 110	3, 319, 335	6, 746, 780	7, 320, 152
2	New Hampshire	....	4, 839, 429	7, 128, 196	12, 318, 867	10, 146, 904
3	Vermont	....	114, 415	181,030	292, 269	508, 297
4	Massachusetts	....	11, 289, 309	17, 214, 592	37, 371, 599	35, 994, 109
5	Rhode Island	....	3, 484, 579	5, 799, 223	13, 268, 315	12, 291, 437
6	Connecticut	....	2, 500, 062	4, 028, 406	8, 818, 651	8, 029, 127
	Total	....	23, 800, 904	37, 670, 782	78, 816, 481	74, 290, 026
	MIDDLE STATES.					
7	New York	....	1, 985, 973	3, 061, 105	6, 990, 626	4, 652, 745
8	New Jersey	....	666, 645	1, 165, 435	1, 964, 758	2, 018, 175
9	Pennsylvania	....	3, 152, 530	7, 386, 213	10, 724, 052	6, 105, 700
10	Delaware	....	312, 068	570, 102	704, 733	527, 205
11	District of Columbia	....	67, 000	47, 403	....	....
12	Maryland	....	1, 165, 579	1, 698, 413	3, 409, 426	2, 887, 933
	Total	....	7, 349, 795	13, 928, 071	23, 793, 595	16, 191, 758
	SOUTHERN STATES.					
13	Virginia	....	828, 375	811, 187	937, 820	640, 391
14	North Carolina	....	531, 903	622, 363	963, 809	1, 463, 645
15	South Carolina	....	295, 971	431, 525	761, 469	1, 808, 300
16	Georgia	....	900, 419	1, 466, 375	2, 504, 758	4, 019, 673
17	Florida	....	30, 000	23, 600	....	18, 095
18	Alabama	....	237, 081	617, 633	764, 965	783, 711
19	Mississippi	....	21, 500	79, 800	123, 568	337, 149
20	Louisiana	....	....	226, 600	161, 485	72, 470
21	Texas	....	....	64, 140	216, 519	14, 827
22	Kentucky	....	180, 907	214, 755	375, 048	253, 818
23	Tennessee	....	297, 500	384, 548	595, 789	553, 761
24	Arkansas	....	8, 975	11, 600	13, 780	33, 305
	Total	....	3, 332, 631	4, 954, 126	7, 419, 010	9, 999, 145
	WESTERN STATES.					
25	Ohio	....	237, 060	374, 100	493, 704	286, 692
26	Indiana	....	28, 220	229, 925	542, 875	651, 434
27	Iowa	....	....	....	4, 050	....
28	Illinois	....	....	11, 930	177, 525	142, 183
29	Missouri	....	86, 446	110, 000	481, 745	376, 081
30	Michigan	....	....	....	....	41, 000
31	Wisconsin	....	....	....	....	194, 556
32	Minnesota	....	....	....	....	30,000
33	Utah territory	....	....	6, 000	7, 051	3, 472
	Total	....	351, 726	731, 955	1, 707, 850	1, 725, 418

MATERIALS, QUANTITY OF GOODS MANUFACTURED, AND VALUE OF PRODUCTS.

GOODS MANUFACTURED YEARLY—POUNDS.					VALUE OF PRODUCTS.					
1831.	**1850.**	**1860.**	**1870.**	**1880.**	**1831.**	**1850.**	**1860.**	**1870.**	**1880.**	
59, 514, 926	....	....	349, 314, 592	607, 264, 241	....	$65, 501, 687	$115, 681, 774	$177, 489, 739	$192, 090, 110	
525, 000	....	....	23, 627, 155	44, 352, 698	....	2, 630, 616	6, 235, 623	11, 844, 181	13, 319, 363	1
7, 255, 060	....	....	35, 003, 432	63, 881, 540	....	8, 861, 749	13, 699, 994	16, 909, 672	17, 953, 403	2
574, 500	....	....	1, 051, 000	2, 159, 108	....	280, 300	357, 450	546, 510	855, 864	3
21, 301, 062	....	....	113, 803, 458	219, 160, 105	....	21, 394, 401	38, 004, 255	59, 493, 153	72, 289, 518	4
9, 271, 481	....	....	38, 503, 060	60, 905, 642	....	6, 495, 972	12, 151, 191	22, 049, 203	22, 875, 111	5
5, 612, 000	....	....	27, 296, 710	42, 285, 517	....	4, 122, 952	8, 911, 387	14, 026, 334	16, 069, 771	6
44, 539, 103	....	....	239, 284, 815	432, 744, 610	....	43, 785, 990	79, 359, 900	124, 959, 053	143, 363, 030	
5, 297, 713	....	....	22, 113, 630	25, 649, 456	....	5, 019, 323	6, 676, 878	11, 178, 211	8, 266, 836	7
1, 877, 418	....	....	6, 723, 748	8, 275, 260	....	1, 289, 648	2, 217, 728	4, 015, 768	4, 548, 275	8
4, 207, 192	....	....	32, 494, 857	34, 457, 323	....	5 812, 126	13, 650, 114	17, 490, 080	11, 021, 054	9
1, 201, 500	....	....	2, 437, 649	2, 867, 969	....	538, 439	941, 703	1, 060, 898	871, 007	10
....	....	....	....	....	....	100, 000	74, 400	....	....	11
2, 224, 000	....	....	10, 496, 677	22, 324, 511	....	2, 021, 396	2, 973, 877	4, 852, 808	4, 682, 114	12
14, 807, 823	....	....	74, 266, 561	93, 574, 519	....	14, 780, 932	26, 534, 700	38, 597, 765	29, 389, 286	
168, 000	....	....	3, 456, 569	4, 339, 476	....	1, 446, 109	1, 489, 971	1, 435, 800	1, 040, 962	13
....	....	....	3, 444, 166	9, 646, 380	....	985, 411	1, 046, 047	1, 345, 052	2, 554, 482	14
....	....	....	4, 125, 210	12, 251, 272	....	842, 440	713, 050	1, 529, 937	2, 895, 769	15
....	....	....	9, 596, 800	27, 733, 153	....	1, 395, 056	2, 371, 207	3, 648, 973	6, 481, 894	16
....	....	....	....	134, 000	....	49, 920	40, 000	....	25, 000	17
....	....	....	2, 843, 000	6, 154, 470	....	398, 585	1, 040, 147	1, 088, 767	1, 228, 019	18
....	....	....	529, 573	2, 481, 022	....	22, 000	176, 328	234, 445	679, 093	19
....	....	....	629, 025	166, 496	....	....	466, 500	251, 550	86, 776	20
....	....	....	887, 695	99, 880	....	....	80, 695	374, 598	21, 600	21
....	....	....	1, 389, 000	1, 722, 500	....	445, 639	315, 270	498, 960	418, 286	22
....	....	....	2, 381, 477	3, 874, 616	....	508, 481	698, 122	941, 542	874, 717	23
....	....	....	53, 125	255, 000	....	17, 360	23, 000	22, 562	50, 000	24
168, 000	....	....	29, 335, 640	68, 858, 265	....	6, 111, 001	8, 460, 337	11, 372, 186	16, 356, 598	
....	....	....	1, 918, 000	1, 993, 182	....	594, 204	723, 500	681, 835	637, 000	25
....	....	....	1, 779, 481	5, 238, 020	....	86, 660	344, 350	778, 047	1, 155, 029	26
....	....	....	18, 000	....	....	....	....	7, 000	....	27
....	....	....	739, 000	917, 634	....	....	18, 987	279, 000	219, 861	28
....	....	....	1, 949, 900	2, 200, 027	....	142, 900	230, 000	798, 050	522, 980	29
....	....	....	....	250, 000	....	....	....	....	70, 000	30
....	....	....	....	1, 314, 864	....	....	....	....	328, 389	31
....	....	....	....	160, 000	....	....	....	....	40, 000	32
....	....	....	23, 195	13, 120	....	....	10, 000	16, 803	7, 937	33
....	....	....	6, 427, 576	12, 086, 847	....	823, 764	1, 326, 837	2, 560, 735	2, 981, 196	

The foregoing tables clearly indicate the rapid extension of the cotton manufacture to the southern states, where the cotton is at hand and labor is much cheaper than at the north. The number of spindles in the southern states was increased from 327,851 in 1870 to 542,048 in 1880, or 65+ per cent.; in New England the increase was from 5,498,408 to 8,632,087, or very nearly 57 per cent.; the middle states from 1,246,045 in 1870 to 1,391,164 in 1880, or 11+ per cent.; the western states from 60,191 in 1870 to 88,136, or 46+ per cent. In the whole country the increase was from 7,132,415 spindles in 1870 to 10,653,435 in 1880, or 49+ per cent. It will be seen that the states of Michigan, Wisconsin, and Minnesota have been added to the list of cotton manufacturing states since 1870.

On the continent of Europe the cotton manufacture has come under the rule of the new system, but not to that extent shown in Great Britain and America. Mulhall, in his *Progress of the World*, gives the number of spindles to each operative in various countries, as follows: Great Britain, 83; United States, 66; Germany, 46; France, 24; Russia, 20; Switzerland, Austria, India, 20; average, 54.

THE GENERAL APPLICATION OF THE FACTORY SYSTEM.

In nearly all industries where the terms of the definition of a factory can apply, that is, where raw material can be converted into finished goods by consecutive, harmonious processes, carried along by a central power, the factory system has been adopted. In all textile manufactures this has been the case, and the adoption of the new system in the woolen, silk, worsted, flax, and all textile trades, followed immediately upon, or was contemporaneous with, the adoption of the system in the cotton trade. Outside of the textile trades the extension of the system has been rapid indeed, until the statistics of industries of Great Britain and of the United States are simply the statistics of manufactures under the factory system. This statement is, in the main, true of Belgium, France, and Germany, although in France a very large proportion of weaving, especially of fine goods and silks, is still done by hand; in the silk industry in France, however, the power-loom is now rapidly displacing the hand-loom. Notwithstanding this general adoption of the system by the textile trades in the great manufacturing states of Europe and America, more than one-half the population of the globe is clothed with hand-made goods.

While the inauguration of the factory system in the United States was some fifteen years later than its birth in England, the extension of the system has been more rapid and its application more varied here than in any other country. As parties engaged in industries other than the manufacture of textiles saw the wonderful results of systematized labor, by its division under the scientific methods of the factory system, they gradually adopted the new order, until now it is quite safe to say that of the nearly three millions of people employed in the mechanical industries of this country at least four-fifths are working under the factory system. Some of the other remarkable instances of the application of the system are to be found in the manufacture of boots and shoes, of watches, musical instruments, clothing, agricultural implements, metallic goods generally, fire-arms, carriages and wagons, wooden goods, rubber goods, and even in the slaughtering of hogs. Most of these industries have been brought under the factory system during the past thirty years.

It is but a comparatively few years since the manufacture of boots and shoes was carried on in the little home shops which were attached to or built near the dwellings of the shoemakers. These little shops, in which a few men, rarely more than four, worked upon the bench, upon stock received from the manufacturer, cut out and ready to be put together, are closed, and the great shoe-factory takes their place. In the shoe-factory is to be seen the perfect adaptation of the manufacture of goods by successive, harmonious processes. The shoe-factory is rapidly doing away with the clogs of England and the sabots of the continent. The watch-factory presents, perhaps, the most completely scientific application of the factory system. It certainly has brought the watch within the means of the poor man. Pianos, house organs, tapestry carpets, and many other luxuries which the rich only could afford, are now enjoyed by the masses, simply as the result of the factory system of industry.

The history of the achievements of the modern system would require volumes devoted to that particular subject; the instances referred to indicate the vast extent of the application of the system; if they do not, the fact that the product of the industries of the United States has reached $6,000,000,000 per annum will illustrate the extent of its growth. Many goods are made under a mixed system of manufacture, but the tendency is to bring all under the factory system as rapidly as possible. This tendency is accelerated by the small expense and the comparative ease with which inventions are secured and protected in this country; and this may account, in some degree, for the more general adoption of the system here than in other countries. It is quite impossible to arrive at an accurate statement as to the number of persons it would require under the old individual system to produce the goods made by the present factory workers of this country, but by careful computations in some branches of work a rough estimate of the whole would indicate that each factory-system employé in 1882 represents, on an average, at least fifty employés under the individual system. Thus it would require about one hundred and fifty million persons working under the old system to produce the goods made by the three million or so factory workers of to-day. This computation may be very wide of the truth, but any other is equally startling. This estimate will hardly be disputed when it is considered that in spinning alone eleven hundred threads are spun now at one time where one was spun under the old system. The influence of the new system upon production is shown in the appropriate section.

THE FACTORY AND THE DOMESTIC SYSTEMS OF INDUSTRY CONTRASTED—APPARENT EVILS OF THE FACTORY SYSTEM.

The rapid extension of the factory system, absorbing as it does small enterprises and crushing out the ideal system of manufacture, has not been accomplished without great social changes, affecting the morals as well as the politics and the legislation of the countries in which it has been established. No one disputes the economic advantages of the modern system; few admit that it is a moral force in the actual progress of civilization; yet the system is, and has been, an active element in the upbuilding of the character of the peoples involved in the changes inaugurated by it.

None of the systems of labor which existed prior to the present or factory system were particularly conducive to a higher civilization. Wages have been paid for services rendered since the wants of men induced one to serve another; yet the wage system is of recent origin as a system. It arose out of the feudal system of labor, and was the first fruit of the efforts of men to free themselves from villeinage. The origin of the wage system cannot be given a birthday, as can the factory system. It is true, however, that the wage system rendered the factory system possible, and they have since grown up together. The first may give way to some other method for dividing the profits of production, but the factory system, perfected, must remain, whether under a socialistic system or under whatever other political system that may exist, until disintegration is the rule in society.

The feudal and the slave systems had nothing in them from which society could draw the forces necessary to growth; on the contrary, they reflected the most depressing influences, and were actually the allies of retrogression. The laborer owned nothing; not even in the sweat of his own brow could he earn his bread. It is not so very long ago that the factory system stepped upon the bondage of labor. The one actually overtook the other, so slow was the retirement of the slave system.

The domestic system, which claims the eighteenth century almost entirely, was woven into the two systems which existed before and came after it; in fact, it has not yet disappeared. It is simple fact when we say that the factory system set aside the domestic system of industry. There is something poetic in the idea of the weaver of old England, before spinning machinery was invented, working at his loom in his cottage, with his family about him, some carding, others spinning the wool or the cotton, and writers and speakers are constantly bewailing the departure of such scenes. I am well aware that I speak against popular impression, and largely against popular sentiment, when I assert that the factory system in every respect is vastly superior as an element in civilization to the domestic system which preceded it; that the social and moral influences of the present outshine the social and moral influences of the old. The hue and cry against the prevailing system has not been entirely genuine on either side of the Atlantic. Abuses have existed, great and abominable enough, but not equal to those which have existed in the imaginations of men who would have us believe that virtue is something of the past. The condition of the workers of society has never been the ideal condition, and the worker is too often the victim of a contemptible selfishness which tempts men to commit the crime of robbing the operative of his just share in the results of his toil. That the evils of the factory system are sufficient to call out all the sentiments of justice and philanthropy which enable us to deal with wrong and oppression I do not dispute; but I claim that, with all its faults and attendant evils, it is a vast improvement upon the domestic system of industry in almost every respect, not only with reference to the individual and the family, but with reference to society and the state.

The usual mistake is to consider the factory system as the creator of evils, and not only of evils, but of evil-disposed persons. This can hardly be shown to be true, although it is true that the system congregates evils or evil-disposed persons, and thus gives the appearance of creating that which already existed. People have not yet outgrown the impression created by the reports of Sadler, before a parliamentary committee, in 1832. It is difficult, I know, to establish close comparisons of the conditions under the two systems, because they are not often found to be contemporaneous; yet sufficient evidence can be adduced, I think, from a consideration of the features of the two, to establish the truth of my assertions.

It should not be forgotten that "the term factory system, in technology, designates the combined operation of many orders of work-people * * *. in tending with assiduous skill a series of productive machines continuously impelled by a central power. This definition includes such organizations as cotton-mills, flax-mills, silk- and woolen-mills", and many other works; "but it excludes those in which the mechanisms do not form a connected series, nor are dependent on one prime mover." It involves, in its strictest sense, "the idea of a vast automaton, composed of various mechanical and intellectual organs, acting in uninterrupted concert for the production of a common object, all of them being subordinated to a self-regulated moving force." (*a*)

So a factory becomes a scientific structure, its parts harmonious, the calculations requisite for their harmony involving the highest mathematical skill, and in the factory the operative is always the master of the machine, and never the machine the master of the operative. Under this system the work is carried on in an establishment peculiarly adapted to it, and the operative's home is separated from the workshop. Under the domestic system the home of the worker was the workshop also, and the wheels or looms disputed with the inmates for the room and the

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a Phil. of Manufactures. Andrew Ure, M. D., page 13.

conveniences for housework. Small, close, crowded, with bad air and bad surroundings, the hut of the domestic worker was occupied day and night by a class which has not found and cannot find its like under the factory system; for as a rule the operative of to-day occupies a home, even in the factory tenement or boarding-house, superior in every sense to the home of the domestic worker.

Under the domestic system of industry grew up that great pauper class in England which was a disgrace to civilization. It was fed by the agricultural districts more than by those devoted to manufactures. (*a*) It continued to grow until one-fourth of the annual budget was for the support of paupers. The evil became fixed upon the social life as one of its permanent phases. Legislation, philanthropy, charity, were utterly powerless in checking it, and it was not checked till the inventions in cotton manufactures came, since which events it has been on the decline, taking the decades together. The factory absorbed many who had been under public support; on the other hand, it drew from the peasantry, by the allurements of better wages and without any guarantees as to permanence or care as to moral responsibility; yet on the whole the state was benefited more than any class was injured.

It is not true, however, as it is often asserted, that the factory destroyed the yeomanry of England. (*b*) The domestic laborer's home was far from the character poetry has given it. Huddled together in what poetry calls a cottage and history a hut, the weaver's family lived and worked, without comfort, conveniences, good food, good air, and without much intelligence. Drunkenness and theft of materials made many a house the scene of crime and want and disorder. Superstition ruled and envy swayed the workers. Ignorance under the old system added to the squalor of the homes of the workers under it, even making the hut an actual den, shared in too many instances by the swine of the family. The home of the agricultural laborer was not much better; in fact, in Great Britain and France, he has to a great degree continued in his ignorance and in his degraded condition.

Sentiment has done much, as I have said, to create false impressions as to the two systems of industry. The reports of the poor-laws commissioners of England are truer exponents of conditions, and show whether the town was, during the first fifty years of the new system, staining the country or the country the town.

From the documents published by these commissioners, it appears that but for the renovating influence of her manufactures England would have been overrun with the most ignorant and depraved men to be met with where civilization has made much progress. It has been in the factory districts alone that the demoralizing agency of pauperism has been most effectually resisted and a noble spirit of industry, enterprise, and intelligence called forth. Agriculturists gave children and youths no more than half the wages paid them in factories, while they filled the workhouses with the unemployed. Under the operation of the miserable poor-laws which the domestic system fathered, the peasantry were penned up in close parishes, where they increased beyond the demand for their labor, and where the children were allowed to grow up in laziness and ignorance, which unfitted them from ever becoming industrious men and women. (*c*)

But in the chief manufacturing districts, while the condition of the factory children became the subject of legislation for their protection, (*a*) their condition was one to be envied when compared with that of the children in mining and agricultural districts.

The spasmodic nature of work under the domestic system caused much disturbance, for hand-working is always more or less discontinuous from the caprice of the operative, while much time must be lost in gathering and returning materials. For these and other obvious reasons a hand weaver could very seldom turn off in a week much more than one-half what his loom could produce if kept continuously in action during the working hours of the day, at the rate at which the weaver in his working paroxysms impelled it. The regular order maintained in the factory cures this evil of the old system, and enables the operative to know with reasonable certainty the wages he is to receive at the next pay-day. His life and habits become more orderly, and when he has left the closeness of his home-shop for the usually clean and well-lighted factory he experiences an agreeable and healthful change. It is commonly supposed that cotton factories are crowded with operatives. From the nature of things the spinning- and weaving-rooms cannot be crowded. The spinning-mules, in their advancing and retreating locomotion, must have five or six times the space for working that the actual bulk of the mechanism requires, and where the machinery stands the operative cannot stand. In the weaving-rooms there can be no crowding of persons. During the agitation for factory legislation in the early part of this century, it was remarked before a committee of the house of commons "that no part of a cotton-mill is one-tenth part as crowded, or the air in it one-tenth part as impure, as the house of commons with a moderate attendance of members". This is true to-day; the poorest factory in this country is as good a place to breathe in as representatives' hall, in the national Capitol, during sessions, or as the ordinary school-room. In this respect the new system of labor far surpasses the old.

Bad air is one of the surest influences to intemperance, and it is susceptible of proof that intemperance does not exist and has not existed to such an alarming degree under the new as under the old system; certainly the influence of bad air has not been as potent. The regularity required in mills is such as to render persons who are in the habit of getting intoxicated unfit to be employed there, and many manufacturers object to employing persons guilty of the vice. At Amiens, France, the two systems were in existence, side by side and in full force, in 1860, and are now to a considerable extent. The domestic system exists in the country around Amiens, while the factory

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a See section on "Factory Legislation".

b The main causes of the destruction of this most useful element of English country life are given by Mr. Lecky, in his *History of England in the Eighteenth Century*, vol. i, p. 212.

c *Phil. of Manufactures*, pp. 354–357.

system prevails in the city itself. The country workers have had a very bad reputation. The evil of intemperance is inveterate. The people living under the old system have resisted improvement; they wish to live and die in the houses of their parents, and express no desire to leave them. The great mass of these workers were at home, even at a date as late as 1860, under a roof that was never abandoned. The investigations of Louis Reybaud prove that the homes of the factory workers were incontestably better than those of the home workers, for they were free from the incumbrances and clogging influences which existed when the means and materials for manufacture disputed with the necessities of housekeeping for a great part of the room. This difference in the homes under the two systems is also the result of circumstances easily explained. The factory workers as a rule earn more than the home workers, and by having fixed and regular hours they are kept from falling into habits of idleness. They know, to a centime, what they will have at the end of the week. Their dependence is their security. Their wages have the merit of steadiness. The condition of the home workers is precarious, as often they are out of work at times for weeks and months. Financial crises, derangements of commerce, change in fashion—all these affect them far more seriously than they do the factory people. To-morrow is never sure with the workers under the domestic system, and privation in the future is always staring them in the face. All these bad conditions are aggravated by the serious intemperance of the home workers about Amiens. There are no heads of establishments under the domestic system to influence these men; they occupy an independent and really an isolated position. Under the factory system in France intemperance is often dealt with effectually, and the first honor belongs to the heads of the establishments. By concerted action, which should be taken for an example, they often close their doors against those addicted to intemperance. In Amiens, in 1881, I found that the factory had brought both classes up from the condition described by Reybaud and that drunkenness had ceased to be an obstacle to the success of industrial establishments. Drunkenness, in fact, is not a serious obstacle to such success at the present time, either in this country or in Europe. This I assert not only on the authority of men occupying positions which enable them to judge, but as the result of my own investigations in leading factory centers. The study of the conditions attending the hand-weavers of Lyons brings the facts stated by Reybaud into clear light. In Lyons at the present time there are about 40,000 hand-weavers working upon silk goods. These weavers live and work in small rooms, in high buildings, some of them having eight stories. The sleeping places of the children are recesses or shelves, like small scaffoldings, on the walls. Sometimes the *chef d'atelier* runs several looms in one large room, paying the weavers, who in this case live elsewhere, one-half the proceeds from their work; but the larger number live, work, and sleep in the same apartments. This is true to the extent that in many cases, as the hand-weavers of Lyons themselves have informed me, work can be done upon black goods only, as the vapors from cooking would injure goods of light colors. The children of the weavers rarely go out of the rooms except on Sunday. In my visits to weavers' homes I invariably found the children clinging about the looms or tucked in the corners of the rooms, a pale and dispirited-looking class. The buildings are close and odorous from bad sanitary arrangements, and have a general penitentiary look and smell. The occupants correspond in looks and bearing with the houses. They eat little or no meat, are listless and sullen, and, taking everything into consideration, they are worse off than any other class of operatives I have ever seen. On the other hand, the power-loom silk weavers of Lyons, working in factories outside the city, have better pay, live better, are steadier, and generally thrive. Prominent manufacturers corroborated my own conclusions, and added that the manufacturer had no interest in the hand-loom weaver, for he seldom saw him, and did not superintend his work, for he did not see him at his work; while the factory worker becomes of interest in himself to the proprietors, his presence being requisite, and his usefulness depending upon constancy and sobriety.

A picture the reverse of that made by the hand-loom weavers of Lyons is presented by those of Crefeld, in Rhenish Prussia. Here there are some 40,000 hand weavers, working on silk goods, but they live and work in ample cottages, four-fifths in their own houses, and have grounds for cultivation. The living rooms are separate from the weaving rooms. The municipal government has done much to enable these people to secure houses of their own and to educate their children. Consequently the hand weavers of Crefeld are happy, contented, thrifty, and intelligent. The condition of the hand-loom weavers of Crefeld is an exception to the rule. (*d*)

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a I visited Crefeld in June, 1881, and through the courtesy of our consul, Hon. J. S. Potter, and Herr Heimendahl, president of the chamber of commerce, I learned the secret of the prosperity of the hand weavers. I find the following in my note-book: The population of Crefeld proper is about 85,000. Around Crefeld are eighty-two small villages; in these and in Crefeld there are about 40,000 hand-loom weavers, four-fifths of them living in their own houses. These houses are very neat and comfortable; they have gardens about them, and many have two or three or more acres of land. In the town are some power-loom weavers, but they are not as happy and as contented as the hand weavers. The laws and regulations of Crefeld are made to favor the purchase of homes, freeholds, and the savings-banks aid the efforts of the municipality. The hand-loom weavers have their looms in a large room, but have three or four good rooms beside. All are well furnished and tidy. I saw scores of houses, and, without exception, they were neat and cosy cottages. The tenement house does not flourish here. The people are sober and virtuous, and apparently happy. They do not emigrate. The children are very clean and healthy. The condition of things is remarkable, and special in its nature. The whole system is the old domestic system, without the accompaniments of that system. The land system here is the secret of the success of the domestic system of industry. The weaving school of Crefeld, one of the best in the world, helps to sustain the science of hand-loom work for velvets and figured silks, so that the young are brought up to the domestic system. In other countries where the hand-loom is still used it is usually the old weaver only that is found. The weaver of Crefeld earns from 3 to 4 marks (75 cents to $1) per day. Houses with three rooms rent for

It is true that many disadvantages appear to accompany the factory system, and these, upon superficial study, are denominated evils; but a careful study shows that these apparent evils or disadvantages do not of necessity belong to the system, nor can they be attributed to it. Such study does show that existing factory evils, so called, may be congregated by it, but are not called into existence by it. For the categorical consideration of such alleged evils they may be classified as follows:

A.—The factory system necessitates the employment of women and children to an injurious extent, and consequently its tendency is to destroy family ties and domestic habits and ultimately the home.

B.—Factory employments are injurious to health.

C.—The factory system is productive of intemperance, unthrift, and poverty.

D.—It feeds prostitution and swells the criminal lists.

E.—It tends to intellectual degeneracy.

These are the apparent disadvantages which many honestly believe belong naturally to and are inseparable from the system, and which will be associated with the system as long as it exists. For the sake of directness these will be examined in order.

A.—*The factory system necessitates the employment of women and children to an injurious extent, and consequently its tendency is to destroy family ties and domestic habits and ultimately the home.*

In one sense this is true; in another it is not true. I cannot discuss the question as to differences in the capacity of individuals, nor why this one is born to good conditions and that one to bad, but must take the facts as they are. The majority of human beings are born to the lot of toiling with their hands for their daily bread. This decree necessitates employment, and until all classes can be employed at fairly remunerative rates poverty, even to pauperism, must be a large factor in society. This was the case at the birth of the factory system. In fact, the great evils which became apparent during the early days of the system were simply, as I have said, the results of bringing together the labor which had become pauperized under the domestic system and in agricultural districts. The factory brought these evils to the light, and the employment of women and children became an offense in the eyes of the public, not because it was severer than under the old system, but because under the new the evils of such employment could be seen.

It is true that the success of the system, so far as textiles are concerned, has depended in a large degree upon such employment, and it is also true that such employment has enabled women and children to step from the ranks of degrading dependence and pauperism to the ranks of comparative comfort and the dignity which comes from self support. In the early days of the factory the children were by their employment really placed in a much better position than they occupied before.

It is to be regretted that no authoritative statistics on an extended scale exist relative to the employment of married women in factories, and the train of bad results which follows such employment. The employment of married women it seems to me is the very worst feature of factory employment, but the facts relating to it are the most meager. I have been able, however, to gather some information.

In England the proportion of married women to the whole number of women employed in textile works is unknown, but for those factories concerning which I have been able to make inquiries 10 per cent. is the average. In Germany I found from 20 to 50 per cent. of the textile-factory women to be married. Dr. Engel [a] gives the percentage in various industries as 24. Proprietors in both countries discourage the employment of married women. The statistics of Massachusetts show that the married female operatives constitute 8 per cent. of the whole number of females employed in all textile factories.

In the states named below, in a number of representative factories employed on plain goods only, I have found the percentage of married women to the whole number of women above fifteen years of age to be as follows: In Massachusetts, 23.5; New Hampshire, 19.9; Maine, 14.5; Connecticut, 19.4; Rhode Island, 21.9; New York, 9.9; Georgia, 19.2.

I am well satisfied from all I can learn that, taking all textile factories into consideration, the percentage would not exceed 10. It is evident, then, that in Great Britain and the United States infant mortality is not, on the whole, affected to any great degree by the employment of married women; but it is affected seriously so far as the children of those employed are concerned. In a general way the statistics of infant mortality in some of the leading factory and agricultural towns and towns with mixed employments in Massachusetts and Rhode Island are valuable as indicative of the influence of the employment of married women. The ratio of deaths of children under five years of age to 1,000 of population is given for census years only (1870, 1875, 1880), but the number of deaths in each town named is given for each year from 1870 to 1880, inclusive. I have taken these two states, because for them only could I ascertain all the elements essential for the succeeding tables.

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about $18 per annum. Members of the family not employed on the looms cultivate the soil; consequently, if styles change and times are for a while dull, the people are in good condition to wait the returns of prosperity in weaving. In the weaving school pupils are taught all processes of silk and velvet weaving, both on hand- and power-looms. In the museum of the school there are 3,000 specimens of the silk productions of different periods and countries since the thirteenth century. The people believe in technical education, and it has done, and is doing, much to enhance their prosperity.

[a] Of the royal bureau of statistics at Berlin.

MASSACHUSETTS: FACTORY CITIES AND TOWNS.

Years and classification.		Clinton.	Fall River.	Holyoke.	Lawrence.	Lowell.	Millbury.	New Bedford.	North Adams.	Pittsfield.	Southbridge.	Aggregates.
1870	Population	5, 429	26, 766	10, 733	28, 921	40, 928	4, 397	21, 320	12, 090	11, 112	5, 208	166, 904
	Deaths under 5 years	53	265	155	252	416	38	108	106	68	44	1, 505
	Deaths under 5 years to 1,000 of population	9. 8	9. 9	14. 4	8. 7	10. 2	8. 6	5. 1	8. 8	6. 1	8. 4	9. 0
1871		58	280	135	268	347	49	96	71	41	64	....
1872		52	517	251	320	392	51	194	106	112	60	....
1873		36	670	227	312	488	42	139	107	78	50	....
1874		35	549	214	318	509	37	141	114	92	42	....
1875	Population	6, 781	45, 340	16, 260	34, 916	49, 688	4, 529	25, 895	15, 760	12, 267	5, 740	217, 176
	Deaths under 5 years	49	539	225	421	382	34	180	121	78	50	2, 079
	Deaths under 5 years to 1,000 of population	7. 2	11. 9	13. 8	12. 1	7. 7	7. 5	7. 0	7. 7	6. 4	8. 7	9. 6
1876		54	546	203	369	528	37	167	124	69	30	....
1877		47	563	160	433	432	38	167	75	79	20	....
1878		29	532	224	380	438	29	180	29	48	37	....
1879		60	558	242	346	347	22	207	37	51	23	....
1880	Population	8, 029	48, 961	21, 915	39, 151	59, 475	4, 741	26, 845	10, 191	13, 364	6, 464	239, 136
	Deaths under 5 years	42	655	275	391	633	35	218	44	87	47	2, 427
	Deaths under 5 years to 1,000 of population	5. 2	13. 4	12. 5	10	10. 6	7. 4	8. 1	4. 3	6. 5	7. 3	10. 1

MASSACHUSETTS: AGRICULTURAL TOWNS.

Years and classification.		Ashby.	Ashfield.	Belmont.	Blandford.	Northfield.	Petersham.	Savoy.	Southampton.	Sudbury.	Swansea.	Aggregates.
1870	Population	994	1, 180	1, 513	1, 026	1, 720	1, 335	861	1, 159	2, 091	1, 294	13, 173
	Deaths under 5 years	3	1	11	4	2	3	1	3	7	....	35
	Deaths under 5 years to 1,000 of population	3. 0	0. 8	7. 3	3. 9	1. 2	2. 2	1. 2	2. 6	3. 3	....	2. 7
1871		3	2	11	1	2	4	2	5	4	4	....
1872		1	2	10	3	5	....	4	5	4	2	....
1873		2	2	14	3	2	1	1	2	3	3	....
1874		2	....	6	....	1	4	....	3	1	2	....
1875	Population	962	1, 190	1, 937	964	1, 641	1, 203	730	1, 050	1, 177	1, 308	12, 162
	Deaths under 5 years	1	4	16	5	4	3	2	4	6	2	47
	Deaths under 5 years to 1,000 of population	1. 0	3. 4	8. 3	5. 2	2. 4	2. 5	2. 7	3. 8	5. 1	1. 5	3. 9
1876		4	....	12	3	7	1	3	5	3	5	....
1877		1	....	15	1	2	5	4	3	3	6	....
1878		1	....	10	2	8	3	1	3	5	1	....
1879		2	2	9	2	8	7	....	4	8	5	....
1880	Population	914	1, 066	1, 615	979	1, 603	1, 109	715	1, 046	1, 178	1, 355	11, 580
	Deaths under 5 years	....	2	9	6	4	1	1	3	3	1	30
	Deaths under 5 years to 1,000 of population	....	1. 9	5. 5	6. 1	2. 5	0. 9	1. 4	2. 9	2. 5	0. 7	2 6

MASSACHUSETTS: CITIES AND TOWNS WITH DIVERSIFIED INDUSTRIES.

Years and classification.		Attleborough.	Cambridge.	Fitchburg.	New Marlborough.	Newton.	Northampton.	Sandwich.	Springfield.	Waltham.	Worcester.	Aggregates.
1870	Population	6, 769	39, 634	11, 260	1, 855	12, 825	10, 160	3, 694	26, 703	9, 065	41, 105	163, 070
	Deaths under 5 years	42	362	94	6	34	44	10	195	61	464	1, 252
	Deaths under 5 years to 1,000 of population	6. 2	9. 1	8. 3	3. 2	2. 7	4. 3	2. 7	7. 3	6. 7	9. 8	7. 7
1871		31	343	69	3	26	47	8	216	51	488	....
1872		42	505	68	6	65	87	20	327	54	682	....
1873		62	421	72	5	58	82	12	258	63	412	....
1874		38	528	67	3	68	91	10	239	45	381	....
1875	Population	9, 224	47, 838	12, 289	2, 037	16, 105	11, 108	3, 417	31, 053	9, 967	49, 317	192, 355
	Deaths under 5 years	60	571	70	5	73	78	12	248	69	418	1, 604
	Deaths under 5 years to 1,000 of population	6. 5	11. 9	5. 7	2. 5	4. 5	7. 0	3. 5	8. 0	6. 9	8. 5	8. 3
1876		41	419	108	3	88	67	10	228	56	423	....
1877		41	473	73	10	70	43	10	165	64	415	....
1878		46	396	46	7	82	39	7	146	63	346	....
1879		37	370	49	3	65	46	5	227	48	340	....
1880	Population	11, 111	52, 669	12, 429	1, 876	16, 995	12, 172	3, 543	33, 340	11, 712	58, 291	214, 138
	Deaths under 5 years	67	377	94	3	86	60	16	240	46	454	1, 443
	Deaths under 5 years to 1,000 of population	6. 0	7. 2	7. 6	1. 6	5. 1	4. 9	4. 5	7. 2	3. 9	7. 8	6. 7

RHODE ISLAND: FACTORY CITIES AND TOWNS.

Years and classification.		Burrillville.	Lincoln.	Pawtucket.	Westerly.	Woonsocket.	Aggregates.
1870	Population	4, 674	....	6, 619	4, 709	*7, 698	23, 700
	Deaths under 5 years	18	....	29	6	36	89
	Deaths under 5 years to 1,000 of population	3. 9	....	4. 4	1. 3	4. 7	3. 8
1871		14	37	25	12	61	....
1872		25	91	28	18	162	....
1873		24	92	29	28	141	....
1874		29	99	90	18	116	....
1875	Population	5, 249	11, 565	18, 464	5, 408	13, 576	54, 262
	Deaths under 5 years	22	88	87	28	134	359
	Deaths under 5 years to 1,000 of population	4. 2	7. 6	4. 7	5. 2	9. 9	6. 6
1876		15	67	103	13	107	....
1877		23	113	135	21	141	....
1878		11	85	123	12	120	....
1879		17	84	106	20	127	....
1880	Population	5, 714	13, 765	19, 030	6, 104	16, 050	60, 663
	Deaths under 5 years	43	98	121	32	170	464
	Deaths under 5 years to 1,000 of population	7. 5	7. 1	6. 4	5. 2	10. 6	7. 6

* Not including population acquired in 1870 by annexation from Smithfield.

RHODE ISLAND: AGRICULTURAL TOWNS.

Years and classification.		Coventry.	Foster.	Gloucester.	Scituate.	South Kingstown.	Aggregates.
1870	Population	4, 349	1, 630	2, 385	3, 846	4, 493	16, 703
	Deaths under 5 years	14	....	2	8	11	35
	Deaths under 5 years to 1,000 of population	3. 2	....	0. 8	2. 1	2. 4	2. 1
1871		17	....	4	14	12	....
1872		22	3	8	10	10	....
1873		14	2	6	10	10	....
1874		19	2	15	18	7	....
1875	Population	4, 580	1, 543	2, 098	4, 101	4, 240	16, 562
	Deaths under 5 years	12	3	3	25	19	62
	Deaths under 5 years to 1,000 of population	2. 6	1. 9	1. 4	6. 1	4. 5	3. 7
1876		14	2	9	9	8	....
1877		7	3	5	12	12	....
1878		21	1	6	15	6	....
1879		12	....	8	6	8	....
1880	Population	4, 519	1, 552	2, 250	3, 810	5, 114	17, 245
	Deaths under 5 years	14	2	9	13	4	42
	Deaths under 5 years to 1,000 of population	3. 1	1. 3	4. 0	3. 4	0. 8	2. 4

RHODE ISLAND: TOWNS WITH DIVERSIFIED INDUSTRIES.

Years and classification.		Cumberland.	North Kingstown.	Smithfield.	Warren.	Warwick.	Aggregates.
1870	Population	3, 882	3, 568	*17, 376	3, 008	10, 453	38, 288
	Deaths under 5 years	10	16	39	6	37	108
	Deaths under 5 years to 1,000 of population	2. 6	4. 5	2. 2	2. 0	3. 5	2. 8
1871		15	12	2	16	71	....
1872		19	15	5	27	58	....
1873		19	10	4	26	40	....
1874		22	17	7	18	54	....
1875	Population	5, 673	3, 505	2, 857	4, 005	11, 614	27, 654
	Deaths under 5 years	24	11	9	31	47	122
	Deaths under 5 years to 1,000 of population	4. 2	3. 1	3. 2	7. 7	4. 0	4. 4
1876		11	19	6	19	37	....
1877		31	7	12	34	49	....
1878		33	7	11	29	58	....
1879		28	7	5	16	75	....
1880	Population	6, 445	3, 949	3, 085	4, 007	12, 164	29, 650
	Deaths under 5 years	49	17	10	18	58	152
	Deaths under 5 years to 1,000 of population	7. 6	4. 3	3. 2	4. 5	4. 8	5. 1

* Including present towns of Lincoln and North Smithfield, and part of present town of Woonsocket.

The tables are very significant, although it must not be presumed that the employment of married women is the sole cause of the very high percentage of deaths under five years in factory towns compared with deaths in towns of diversified industries and agricultural towns Crowded houses, bad sanitation, and the general effect of compact towns upon young children, especially during inclement seasons, are potent influences in producing the high rates in the first class of towns given in the preceding tables. The statistics of factory towns in England do not exhibit a larger proportion of deaths of infants than occur in other large towns where few or no factories are in operation, yet the proportion is very much larger than in agricultural towns.

In Germany, according to information furnished by Dr. Ernst Engel, chief of the royal bureau of statistics, in a factory city in the district of Zwickau, a few years ago, out of 459 children born in one year, 169, or 36 per cent., died under one year of age. Of those who died it was learned that 98 had not been nursed at all, and only 32 for the full time. In another factory city in the same district, in the same year, out of 428 children born, 185, or 43 per cent., died the first year, of whom 98 were never nursed at all, and only 23 for the full time, and of the remainder only two for more than twenty weeks. In a third city, 48 per cent. in 1873 and 41 per cent. in 1874 of all the children who died had not reached the age of one year, and the great majority were the children of factory operatives. In a fourth factory city, of 731 persons who died in 1874 the children numbered 510, of whom 406 were under one year of age. The attending physicians in the cities ascribed the infant mortality partly to the bad condition of houses, but mainly, without hesitation, to the fact that the mothers gave their attention to the work in the factory; that natural nursing was either given up entirely or continued for only a short time; and that the children, instead of receiving a mother's care, were left to the guardianship of older children.

In the district of Liegnitz, in Prussia, the rate of mortality has decreased among small children since hand-loom weaving gave way to factory employment. At Aix, in all cases where the mothers resumed work in the factory soon after confinement, an unusual mortality occurred among the infants.

In the greater part of the districts of Bavaria the health of the factory operatives seems good. If here and there a greater mortality among infants and poor health among the older children are met with, it should not be ascribed to any special branch of industry, nor necessarily to factory work, but to the unfavorable conditions under which children belonging to the working class, whether in the factory or out of it, are brought up.

In Swabia, the city of Augsburg alone furnishes unfavorable reports. Out of 418 children under one year belonging to the factory population, 273, or 65 per cent., died in a year; out of 1,692 infants of the remaining population, 732, or 43 per cent., died.

In Wurtemburg much complaint has been made of an excessive mortality among infants, but the cause is thought to be, not that the mothers are employed in the factories, but in that lack of maternal care which is notorious among the working classes of this district. According to the statistics from these districts, the mortality is often greatest in those places in which few women are employed in the factories, while places in which such employment is general make a favorable showing as to infant mortality.

The mortality among infants in Baden and Hesse does not seem disproportionately large among the factory population. A single report from Hesse speaks of an unusual mortality due to lack of proper care and food.

Some physicians in Saxe-Meiningen report an excessive mortality among the infants of those women who are employed in the porcelain and toy trades. This is true not only for those employed in the shops, but for those who work in their own houses.

By the German law (*a*) women are not to be employed for three weeks after confinement, and in some factories they are allowed three-fourths of their wages for this period of rest. I know of no such provision of law elsewhere. My own investigations in large representative factory towns in this country indicate the evil results of the employment of married women. In many cases where mothers had lost their first, second, and in some cases the third child, while operatives, they had, on leaving the factory, raised up children, each succeeding child growing more healthy as the period after factory work became more extended. A well-known physician in one of the towns spoken of informed me that chlorosis attended factory work among young girls; that in Canada, where he had practiced, about 10 per cent. of the females were attacked by this disease, while in the factory towns in the states he found 90 per cent. of the Canadian girls suffering from this trouble. Many physicians in factory places testify that functional irregularities prevail among female operatives to a greater extent than among others; on the contrary, some of the most eminent practitioners give an opinion at variance with this, and insist that if home life is cleanly, and accompanied by good conditions, the factory worker should be as healthy as others. One of the best known physicians in one of the largest factory towns in New England states that factory labor does not incapacitate women for bearing healthy children; that it is better for them to work in factories than to pass the period of gestation in inactivity, as many of the wealthy do; that the air-space in the mills is sufficient to insure pure air, the ventilation being far superior in the mills to that in the homes of the operatives. He is of the opinion, however, that too severe work entails a bad state of health upon mother and child. It is the testimony of all physicians that the factory is better for married and even pregnant women than unwholesome houses. In one city, from thirty-two families where the mothers had continued in the factories almost till confinement, there had been forty-four deaths of infants.

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a See section on "Factory Legislation".

I am confident, from all the testimony I have been able to gather, that there are many more children of mothers working in factories during pregnancy who die in infancy than of other classes; and that while many children die when only a few months or a year old, in consequence of the factory work of the mother during pregnancy, many born healthy, or comparatively so, die from want of proper maternal care. I am further satisfied that the conditions of the homes of these women are as deleterious to their health, and to infants born to them, as the work of the factory. I am also satisfied that to exclude such women from the factory would be an act of great injustice to those concerned. And yet I am satisfied that the employment of married women is the worst apparent evil of the factory system. I am not aware of many attempts to relieve communities of the unhappy results of such employment.

At Mulhouse, in Alsace, the birthplace of industrial societies, there are maternity associations for aiding factory women in confinement. It is worth while in this country to study the effect of such institutions, and I have therefore extracted from a recent official document, published at Mulhouse, an account of the attempts in that city to aid women:

> We know what considerations affect the state of the woman who is to become the mother of a child. The least imprudence can compromise the existence of two beings, the mother and the child which is to be. Mothers know in general that prolonged privations or too much hard work exert a disastrous influence on the shape and health of the child. Nothing is more distressing than the condition of the woman who becomes a mother when she is not surrounded by those conditions of well-being and care which her state requires. On the other hand, nothing sadder, from a humanitarian point of view, can be seen than the frightful mortality which affects children in the first days of their lives, when they lack aid and indispensable precautions in the first months of their existence.
>
> Dr. Penot stated on authority, ten years ago, in a report made to the Industrial Society of Mulhouse, that in the industrial cities, more than anywhere else, the mothers, pressed by want, continued their work in the factories to the last moment possible, almost to the time of their becoming mothers, and that they resumed work in a very few days afterward, which course could not fail to give very deplorable results as regards sickness and death among the mothers as well as the young children. Justly excited by this state of things, the manufacturers and heads of firms of the greater part of our establishments were soon actively engaged in taking proper measures to supply a suitable remedy by establishing funds for the aid of women in labor. These excellent institutions have carried on their work almost without change for fifteen years, and have largely increased; the most encouraging results have been obtained.
>
> Several industrial establishments take upon themselves the cost of the midwife, medicine, clothing, etc., and beside pay the mother her daily wages during the time devoted to necessary rest.
>
> Messrs. Hartmann, Schmalzer & Co. (now Germain & Co.), at Malmerspach, pay to the working woman when she becomes a mother the sum of 20 francs, and beside her full wages for the first four weeks afterward, on condition that she devotes all her time to the care of herself and child. In certain cases the unmarried mothers are allowed to enjoy the same advantages.
>
> At Guebwiller, Messrs. Bourcart, Son & Co., since 1865, have paid all the necessary expenses of their working women who became mothers, beside their full wages for three weeks. Several ladies of this city have also established an association the object of which is to furnish aid to women about to become mothers. In 1877 the number of women aided was 300; the sum spent each year is about 1,200 francs. At Cernay, Messrs J. Gros & Co. pay for medical care and 50 francs beside, on condition that the mothers do not begin work for fifteen days.
>
> In 1864, Mr. Jean Dollfus brought to the attention of the Industrial Society the important question of caring for women in labor. The house of Dollfus, Mieg & Co. had adopted the plan of paying the charges of the midwives, and also had paid the wages of the working women until their health was fully restored. Mr. Jean Dollfus saw by examination of the records, that had been kept with care, that the number of deaths of children belonging to the working people in his employ had sensibly diminished as the result of the measures he had taken. He spoke of his plan, and recommended it to the attention of the other manufacturers. It was only necessary to bring to their knowledge so important a fact to have them look at it immediately in the same light, and they began at once the study of the question.
>
> The question is not as simple as it at first appears. Although decided to make all necessary sacrifices, the heads of establishments were not in accord as to ways and means. Was it expedient to make a distinction between married women and unmarried mothers in the distribution of aid? Was it best for the patrons to bear all the expense of such aid, or was it better for all the women in an establishment to have a certain sum retained from their wages and put into a common fund, the firm adding an equal sum each time? The two systems have been tried.
>
> Messrs. Trapp & Co., to-day Tournier & Co., have also given aid to women and girls in labor, but without having any recourse to any association whatever, the firm paying all expenses; only, in order to establish a distinction between the married women and the unmarried mothers, Messrs. Trapp & Co. give help openly to the first, but reach the latter who need assistance in an indirect way. These various regulations each have merit and have been regularly carried out for a sufficient number of years to enable us to prove with great satisfaction the happy results obtained.
>
> The most important of these organizations, which is centralized in the house of Dollfus, Mieg & Co., has undergone many changes since 1872; the assessments for each working woman after three years were raised from 15 to 20 centimes, the patrons paying the same sum. Since that time the association, which was in debt 2,600 francs, has paid that sum, and in 1877 had in its treasury 11,152.25 francs. The aid paid to each woman is now 60 francs for the full six weeks, instead of the 54 francs paid up to 1875. The woman has also received during the past year the services of a physician without expense, and the association pays the apothecary. In several cases the association has purchased clothing for the infants, which has been given to the most needy women. Every five years a report is made of the results secured by the association. The first of these reports was made to the Industrial Society by Mr. Burnat in 1871; the second by Mr. Gustave Dollfus in 1875. These two reports show a considerable amelioration in the health of the women and children assisted, and a notable diminution in their mortality since 1872. It is shown that the mortality of children born within the association, reckoning from the day of birth to one year, has fallen from 28 to 21 per cent. This result is satisfactory enough to encourage both the manufacturers and the employés to continue in the path they have so far followed.
>
> It is perhaps to be regretted that all the manufacturers in this locality have not joined in one association; for often in changing from one factory to another a working woman who finds herself in need of aid from the association loses it because she has not worked long enough in one of the establishments belonging to it. The services that these institutions have rendered for more than ten years are well known and appreciated; many working women not employed in the associated establishments voluntarily pay 40 centimes assessment, in order to enjoy the advantages that the association supplies.

Mr. Gustave Dollfus, of Mulhouse, a broad philanthropist, who has learned his philanthropy from his knowledge as a large manufacturer of the wants of the operatives, made a report to the Industrial Society of Mulhouse, in February, 1880, upon the results of the efforts of the Maternity Association. In this report Mr. Dollfus said:

> When M. Jean Dollfus proposed the foundation of this association, in 1866, he did not foresee remarkable results. Our association dates from August, 1866. It is consequently thirteen years old. There have been during that time 3,281 births of living children and 151 still-born, being an average of 4.40 per cent. The first six years show an average of 5.47 per cent. of still-born, while the last six years show an average of 3.26 per cent. The year 1877-'78 shows only 1.61 per cent., which is a diminution of 44 per cent. in the number of still-born.
>
> The proportion of illegitimate births shows an average of 19.47 per cent.; there has been a noticeable falling off, for the first six years give an average of 21.02 per cent. and the last six years 17.82 per cent., showing a falling off of 14.30 per cent. in the number of illegitimate births. The deaths to 100 births, from a day old to six months, were, for legitimate children, 21.33 per cent. for the first three years, and 13.78 per cent. for the last three years. For illegitimate children in the same years the average of 30.84 per cent. was reduced to 16.55 per cent. In the first case the reduction has been 36 per cent., and in the second case 46 per cent. of the number of deaths. The number of those dying between six months and a year has remained about the same.
>
> The total number of deaths of legitimate children at the end of a year, which was 26.36 per cent., has been reduced to 19.86 per cent., and that of illegitimate children from 38.52 per cent. to 25.82 per cent. As a whole, the mortality of children, which was 28 per cent., is no more for the last three years than 20.86 per cent.; that is to say, the falling off has been 27 per cent. of the number of deaths.
>
> With an average of 267 births in a year there have been during the last three years 52 deaths, instead of 72, which was the proportion for the first three years. The result is striking, and certainly merits careful attention.
>
> The association made payable to its members from 1866 to 1873 an assessment of 15 centimes; the proprietor added for each working woman an equal sum. The woman in confinement received then 54 francs for six weeks, during which she was obliged to remain at home to give to her new-born child the care that it needed. The association numbered then 1,946 members and had 286 births in a year. The assessment was found to be too small, for at the end of the seven years the treasury showed a deficit of 4,000 francs. Since June, 1873, each working woman has paid an assessment of 20 centimes, and so has the proprietor; the deficit has been covered, and the treasury has a reserve of 16,000 francs. The assistance, which was 54 francs, has been raised to 60 francs. The association binds itself to pay the midwife 8 francs and the fees of the physician and apothecary in case of the sickness of the mother or child. The year 1878-'79 showed only 1,550 members; this falling off was caused by a reduction in the number of employés in certain print-works. Messrs. Schaeffer & Lalance, having noticed the results obtained, have decided with ardor to have their employés join the association, so that we number to-day 1,738 members.
>
> We wish and ought to show the moral influence of the association, as well as the benefits that an examination of the statistics proves have been secured. A woman depending upon her own labor for her support returns to the factory as soon as possible after her confinement and leaves her child in the care of strangers or puts it out to nurse. The mother is thus, from the first, forced to separate herself from her child, to which she has not had time to become attached. This child will remain all its life little better than an adopted child; the mother will not show for it the true maternal love. The family tie will not exist; but if it does, it will be very feeble. The six weeks during which the mother takes care of her child will attach them to each other. The maternal love will be developed, will become rooted in the mother's heart, and the family ties so established will last forever. To attach children to their parents and parents to their children is a moral work and elevates the dignity of both. Our regulations have been sent for from Paris and London, where the public aid prefers, as we do, this kind of an association to the nursery or infant asylum, because it develops the family ties, while the others break them and prevent their growth. It can be seen that our association is doing a good work; for that reason it is so much the more to be regretted that, as a general measure, all the establishments in our city do not decide to join it, for then so much more good could be done. (*a*)

The following table shows the results within and without the association at Mulhouse, and in comparison with a district more rural in its conditions:

INFANT MORTALITY IN THE FIRST YEAR AFTER BIRTH.

[Twins are counted only as one birth.]

Places and years.	Births, not including still-born.			Still-born.	Still-born to 100 births.	Illegitimate to 100 births.	Deaths (at the end of first year) to 100 births.		
	Legitimate.	Illegitimate.	Total.				Legitimate.	Illegitimate.	Total.
Mulhouse, 1871	1,567	413	1,980	98	4.72	20.86	36.56	51.57	39.69
Mulhouse, 1873	2,019	383	2,402	115	4.57	15.90	26.50	43.34	29.18
Average					4.64	18.40	31.53	47.45	34.43
Brunstatt, 1871	96	6	102	6	5.56	5.88	31.25	100.00	35.29
Brunstatt, 1873	96	2	98	5	4.85	2.04	28.25	100.00	29.60
Average					5.20	3.96	29.75	100.00	32.44
Association,* 1871	194	81	275	19	6.46	29.45	23.19	48.14	30.54
Association, 1873	268	41	309	8	2.52	13.27	28.86	46.84	29.44
Average					4.49	21.36	47.49	47.49	29.99

*For aiding women in labor.

Does the employment of women and children tend to destroy the home? To the extent that women who are mothers and have the care of a household, and who become careless of maternal ties through hard work and maternal duties combined, it does; for the factory mother who has buried several children learns sooner or later to speak of

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a From the Bulletin of the Industrial Society of Mulhouse, April-May, 1880.

her losses in a careless and unfeeling manner. Domestic felicity does not and cannot reach a very high place when a mother must arise before the rest of the family to prepare hastily the breakfast for all, then hasten to the mill and make her time good till the noon hour, when the dinner must be prepared as hastily as was the breakfast; while at night, after a day of constant labor, she must see that supper is served and then take up the thousand and one duties of the household, which keep her busy till the hour has long passed when she should be asleep. No ten-hour law has been able to reach the factory woman with a family.

It is gratifying to be able to believe that the number of married women employed in factories is decreasing. Notwithstanding the evil results of their employment, their condition is a vast improvement upon that which surrounded the workers under the domestic system.

The home in the United States suffered more from the institution of the factory system than it did in England, for there the factory found a population ready to become factory workers, while here it was necessary to provide for a new population, and this opened the way for the tenement house and the factory boarding-house, two features of factory life quite unknown in England and on the continent, and which are gradually disappearing in this country, (*a*) while the individual home is increasing in its influence. With this growth of the influence of the individual home there is, as I have said, a gradual decrease in the employment of married women. If, at times, the employment of women has taken the mother from the care of her infant, it has enabled more who had no home to become self-supporting, for the employment of women generally is now no evil, thanks to improved machinery and generally wise legislation.

Young children are now almost universally excluded from the factory and workshop. Where their age permits, they are much better off inside than outside the factory, and their employment enables them to contribute to home support rather than to draw from the income of the family.

B.—*Factory employments are injurious to health.*

That some factory employments are injurious to health is true, but it is not true that factory employment, as such, in comparison with any other mechanical employment, is unhealthy. A recent writer, describing a watch factory, states what is true as to all factories:

> The first requisites of a watch factory are neatness and abundance of light. It is now recognized that no man can do his best work unless he is physically comfortable. Excess of heat or cold, a poor light, and, more than all, bad air, are positive hinderances to good work. Of two men, equally skilled, one in a close, damp, or hot room with a bad light, and the other in a dry, sweet, and healthful room with the best light, the man who has the most comfortable quarters will do the most and best work in a day.

It is now seen that everything that contributes to the physical and mental comfort of workmen pays a good return on the cost, and certainly makes better citizens of the operatives.

Intelligent employers of labor adopt all plans which can be devised for securing the health of their operatives. Factory legislation compels the ignorant employer to adopt them. If some means could be devised to make all the homes of the operatives as neat, clean, and wholesome as the factory, we should hear no more of the tendency of the factory to physical degeneracy. All employments have features not conducive to health. These features are incidental, and cannot be separated from the employment. In mining coal, for instance, the nature of the occupation is bad in nearly all respects; but coal must be had, and there is never any lack of miners. What, then, shall be done? Operators are in duty bound, of course, to make all evils, whether incidental or artificial, as light as possible, and should introduce every improvement which will lighten the burdens of all who are obliged to seek employment in the lowest grades of labor. Machinery is constantly elevating the grades of labor and the laborer. The working of mines, even, is to-day an easy task compared to what it was a few years ago. The workers themselves have much responsibility on their own shoulders, so far as the healthfulness or unhealthfulness of an occupation is concerned. The professional man can soon burn out his fires if he does not have a care for the supply of fuel. Sedentary habits are as bad for one class of workers as the presence of fibers, smoke, and dust is for another, and each should be held responsible for the best care of himself under whatever condition he finds himself employed. Let the children of factory workers everywhere be educated in the rudiments of sanitary science, and then let law say that bad air shall be prohibited, even in homes, and I believe the question of the health of the operatives will not so seriously trouble us.

It is often asserted that the air of the factory is very deleterious to health, not only because it is impure, but because there is an insufficient supply. This assertion comes from persons who have not inspected factories. To the man acquainted with the inside of a textile factory no evidence is needed, but to the public it may be essential. I am able to present facts on this point relating to Mulhouse and to Massachusetts.

Some years ago, while calculating the average air-space allowed to each operative in the textile factories of Massachusetts, I ascertained, so far as possible from scientific sources, the amount of air-space which has been deemed essential to secure a proper condition under which the operative may work with safety, so far as the air he breathes is concerned.

The royal commissioners appointed by the British government to inquire into the sanitary condition of barracks and hospitals reported, in 1857, that the capacity of the rooms should be not less than 600 cubic feet of air-space for each soldier, and the supply of air per minute and per man not less than 20 cubic feet. Mr. Carl Pfeiffer,

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a See section on "Homes of Operatives".

formerly secretary of the American Institute of Architects, has given the following estimate of fresh air required by every person every hour:

	Cubic feet.
In hospitals, ordinary patients	2,000 to 2,800
In hospitals, wounded patients	4,800
In hospitals, epidemic patients	5,600
In workshops	2,000 to 3,500
In prisons	2,100
In barracks	1,000 to 1,650
In theaters	1,400 to 2,400
In schools for children	400 to 500

By this estimate each operative should have from 2,000 to 3,500 cubic feet of fresh air per hour, or a supply of from 30 to 60 cubic feet per minute.

Pettenkofer, Wilson, and Parkes, all eminent authorities, agree in the opinion that 3,000 cubic feet of pure air should be supplied to each adult per hour, or about 50 cubic feet per minute; that the problem is to determine how many times the air in a smaller space can be changed; how much smaller the space may be than 3,000 cubic feet; and what agencies shall be used to change the air. Practically it is determined that by what is called natural ventilation (*i. e.*, no fans, blowers, exhausts, etc., being used) the air in a small space can be changed but a few times per hour without creating draught; hence the smaller the space the more rapid the change must be, and the greater the danger from draught; and, indeed, without the best appliances, air can be changed in a small space only a few times, say six or eight per hour, at best, without danger. Consequently, it is far better to have 3,000 cubic feet of air-space, and change the air gradually once an hour, than an air-space of 1,000 cubic feet and change three times an hour.

Ranke, in his *Elements of Physiology*, fixes as the necessary minimum amount for each individual the average quantity of 2,118 cubic feet of air per hour, or about 35 cubic feet per minute. It is well established that the breath of one adult will vitiate about 500 cubic feet of air per hour, while the heat of the body, of gas and other lights, fires, etc., will vitiate perhaps half as much more; so that, on this basis, an adult in a sweet and well-built dwelling requires at least from 700 to 800 cubic feet of air per hour. How much, then, should the operative have when surrounded by the various gases, steam, dust, heated air, and oil-fouling condition of the factory, and working in a room with many others—all the circumstances connected with his employment demanding a large consumption of oxygen? It is clearly and quite positively shown that an operative in our mills, or a workman in our work shops, should have a supply of fresh air of from 25 to 50 cubic feet per minute, or 1,500 to 3,000 cubic feet per hour, and an air-space of from 1,000 to 3,000 cubic feet, according to surroundings and means of ventilation. The statistics show whether or not he has this air-space.

I have the exact measurement of 2,140 separate rooms, comprising 64 different kinds of rooms, or rooms used for 64 different purposes, in textile factories. The following table shows the style of room, number of each kind examined, the average amount of air-space to each operative employed in the various rooms; also, the largest and the least amount of air-space to one operative, in the several departments. A few large rooms used for purposes where but a small number of people are employed have been left out of the table, but they do not affect the average given. It will be borne in mind that machinery and materials diminish the average amounts of air-space given at least 25 per cent.

Names of rooms.	Number of rooms inspected.	Average air-space, in cubic feet, to each operative.	Largest amount of air-space, in cubic feet, to one operative.	Least amount of air-space, in cubic feet, to one operative.	Names of rooms.	Number of rooms inspected.	Average air-space, in cubic feet, to each operative.	Largest amount of air-space, in cubic feet, to one operative.	Least amount of air-space, in cubic feet to one operative.
Bleachery	21	7,055	50,369	1,428	Packing	93	5,299	24,901	532
Boiler-room	9	19,485	73,500	4,100	Picker-house	32	7,434	24,960	923
Braiding-room	4	5,246	12,666	2,037	Printing	11	2,458	4,420	579
Burling-room	7	2,290	6,720	847	Repairing	43	4,890	15,850	1,178
Cloth-room	9	3,620	6,321	1,180	Reeling	6	2,551	6,840	784
Combing-room	3	5,554	7,250	3,571	Spinning (ring)	127	3,049	11,572	555
Carding	13	3,461	6,652	1,125	Spinning (mule)	281	5,213	21,360	687
Cotton-house	3	10,758	19,200	1,574	Spinning (jack)	33	3,279	10,944	1,519
Dressing	139	6,748	33,583	1,014	Spinning (flyer)	4	8,692	24,055	1,579
Dyeing	80	5,680	70,025	443	Spinning (cop)	4	1,802	2,231	1,313
Drying	56	11,782	53,912	1,188	Spooling and warping	162	3,953	21,299	574
Engine-room	6	14,113	24,288	2,540	Scouring	19	6,079	11,606	1,027
Engraving-room	7	2,130	3,000	521	Steaming	2	20,531	38,400	2,672
Finishing-room	109	3,298	26,673	540	Shearing	7	10,289	50 369	2,400
Folding-room	29	3,748	12,393	974	Twisting	6	3,736	6,840	1,863
Fulling-room	11	4,487	11,037	2,000	Weaving	276	3,327	34,908	495
Gigging-room	9	3,573	5,113	2,330	Wool washing	6	8,713	27,440	1,809
Hosiery-room	4	1,437	3,612	1,126	Wool sorting	28	3,131	13,000	1,035
Machinery	26	7,022	50,600	720	Winding	7	1,871	3,278	511
Preparation	395	5,815	62,050	947					

The following table shows the ventilation for the factories of Mulhouse:

Industry.	Number of employés.	Cubic feet for each employé.	Remarks.
Cotton carding	117	2, 191	Stories.
Do	89	2, 509	Do.
Do	115	2, 756	Do.
Do	27	3, 110	Do.
Do	30	3, 675	Do.
Do	57	3, 710	Do.
Do	225	4, 205	Ground floor.
Do	8	5, 407	Stories.
Do	44	7, 951	Ground floor.
Do	13	8, 754	Stories.
Wool combing	115	4, 735	Ground floor.
Do	77	7, 279	Do.
Cotton spinning	10	4, 064	Stories.
Do	25	4, 417	Do.
Do	135	4, 523	Do.
Do	87	4, 947	Do.
Do	17	5, 613	Do.
Do	145	6, 149	Ground floor.
Cotton spinning	67	6, 164	Stories.
Do	32	6, 254	Do.
Do	207	7, 703	Ground floor.
Do	25	7, 703	Stories.
Do	75	9, 294	Ground floor.
Wool spinning	307	4, 417	Do.
Do	138	4, 876	Do.
Do	160	5, 613	Do.
Wool twisting and reeling	161	2, 050	Stories.
Wool twisting	56	3, 296	Do.
Washing and pressing wool	35	5, 265	Ground floor.
Preparing for weaving		1, 626	Stories.
Do	43	2, 191	Do.
Do		3, 251	Do.
Weaving	354	1, 201	Do.
Do	680	1, 343	Ground floor.
Do		1, 519	Do.
Do	346	2, 156	Do.

These facts are of the highest value in answering the question relative to crowded factories, and are as true of Great Britain as of Alsace and of Massachusetts. The trouble is not in the air-space of the factories, but in that of the homes. In the construction of factories of all kinds at the present time the most careful attention is paid to their ventilation, and large sums are paid for improved methods of changing the air and for regulating its temperature. The air of a cotton factory is better than that of a lecture-room.

It is often alleged that the mortality of factory operatives is much higher than for other classes of wage workers. This is true in some sense, and for some localities, but not as a rule, as the following tables will show.

The following table shows, for England, the influence of occupations on mortality, at different ages, in 1853:

Occupations.	Age.		Years during which the influence of the occupation shows itself the most.				Age.	
	15 years.	20 years.	25 years.	35 years.	45 years.	55 years.	65 years.	75 years.
Average of mortality per 100 in all classes	0. 632	0. 859	0. 985	1. 305	1. 853	3. 215	6. 676	16. 584
Protestant clergymen		0. 990	0. 583	0. 730	0. 933	2. 460	5. 627	16. 398
Physicians		1. 117	1. 287	1. 474	2. 047	3. 046	6. 287	18. 414
Civil engineers	0. 169	0. 577	0. 944	1. 531	1. 049	2. 217	5. 387	26. 389
Servants	0. 242	0. 503	0. 901	1. 368	1. 857	3. 184	7. 848	22. 786
Coachmen	0. 306	1. 091	1. 218	2. 025	2. 954	4. 724	9. 986	22. 076
Tailors	0. 644	1. 087	1. 200	1. 385	2. 006	3. 300	6. 982	18. 451
Butchers	0. 232	0. 589	1. 005	1. 732	2. 245	3. 745	8. 223	20. 102
Cotton operatives	0. 714		0. 929	1. 166	1. 855	3. 723	8. 527	22. 617
Miners	0. 808		0. 984	1. 245	2. 047	4. 359	10. 026	24. 807
Day laborers	0. 513		0. 872	1. 080	1. 507	2. 734	6. 060	18. 256
Farmers	0. 484		0. 694	0. 834	1. 221	2. 313	5. 665	16. 805

From this table it can be seen that the mortality of clergymen is least, while coachmen, butchers, and miners have the least chance to live long. The cotton operatives present this peculiarity, that they do not sensibly exceed the average until they arrive at fifty-five years of age.

The following statement shows the mortality to 1,000 persons in each occupation in Paris, France, in 1853:

Lawyers	28. 70
Architects, engineers, and mathematicians	39. 80
Servants	155. 80
Cultivators (farmers)	62. 90
Fundholders and proprietors (landlords)	27. 90
Rag pickers	37. 29
Workmen in shops	49. 00
Cotton operatives	27. 00
Army	403. 00

This statement shows that the death-rate in Paris is largest among the servants. This is explained by the small rooms in the mansards where they sleep, by dark kitchens, etc. They are also persons unfitted to do the heavy work in the country, being too weak physically, and consequently they flock to the cities.

It will be seen from the tables, pages 21 and 22, that the percentage of infant decedents to the population in factory towns is very much lower in Rhode Island than in Massachusetts, even with the fact that deaths under five only are given for Rhode Island, while for Massachusetts they also include the children of five years of age. The proportion of children employed in textile factories to the whole number of persons employed is larger in Rhode Island than in Massachusetts, being 18+ per cent. for the former state and 11 per cent. for the latter.

It is perfectly easy, if one is so disposed, to prove by statistics that factory employments are very detrimental to health, or that they are no more so than other mechanical employments. For instance, of 837 spinners employed in fine spinning in Manchester, England, in 1832, before the miserable cellarages of that town had begun to disappear, 621, or 74.2 per cent., reported themselves in good health, 171, or 20.4 per cent., to have pretty good health, and 45, or only 5.4 per cent., to be in indifferent health.

I have found many men and women in the linen factories of Dundee who had worked in flax and jute for thirty years or so, and in the worst processes of transforming the raw material to yarn, and, with the exception of the hand hacklers, the answer to my questions as to the effect of the work was that no ill effects were experienced. Examples of the reverse might easily be given, for it is quite true that the unhealthfulness of some kinds of labor performed in factories has been and is considerable, although less than the bad effects attending the household system. In spinning-rooms, for instance, the flying particles of fiber have a deleterious effect. Science is removing the effects of cotton dust as well as the effects of revolving shafts and the presence of steam in some departments.

Physicians make very conflicting reports regarding the health of factory operatives for different localities, or sections of the same city even. My own conclusion in the matter is that factory operatives, so far as reasonable labor is concerned, may be as healthy as any other class engaged in mechanical pursuits; that if they are not so, it is owing to one of two causes, or the two combined, namely, too severe labor imposed, or bad sanitary conditions at home, for the difference in the health of those families who live in individual houses where hygienic care is taken and those living in close quarters in crowded tenements, the work being equal for both, is very marked indeed. So the statistics of the one or the other portion of factory operatives proves the one or the other conclusion, as the motive of the person using the statistics may indicate. The truth lies between the two extremes. In a factory center, where every effort is put forth by the proprietor to secure good homes and every means is taken for cleanliness in homes and in mills—and the operatives are sufficiently progressive to co-operate with the proprietors, and these two conditions are generally found together—the mortality rates will not be exceptional. Reverse these conditions, and the rate rises in proportion to the general neglect.

Arguments are often drawn from the statistics of Manchester, England, relative to the past; but thirty or forty years ago there were nearly 50,000 working people in Manchester living in cellarages or underground dens. To-day there are not half a dozen families living in such abodes, and consequently the deaths from zymotic diseases have been reduced to the lowest point. During the past ten or twelve years the deaths from typhus and typhoid fevers have been reduced from 635 to 68, or from 1.83 per 1,000 of the population to 0.18, and by very regular reduction, as will be seen from the following table taken from the report of the officer of health of Manchester for 1881:

Years.	Number of deaths.	Rate per 1,000 of the population.
1868	635	1. 83
1869	403	1. 16
1870	392	1. 13
1871	282	0. 80
1872	242	0. 68
1873	232	0. 66
1874	188	0. 53
1875	177	0. 50
1876	225	0. 63
1877	164	0.46
1878	115	0. 32
1879	68	0. 18

Dr. John Leigh, the health officer of Manchester, informs me that he believes the next generation of operatives will be much better educated than the present—have better habits, better amusements, etc. This condition he asserts is now coming as the results of education, reading-clubs, coffee-rooms, etc.

Perhaps Oldham, England, is the most emphatic type of the factory town; it has a population of nearly 115,000; its factories are mostly devoted to spinning; it has about 250 factories, running over 10,000,000 spindles, or nearly as many as the whole United States, and is often quoted as the largest factory town in the world. The population of Oldham is stated by the registrar-general to be 112,176, dating to the middle of 1881. It may be well, as showing the growth of the borough, to give the various totals, from 1851 to 1881, thus: 1851, 52,820; 1861, 72,333; 1871, 82,629; 1881, 112,176.

The following table shows the mortality rate of Oldham, in comparison with several places in England having different kinds of manufactures, or, in some instances, but few:

Towns.	Estimated population in 1881.	Deaths.		
		Weekly average, 1880.	Registered in the week.	Annual rate per 1,000.
London	3, 608, 774	1, 560	1, 452	19. 8
Oldham	112, 170	51	49	22. 8
Liverpool	353, 988	285	257	24. 2
Manchester	341, 269	177	146	22. 3
Salford	177, 760	92	67	19. 7
Newcastle	145, 675	63	56	20. 1
Leeds	310, 490	129	123	20. 7
Sheffield	285, 623	123	123	22. 5
Bradford	184, 037	79	65	18. 4
Hull	155, 161	68	52	14. 1
Birmingham	402, 296	157	121	15. 7
Bristol		82	68	17. 1

All these facts only seem to emphasize the conclusion already stated, and lead me to add that manufacturing concerns and municipal governments acting together can render factory employment as healthful as any mechanical labor can be; and that if this is not done there is culpable negligence somewhere. Low health conditions in factory places, where such conditions exist, are not due to the factory system, but to negligence either on the part of proprietors or of employés; usually, as I have said, on the part of both parties; but in too many cases on the part of the operatives themselves, who sometimes shamefully abuse a good, clean tenement, in spite of all the owner can do to keep it in order. When a landlord is permitted to erect a tenement house in such a way that the ventilators from the privies of an adjoining block discharge their foul gases under the windows of the new structure, as I have found in some instances in an American factory town, blame of ill-health on the part of the operatives occupying such places must not be laid wholly upon employer and employés, but upon legislatures as well, for not giving boards of health the power to interpose before an epidemic occurs.

Law is fast asserting itself in the interest of the health of the people, and it is the knowledge of such conditions as I have referred to which stimulates and encourages the law-makers to take advanced ground in sanitary matters.

C.—*The factory system is productive of intemperance, unthrift, and poverty.*

If it could be shown that the factory leads to intemperate habits, it would follow conclusively that it is productive of unthrift and poverty, the sure conditions resulting from intemperance. It is true that a great deal of drunkenness exists in factory towns and among factory operatives; it is not true that the factory is the creator of this. On the other hand, the investigations of Louis Reybaud, a member of the Institute of France, conducted in the name of the Academy of Moral and Political Science, relative to the condition of workingmen in various branches of industry, prove conclusively that the factory operatives are far more temperate than those engaged under the domestic system. The industries of France afford the very best opportunities for comparative study in this respect. In the United States drunkenness has never been much of an obstacle in the way of the success of the factory. Factory towns support a large number of common laborers, and the intemperance of this class is usually attributed to the factory. It must be frankly and freely admitted that whatever of unthrift there may be among factory operatives is to a very large degree due to the habit of beer-drinking, but employers, overseers, and even the operatives themselves are creating an *esprit de corps* which does not allow a man to remain in a factory when in the habit of getting drunk. This sentiment is on the increase, and as soon as proprietors will shut their doors to all habitual drunkards, as many have shut them already, the factory will become the most powerful agent we have for the prevention of intemperance. Its power in this direction is far greater than is generally known.

Unthrift and poverty do not belong to the factory system of industry to any such extent as they belonged to the system which it supplanted; indeed, the poverty existing at the birth of the factory system was one of the most potent influences which enabled it to grow. This is the historical view, not the sentimental one. There was a time, within a quarter of a century, too, when the drunkenness of factory operatives constituted a serious obstacle to the successful operation of factories in Great Britain and on the continent. Sunday was a day of debauch, and many, spinners especially, did not get into condition for work before Tuesday or Wednesday. It is the unanimous testimony of manufacturers in the leading factory towns of Great Britain that drunkenness is not now a serious obstacle to the running of their works, and in many places on the continent the same testimony is given.

The savings-bank records of factory towns in Europe prove the assertions as to poverty and unthrift to be groundless so far as the Old World is concerned, and too many evidences exist here to require especial argument against such assertions. I know full well how hard is the struggle many make to support their families, and that beer-drinking is the chief cause, in too many cases, of the severity of the struggle; but it cannot be shown that the factory system produces either intemperance or unthrift. If we take the French Canadian factory population of the United States upon which to base a conclusion, we cannot arrive at any other result than that the factory stimulates thrift and prosperity. The United States afford the very best proof possible of the thriftiness of factory people, in this, that within a generation the nationality of the cotton-factory operatives has changed from American and English to English and Irish, largely the latter, and now to French Canadian; with each change has come a class seeking an improvement of condition, and as the improvement has come the old have stepped up from the mills to higher occupations, shop-keeping, farming, etc., and the new have stepped in, and as their children become better educated than their parents, others coming to our shores will crowd them out of the factories that they, the newcomers, may receive the advantages which have given their predecessors a push along in the way of progress.

D.—*It feeds prostitution and swells the criminal lists.*

The charge that the factory feeds prostitution and swells the criminal lists is absolutely unfounded. This impression first grew from the condition of Manchester, England, where a large cellarage population, which has entirely disappeared, was attributed to the factory. It has been shown by the returns from the penitentiary of Manchester that the ranks of prostitution were not fed from the factory, 8 out of 50 coming from the factory and 29 out of 50 from domestic service. An extensive examination of the criminal records of a large number of British factory towns discloses the fact that neither the ranks of prostitution nor the criminal lists are increased to such extent from the factory population of those towns as from other classes. This is equally true in this country. It should be borne in mind that regular employment is conducive to regular living, and that regular employment does not, as a rule, harmonize with a life of prostitution, intemperance, and crime. The virtue of the factory women of this country and of Europe will compare favorably with that of any other class, and much better than with many departments of social life. A manager connected with the establishments of the Messrs. Coates, at Paisley, and who had been in service there forty years, informed me that during that period no one had ever gone from those works into a life of prostitution. Certainly there is nothing in factory employment conducive to vicious lives.

Much has been said by writers, in treating of the factory, of Manchester, and its "hoodlum" class is cited as the operative population. Nothing could be farther from the truth; it was the miserable hovel tenantry outside the factory workers which made Manchester's criminal lists in the past so large. Another common mistake has been made in taking a place like Manchester by which to judge the factory system. Manchester is not purely a factory town.

Most of the attempts to support charges of the abundance of crime and prostitution in operative towns in England by statistical tables have been based on the supposition that the great town nuisances are connected with the factory system. To ascertain the true facts as to crime and the factory system it is necessary to know the ratio of factory operatives to the whole population and the ratio of the number of criminals from the operative ranks to the whole number of criminals. In this investigation I have sought to learn these ratios, but the police departments of British cities and towns, while entering in the records the occupations of parties arrested, do not publish these occupations. Manchester is an exception. The statements contained in the tables relating to crime in factory towns in England I have taken from the original records. In the United States I have found but few factory places where the occupations of parties arrested are entered even, and then they are rarely reported. The statistics used in this report have been furnished me by the city marshals or chiefs of police of the places for which statistics are given. The following table exhibits the facts for Manchester, and it will be seen that in no year was the proportion of arrests of factory operatives to the whole number of arrests equal to the proportion of factory operatives to the whole population. I have used arrests instead of convictions, because I could not trace the parties through to conviction, but about the same percentage of all parties arrested were discharged from arrest or acquitted upon trial; so the arrests, as used for all, furnish a good basis for conclusions:

Year.	Total number taken into custody.	Total number of factory operatives taken into custody.			At work.			Out of work.			Percentage of factory operatives 20 years of age and upward to whole population.	Percentage of arrests of factory operatives to whole number of arrests.
		Both sexes.	Males.	Females.	Both sexes.	Males.	Females.	Both sexes.	Males.	Females.		
1874	20,103	1,889	723	1,166	1,167	506	661	722	217	505	14	9.3
1875	20,828	2,574	789	1,785	1,659	565	1,094	915	224	691	14	12.3
1876	19,750	2,053	560	1,493	1,312	395	917	741	165	576	14	10.3
1877	18,917	1,649	426	1,223	1,010	290	720	639	136	503	14	8.7
1878	18,638	1,584	408	1,176	959	234	725	625	174	451	14	8.4
1879	18,657	1,593	438	1,155	884	235	649	709	203	506	14	8.5
1880	20,256	1,820	515	1,305	998	276	722	822	239	583	14	8.9
Total	137,149	13,162	3,859	9,303	7,989	2,501	5,488	5,173	1,358	3,815	14	9.5

The next table shows the facts as to arrests, as described for important factory towns in England, Scotland, and Ireland. In Oldham and Blackburn the ratio of arrests of factory workers is much greater than the ratio of factory operatives to the whole population. This disproportion is the result of minor misdemeanors, and not of crimes, as I was informed by the chief constables of these towns:

Name of place.	Total number taken into custody during year.	Total number of factory operatives taken into custody.	Percentage of factory operatives, 20 years of age and upward, to whole population.	Percentage of arrests of factory operatives to whole number of arrests.
Oldham, England	2, 484	748	21. 5	30. 1
Huddersfield, England	1, 565	119	18. 5	7. 6
Halifax, England	1, 856	188	16. 5	10. 1
Blackburn, England	1, 738	606	17. 6	34. 8
Bradford, England	2, 432	442	18. 4	18. 1
Ashton-under-Lyne, England	671	101	23. 9	15. 0
Salford, England	4, 521	622	11. 7	13. 7
Bolton, England	1, 291	173	16. 7	13. 4
Belfast, Ireland	11, 581	487	....	4. 2
Dundee, Scotland	6, 620	1, 425	18. 9	21. 5
Glasgow, Scotland	* 858	* 33	17. 7	3. 8

* One week.

What has been said of Great Britain is equally true of France and Germany, so far as I have been able to learn. M. Reybaud found a constantly-decreasing criminal list among constantly-increasing factory populations. If the factories have a bad influence on morals, crime should remain in proportion as the number of factory workers increases. The contrary, however, is the case in France, for in the district alluded to by Reybaud (*a*) the criminal list in 1855 was 2,214, while in 1859 it had, by steady reduction, fallen to 1,654, and in a constantly-increasing factory population.

In Chemnitz, in Saxony, the director of police informed me that in 1876 the total number of arrests was 2,884; in 1880 it was 2,699, of which number 2,366 were males, and only 333 females, although the larger proportion of operatives are females, and the operative population of Chemnitz is constantly increasing. The operatives of Chemnitz rarely get drunk.

The exhibit for representative factory towns in the United States is equally gratifying. In Lewiston, Maine, the factory population is 34 per cent. of the whole population over ten years of age. The following table shows the arrests from 1870 to 1881, inclusive, and the proportion of arrests of factory operatives of the whole number of arrests in each year:

Year.	Whole number of arrests.	Number of factory operatives arrested.	Percentage of arrests of factory operatives to whole number of arrests.
1870	203	19	9. 3
1871	223	28	12. 5
1872	267	22	8. 2
1873	291	27	9. 2
1874	546	51	9. 3
1875	792	54	6. 8
1876	544	43	7. 9
1877	443	33	7. 4
1878	407	37	9. 0
1879	279	30	10. 7
1880	283	24	8. 4
1881	242	18	7. 4
Total	4, 520	386	8. 5

The next table is for Pawtucket, Rhode Island, whose factory population is 21 per cent. of the whole over ten years of age:

Year.	Whole number of arrests.	Number of factory operatives arrested.	Percentage of arrests of factory operatives to whole number of arrests.
1876	783	79	10. 0
1877	573	59	10. 2
1878	635	64	10. 0
1879	540	77	14. 2
1880	638	52	8. 1
1881	586	77	13. 1
1882	671	103	15. 3
Total	4, 426	511	11. 5

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[a] See *Le Coton*, by Louis Reybaud.

The police records of Fall River, Massachusetts, one of the largest textile cities in America, are very perfect, and afford the following facts:

Year.	Whole number of arrests.	Number of factory operatives arrested.	Percentage of arrests of factory operatives to whole number of arrests.
1874	2, 116	631	29+
1875	2, 497	748	29+
1876	2, 288	773	33+
1877	2, 332	848	36+
1878	2, 141	759	35+
1879	1, 591	627	39+
1880	1, 853	632	34+
1881*	1, 729	569	32+
Total	16, 547	5, 587	33+

* Ten months.

The operatives, as the above table shows, supply 33+ per cent. of the whole number of arrests, while they constitute 38+ per cent. of the whole population over ten years of age.

In Lowell the records show occupations of persons arrested for 1880 and 1881; for the latter year I have the report for ten months only. The factory population of Lowell is 30+ per cent. of the whole population over ten years of age; the mill operatives in 1880 furnished 22+ per cent., and in 1881, for ten months, 24+ per cent. of the whole number of persons arrested. In the great shoe-factory city of Lynn, Massachusetts, the shoe factories furnish 28+ per cent. of the whole population over ten years of age, and 24 per cent. of the persons arrested.

The following statement is from the city marshal of Nashua, New Hampshire, an important factory city:

> City Marshal's Office,
> *Nashua, New Hampshire, November* 4, 1882.
>
> Carroll D. Wright,
> *Special Agent, U. S. Census.*
>
> Dear Sir: In reply to your inquiry relative to the extent to which the factory operatives of this city contribute to our criminal list, I would say that although we keep no record of occupations, yet I have made a careful examination of my criminal docket for the six months ending November 1, 1882, and estimate that about 7 per cent. of those arraigned before our police court during that time were factory operatives. From my personal knowledge of the parties, and on consultation with my officers, I think this estimate is very nearly correct.
>
> Yours, truly,
>
> JAMES H. HUNT,
> *City Marshal, Nashua, New Hampshire.*

The following statement is from one of the oldest factories in New England:

> We have no statistics, but during the last ten years we have employed at this establishment about 450 operatives; during that time one young man has been convicted of breaking and entering a store and sentenced to state prison, and a young lad who was concerned with him was sent to the reform school. This, so far as I remember, and I have the memory of others to assist me, is the sole case of crime that has been prosecuted. There was one other case of stealing, not prosecuted, and there have been a few brawls, drink at the bottom of them, but the parties have settled among themselves on getting sober. As a whole, our community is very orderly. There are some who drink, and any trouble there is comes from them. We bear it to a certain point, but if the offense is repeated, after warning, we discharge the offending parties.

The foregoing facts are quite representative in their character, and they dispel the prevailing impression that the bulk of the crime of manufacturing towns comes from the factory. It is true that the new system of industry, by securing a better competency, fights bad instincts with the very best of weapons—the interest of those it employs. In large towns the factories have had to contend with all the nuisances which a rapid increase of population beyond the due limits of accommodation must necessarily produce. Notwithstanding the very poor material with which the factory system is often required to deal, the contest for civilization is progressing successfully through its influence, and when the power of moral forces is universally recognized in the conduct of industrial enterprises the ratio of arrests of factory workers to the whole number of arrests will be much less than it is now.

I cannot give statistics relative to prostitution, but all my inquiries have developed but one opinion, and that is that the factory does not feed prostitution to an undue degree. This is true of all countries. A factory girl whose character is not good finds herself in an atmosphere uncongenial at first, but finally so chilling that she leaves the establishment. What there is in factory employment, other than other employments, which should tend to prostitution, it is difficult to understand. Until some effort is made to prove the contrary, I must conclude that the impression generally entertained in this particular is the result of prejudice or of ignorance of the true nature of the work.

E.—*It tends to intellectual degeneracy.*

In considering this objection, which many bring against the factory system, I cannot use statistical data, but am obliged to rely to some extent upon the opinions of those whose positions entitle their statements to the fullest confidence. I am able to assert, however, that no opinion of my own is stated which is not the result of my own observations and investigations; that is, while the treatment of the above objection appears to be statements of opinion only, the statements are really facts. These statements will apply to England as well as to America, although it is quite impossible to compare the intellectual progress of English and American factory operatives; for while England has had her own race constantly to deal with, America has had to deal with operatives from all lands congregated in her factory towns.

The impression that the factory system tends to intellectual degeneracy I believe to be entirely unfounded. Through the simplification of mechanical processes ignorant labor is congregated in factory centers, but it is not created or induced by the factory. The fact that the ignorant masses are enabled by the factory to engage in what it once took skilled labor to perform has given the widespread impression that factory labor has degraded the skilled, when the truth is it has lifted the unskilled; and this is the inevitable result of the factory everywhere. It is a curious fact that after the factory system was inaugurated in England, and the poor, degraded, and excessively ignorant pauper labor of the southern agricultural districts was lifted up to respectable and self-supporting employment and to comparative self-respect, the factory was held to be responsible for the ignorance which it found; and so the laws of England, and in later years of America too, have insisted upon the education of children as a prerequisite to factory employment. This may explain the superior intelligence of the children of factory towns in England as compared with those of agricultural localities. The half-timers of England and the factory children of America are laying a foundation, if proprietors will only recognize the power of moral forces in the conduct of industrial enterprises, which will in another quarter of a century change the social complexion of our factory towns. If the advantages afforded in factory towns will stimulate rural districts to emulate the work of providing for the proper amusement and instruction of children and young people, perhaps the constant depletion of such places may be checked and the inhabitants of crowded towns be attracted to the soil. The mental friction of the factory is not without its healthful influences. Certainly it is better for the persons engaged than the filthy little shops, occupied by a few foul-talking people, which characterized the domestic system. Instead of dwarfing the minds and the skill of the skillful, as is often alleged, the factory enlarges the minds and increases the power of the unskillful. Louis Reybaud, to whose investigations I have referred, testifies that the abasement of intelligence, which is said to follow in proportion as tasks are subdivided, is a conjecture rather than a truth shown by experience, and is presumed not proven. To prove abasement from factory employment it would be necessary to show, for example, that the hand weaver, who throws the shuttle and gives motion to the loom, is of a class superior to the machine weaver, who superintends such double movement. Employment of the muscles in several operations instead of one has nothing in it to elevate the faculties, and this is about all the opponents of the factory claim. In their view, says Reybaud again, "the most imperfect machines, those which require the most effort, are the ones which sharpen the intellectual faculties to the greatest degree. We can easily see where this argument would carry us if pushed to the end." There is no abasement; on the contrary, it is from the influences resulting from the factory system that we discern the elevation of an increased proportion of working people from the position of unskilled to that of skilled laborers, and the opening of an adequate field of remunerative employment to women, two of the most important improvements in the condition of the working masses which could be desired; and these results are stimulated by the factory system.

The impression that the factory degrades the intellect, so far as this country is concerned, springs from the remembrance of the Lowell factory girl, engaged in her literary work, and a contemplation of the present factory girl. We are deceived by this. It requires but a superficial consideration to understand that forty years ago the cotton factories of this country were filled with English and American operatives of a high grade of intelligence. The American girls came from our farming districts, and were the daughters, in many instances, of the best citizens. As machinery was improved, or the American girl was crowded into higher pursuits, the Irish came in and the former operatives stepped out, but did not thereby deteriorate; but the Irish girl stepped up in the grade of employment. Now, within a decade or two, the French Canadian has been successful in displacing, and rapidly, too, the Irish operative, and the latter has not deteriorated thereby; but the French Canadians have taken a step in advance of their old condition. When they go back to their own country, as many do, they carry back with them the results, whatever they are, of contact with a new system, and the effects of such contact will tell upon their children, if not upon themselves. The factory brings progress and intelligence, and establishes at the centers the library, the public hall, the lyceum, and the concert. Such institutions, in the nature of things, could not have found a lodgment under the domestic system. It is in evidence that the book trade of Great Britain flourishes and fades with her manufactures in closest sympathy, while it is nearly indifferent to the good or bad state of her agriculture.

The domestic system could not deal with machinery. While machinery in one sense means the factory system, it is really the type and representative of the civilization of this period so far as mechanics are concerned, because it embodies the concentrated, clearly wrought-out thought of the age. There is something educational in the very presence of machinery. A large proportion of the machines made use of under the factory system of industry were invented by workmen who have been desirous of finding out easier and readier means of performing their accustomed task. These things stimulate industry, which in turn stimulates frugality.

One of the positive results of the factory system has been to enable men to secure a livelihood in fewer hours than of old; this means intellectual advancement, for as the time required to earn a living grows shorter civilization grows up. The most ignorant factory operative of to-day is more than the peer of the skilled workman of a few generations ago in all that goes to make up condition—environment. The fact that the lowest grade of operatives can now be employed in our factories does not signify more ignorance, but a raising of the lowest to higher employments. This process will be repeated again and again, unless society is compelled to take up what is called a simpler system. We should not forget that the machine is the servant of the workman, and neither his competitor nor his master. This process is constantly narrowing the limits of the class which occupies the lowest step in the progress of society. This mission alone stamps the system as an active element in the moral elevation of the race. The factory system does not tend to intellectual degeneracy.

I have considered the main objections which are usually brought against the factory system, and have compared it with the system it supplanted. Its evils come mostly under the heads enumerated, but they are evils which attend the development of the system; they are not its results. Before the system can be condemned as a system it must be shown that it is worse than that which it displaced. This cannot be done. We need not apologize for the weaknesses of the present system, for they come mostly from ignorance, not from the system itself. Under enlightened men it becomes everywhere a great moral power, and a positive, active, and potential element in the processes of civilization. But, admitting every possible domestic evil which accompanies low social conditions—the neglect of young children, and consequent high rates of infant mortality, the physical degeneracy which follows mechanical employments when engaged in by married women—and yet none of these can be attributed to the factory system as the creator of such evils. It cannot be held responsible for their creation. They belong to the ignorance of the substratum of society which the factory system is constantly lifting to another and a higher plane, thereby lessening, instead of increasing, the misery of the world.

The softening of the misery caused by the change in systems has occurred but in subtle ways. Transition stages are always harsh upon the generation that experiences them; the great point is that they should be productive of good results in the end. The mind recoils at the contemplation of the conditions which the vast increase of population would have imposed without the factory system.

> It is a sad law, perhaps, but it is an invariable law, that industry in its march takes no account of the positions that it overturns nor of the destinies that it modifies. We must keep step with its progress or be left upon the road. It always accomplishes its work, which is to make better goods at a lower price, to supply more wants and also those of a better order, not with regard for any class, but having in view the whole human race. Industry is this, or it is not industry; true to its instincts, it has no sentiment in it unless it is for its own interest; and yet such is the harmony of things, when they are abandoned to their natural course, notwithstanding the selfishness of industry, directed to its own good, it turns finally to secure the good of all, and while requiring service for itself, it serves at the same time by virtue of its resources and its power. (*a*)

INFLUENCE OF THE FACTORY SYSTEM UPON WAGES, PRICES, AND PRODUCTION.

The economic advantages of the factory system must be looked for in the increase of wages and production and the decrease in the prices of goods produced. If the purchasing power of wages, so far at least as the products of the factory and the leading necessaries of life are concerned, has not been enhanced, the new system of industry has not yet wrought the good it is capable of working. Authoritative statistics from original and worthy sources, as well as from trustworthy writers and investigators, must answer the question. It is the province of another officer (*b*) of the Census Bureau to compile and analyze the general statistics of wages; but, so far as wages are or have been affected by the factory system, they come legitimately within my consideration.

Here, again, I shall take the cotton industry as illustrative of the influence of the system.

The abnormal condition surrounding the hand weaver of England during the last quarter of the last century is often quoted to show that the workingman of to-day is not so well off as was the workingman one hundred years ago. In some specific departments and under some specific conditions this may be true, but it is impossible to prove what would have been had not something else occurred. The question as to the influence of the factory system upon wages is a difficult one to solve. This difficulty becomes, so far as the cotton trade is concerned, more complicated when we consider the wages of hand-loom weavers after the fly-shuttle came into use, and one weaver could do the work of two. The two tables on page 36 show the rapid declension of wages in England from 1795 to 1834. The first table was furnished the committee of the house of commons on hand-loom weavers, in July, 1834, by Mr. John Makin, a manufacturer of Bolton, England. The second table was furnished the committee on manufactures from the books of Manchester manufacturers.

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a Le Coton. Reybaud.

b Joseph D. Weeks, esq., special agent on wages.

The following table shows the wages paid for weaving a six-quarter 60-reed cambric, 120 picks in one inch, in Bolton:

Year.	Wages.	Year.	Wages.	Year.	Wages.	Year.	Wages.
1795....	$7 98	1805....	$6 00	1815....	$3 36	1825....	$2 04
1796....	7 98	1806....	5 28	1816....	2 88	1826....	1 68
1797....	6 96	1807...	4 32	1817....	2 16	1827....	1 56
1798....	7 20	1808....	3 60	1818....	2 16	1828....	1 44
1799....	6 00	1809 ..	3 84	1819....	2 28	1829....	1 32
1800....	6 00	1810....	4 68	1820....	2 16	1830....	1 32
1801....	6 00	1811....	3 36	1821....	2 04	1831....	1 32
1802....	6 96	1812....	3 36	1822....	2 04	1832....	1 32
1803....	5 76	1813....	3 60	1823....	2 04	1833....	1 32
1804....	5 76	1814....	5 76	1824....	2 04	1834....	*1 32

* After making deductions for expenses, the clear wages of the weaver are only 99 cents per week.

The following table shows the wages paid for weaving the second quality of 74's calico in the neighborhood of Burnley and Skipton:

Year.	Wages.	Year.	Wages.	Year.	Wages.	Year.	Wages.
1802....	$2 06	1810....	$1 48	1818....	$0 78	1826....	$0 30
1803....	1 68	1811....	90	1819....	58	1827....	34
1804....	1 44	1812....	1 10	1820....	62	1828 ..	40
1805....	1 36	1813....	1 34	1821....	76	1829....	26
1806....	1 30	1814....	1 40	1822....	62	1830....	34
1807....	1 14	1815....	98	1823 ...	53	1831....	38
1808....	66	1816....	68	1824....	44	1832....	31
1809....	60	1817....	64	1825....	53	1833....	33

Mr. Edward Baines, whose work on cotton manufactures I have already quoted, writing in 1835, and on the facts given the committees referred to, says:

> These tables naturally draw our attention to the occasions on which the great fall in the wages of weavers took place and to the immediate causes of that fall. It may first be observed that the wages of weaving had previously risen even more rapidly than they afterward fell. Before the invention of the fly-shuttle and the spinning-machines the weavers' wages were very moderate; and when the greater difficulty of weaving without the fly-shuttle and the greater strength required by the coarse goods then made are considered, it may be doubted whether the weavers then earned higher wages in proportion to their labor than at present. The fly-shuttle, which enabled a weaver to turn out twice as many webs as before, was the first cause of a material improvement in wages. As the price of goods did not fall in proportion to the increased facility of production, the weaver gained considerably by the invention. Then came in rapid succession the grand inventions of the spinning-jenny, the water-frame, and the mule, which caused the unparalleled extension of the manufacture we have already seen and enabled the cotton weavers to produce a great variety of delicate fabrics before unknown to their looms. Calicoes, muslins, cambrics, nankeens, and many other tissues began to be woven in England, and as they could be afforded much below the prices formerly paid for the Indian goods of those qualities the demand for them was great and urgent, weavers were in the utmost request, and their wages rose to a rate exceeding those of any other class of workmen; common weavers of steady and industrious habits soon rose into manufacturers, and many fortunes were made at the loom. This induced multitudes to learn the trade, and it continued to attract hands long after the demand was satisfied. An employment so easily learned and so handsomely remunerated became inevitably surcharged with laborers. Then came the reaction. Wages must have fallen even with an unvarying trade, but at every shock which the manufacture received from external or internal circumstances a great and sudden decline took place, which, from the constant pressure of a surplus body of laborers, could never be recovered.
>
> From 1795 to 1807, as will be seen by the above tables, wages gradually receded, notwithstanding a depreciating currency, except in the year 1802, when the peace of Amiens opened the markets of Europe for a short space to English commodities.
>
> The year 1808 was that of the American embargo, when an extremely small supply of cotton reached this country, and thousands of weavers were thrown out of employment. Hence the price of weaving calicoes fell from 4*s.* 9*d.* in 1807 to 2*s.* 9*d.* in 1808. The revival of trade, the flush of paper money, and the famine price of corn raised wages again, and they were sustained by the reopening of the continental markets and the quantities of English goods poured in upon them. In the year 1814 the national fever was at its height. Before 1816 all its debilitating consequences were felt. The foreign markets were glutted; the merchants received no returns; the exchanges fell; government issued no more orders to the manufacturers; the American war closed to us a large market and deprived us of the supply of cotton-wool; the Bank of England rapidly contracted its issues; the paper bubble burst; banks and commercial men failed in fearful numbers; a wretched harvest plunged the farmers into alarm and distress, and many of the disbanded soldiers and sailors, turning to the loom as the easiest trade they could learn, came into competition with the weavers. Under the accumulated disasters of this crisis the weavers received their severest blow. The wages of cambric weavers fell from 24*s.* in 1814 to 12*s.* in 1816, and those of calico weavers from 5*s.* 10*d.* in the former year to 2*s.* 10*d.* in the latter. Before they could in any degree recover the power-loom rose into formidable competition with the hand-loom. The commercial crisis of 1825–'26 was the final calamity; and thus, under reiterated strokes, the hand-loom weavers have been pressed down, and have never, till within the last two years, had even a glimpse of improvement. During that time their wages have risen about 10 or 15 per cent., but the weavers still remain the most depressed and degraded class of English laborers.
>
> These were the occasions and direct causes of the lamentable fall in weavers' wages; but their effects could not have been so serious if there had not been permanent causes, belonging to the nature of the employment itself. Of these, the first and grand cause is the easy nature of the employment. The weaving of calicoes is one of the simplest of manual operations, understood in a few moments, and completely learned in a few weeks. It requires so little strength or skill that a child eight or ten years of age may practice it. A man brought up to any other employment may also very shortly learn to weave. From the facility of learning the trade, and from its being

> carried on under the weaver's own roof, he naturally teaches his children to weave as soon as they can tread the treadles, if he cannot obtain places for them in a factory. Thus they begin at a very early age to add to the earnings of the family, and the wife also toils in the same way to increase their scanty pittance. But it is obvious that that which is only a child's labor can be remunerated only by a child's wages. There are large departments of hand-loom weaving which are almost entirely given up to women and children, and their wages go far to regulate all the rest. The men, where they are able, procure better kinds of work; and where they are not able, they must put up with the most paltry earnings.
>
> The second cause for the low wages of weavers is that their employment is in some respects more agreeable, as laying them under less restraint than factory labor. Being carried on in their own cottages, their time is at their own command; they may begin and leave off work at their pleasure; they are not bound punctually to obey the summons of the factory bell; if they are so disposed, they can quit their loom for the public-house, or to lounge in the street, or to accept some other job, and then, when urged by necessity, they may make up for lost time by a great exertion. In short, they are more independent than factory operatives; they are their own masters; they receive their materials, and sometimes do not take back the web for several weeks; and—what is a lamentable, but far too common occurrence—they have the power, in case of urgent necessity or strong temptation, to embezzle a few cops of their employer's weft in order to buy bread or ale. All this makes the weaver's occupation more seductive to men of idle, irregular, and dissipated habits than other occupations. It is a dear-bought, miserable liberty, but, like poaching or smuggling, it is more congenial to some tastes than working under precise restrictions for twice the remuneration. The mention of this unquestionable fact by no means implies a charge against the weavers that they are all of loose habits and morals; but it helps to account for many continuing at the loom, notwithstanding the wretchedness of their circumstances.

I have given Mr. Baines' opinion at length because he has stated the case so clearly. I have fully verified his statements in every way possible. The above tables have been quoted simply that they should not be used to refute subsequent conclusions, and because mechanical weaving has been generally alleged as the principal cause of the distress of the hand-loom weavers; the other causes have been much more efficient, because a great part of the distress was produced before the power-loom came into use. It is true that the fierce competition between the hand- and the power-loom weavers, after the advent of the latter, accelerated the decline of the former and kept the wages of both classes at a very low point, for each tried to cut the throats of the other, industrially, if not physically. The true period from which to treat of wages under the factory system in Great Britain is, from the nature of things, as described, from 1830 to 1835, or half a century ago. In this country the period from 1815 to 1820 would be the true one, because the condition of things related of the hand-loom weavers of England never existed here, the factory being hailed as a boon by the people of America.

From 1833 the wages of factory operatives in Great Britain may be determined with sufficient accuracy to entitle the data given to our confidence. As already stated, at this period hand-loom weavers were in a deplorable condition; this was true of large towns and of villages; their wages were a miserable pittance, and they worked in confined and unwholesome dwellings. On the other hand, there was no large class of workmen in the kingdom receiving better wages than the operatives in cotton factories. The average earnings in 1833 of 67,819 employés, consisting of 19,247 men, 20,962 women, and 27,610 children, were 10*s.* 5¼*d.* ($2 51) per week for all, indiscriminately, men, women, and children. The respective earnings of different classes of mill operatives will be seen from the following table, (*a*) which shows the average net weekly earnings of the different classes of operatives in the cotton factories of Manchester, Stockport, Duckenfield, Staleybridge, Hyde, Tintwistle, Oldham, Bolton, etc., drawn from the returns of 151 mills, employing 48,645 persons, in May, 1833:

Denomination of process in which employed.	Class of operatives.	Classification as respects age and sex.	Average weekly net earnings.
Cleaning and spreading cotton		Male and female adults and some non-adults	$1 98
Carding	Carders, or overlookers	Male adults	5 64
	Jack-frame tenters	Principally female adults	1 92
	Bobbin-frame tenters	Principally female adults	1 79
	Drawing tenters	Principally female adults	1 80
Mule spinning	Overlookers	Male adults	7 02
	Spinners	Male and female adults, but principally the former	6 16
	Piecers	Male and female adults, and non-adults, but principally the latter.	1 30
	Scavengers	Male and female non-adults	70
Throstle spinning	Overlookers	Male adults	5 37
	Spinners	Female adults and non-adults	1 86
Weaving	Overlookers	Male adults	6 31
	Warpers	Male and female adults	2 94
	Weavers	Male and female adults, male and female non-adults, but chiefly females.	2 60
	Dressers	Male adults	6 68
Reeling	Reelers	Female adults and non-adults	1 91
Roller covering	Roller coverers	Male and female adults	2 91
Attending the steam-engine, and making machines.	Engineers, firemen, mechanics, etc	Male adults	4 92

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a Supplementary report of factory commissioners, 1833.

The rates given above and the statements preceding the table are fully corroborated by the following table, prepared by the chamber of commerce of Manchester and published by the board of trade in the tables of revenue, which gives a statement of the weekly rates of wages paid to the undermentioned description of workmen in Manchester in the year 1832:

Spinners, men	$4 80 to $6 00
Spinners, women	2 40 to 3 60
Stretchers	6 00 to 6 24
Piecers, boys and girls	1 10 to 1 68
Scavengers	36 to 64
In the card-room:	
Men	3 48 to 4 08
Young women	2 16 to 2 28
Children	1 44 to 1 68
Throstle spinners	1 20 to 2 28
Reelers	1 68 to 2 16
Weavers by power:	
Men	3 12 to 4 04
Women	1 92 to 2 88
Dressers, men	6 72 to 7 20
Winders and warpers	1 92 to 2 64
Mechanics	5 76 to 6 24
Weaving by hand:	
Nankeens, fancy quality, woven by men	2 16 to 3 60
Nankeens, common quality, woven by children or women	1 44 to 1 92
Nankeens, best quality, woven by men	2 40 to 3 12
Checks, fancy quality, woven by men	1 68 to 1 80
Checks, common quality, woven by children	1 44 to 1 68
Cambrics, woven by all ages	1 44 to 1 56
Quiltings, woven by men and women	2 16 to 2 88
Fustian cutters, all ages	2 40 to 2 88
Machine makers, men	6 24 to 7 20
Iron founders, men	6 72 to 7 20
Dyers and dressers, men	3 60 to 4 80
Dyers and dressers, young men	2 88 to 3 36
Dyers and dressers, boys	1 20 to 2 40
Tailors, men	4 32 to ....
Porters	3 36 to 3 60
Packers	4 80 to ....
Shoemakers	3 60 to 3 84
Whitesmiths	5 28 to 5 76
Sawyers	5 76 to 6 72
Carpenters	5 76 to ....
Stonemasons	4 32 to 5 28
Bricklayers	4 08 to 4 80
Bricklayers' laborers	2 88 to ....
Painters	4 32 to ....
Slaters, per day	88 to ....
Plasterers	4 56 to 5 04
Spademen	2 40 to 3 60

The rates of wages paid males and females, according to ages, in 1832, in the cotton-mills of Lancashire were given by the factory commissioners in 1833 as follows:

Age.	MALES.		FEMALES.	
	Number employed.	Average weekly wages.	Number employed.	Average weekly wages.
Below 11	246	$0 59	155	$0 58
From 11 to 16	1, 169	1 00	1, 123	1 02
16 to 21	736	2 45	1, 240	1 75
21 to 26	612	4 13	780	2 02
26 to 31	355	4 89	295	2 08
31 to 36	215	5 45	100	2 11
36 to 41	168	5 19	81	2 33
41 to 46	98	4 87	38	2 23
46 to 51	88	3 99	23	2 12
51 to 56	41	3 92	4	2 01
56 to 61	28	3 25	3	1 52
61 to 66	8	3 26	1	1 44
66 to 71	4	2 60	1	1 44
71 to 76	1	4 32	....	....
76 to 81	1	2 08	....	....
Total	3, 770	....	3, 844	....

The foregoing tables are sufficient to show the wages paid in cotton factories in England from 1830 to 1835, and the rates stated had not changed much for twenty years before that. Rates for Scotland were lower. It has been seen that the wages for Lancashire and Cheshire factory operatives of all ages, including men, women, and children, averaged 10*s.* 6*d.* per week, while in Glasgow the average was 8*s.* 1½*d.*, this difference being due chiefly to the greater proportion of women and children employed in Glasgow; for the average weekly wages of the men were 21*s.* 11*d.*, and the average wages of the youngest children 2*s.* The following table (*a*) gives the wages for different classes in Glasgow mills in April, 1832:

Work and wages of cotton spinners.	Fine numbers.	Coarse numbers.
Men on piece-work	At wheels containing from 252 to 300 spindles, earn $1 08 per day.	At wheels from 180 to 300 spindles, earn from 84 cents to $1 08 per day.
Women reelers and winders	Earn 32 cents per day	Earn 28 cents per day.
Lads and girls employed in the preparation-room, or as piecers to the spinners, and paid by the day.	From 14 to 17 years of age, earn 32 cents per day	The same as for fine numbers.
Children, as above	From 10 to 14 years of age, earn 20 cents per day	Earn 16 cents per day.
Children, as above	Under 10 years of age, earn 10 cents per day	Earn 8 cents per day.
Lads and girls		At wheels from 120 to 180 spindles, earn from 48 to 72 cents per day.

NOTE.—The wages of cotton spinners did not vary during the ten years preceding 1820, and but very little since that period. The prices quoted are all net to the workers.

It should be remembered that at this time (1830–'35) the hours of labor were 12 per day in factories for persons under eighteen years of age; but as such persons constituted a large proportion of the operatives, the same hours virtually applied to adults.

The four tables which follow show clearly the changes in wages and prices for the first generation of this century. The first two tables are from the reports of the commons' committee on manufactures, etc., already referred to, and the second two from the reports of the factory commissioners.

The following table shows the wages and work of fine cotton spinners, at different periods, from the wage-books of Mr. Thomas Houldsworth, of Manchester:

Years.	Work turned off by one spinner per week.		Wages per week.			Hours of work per week.	Prices from Greenwich hospital records.		Quantities which a week's net earnings would purchase.	
	Pounds.	Numbers.	Gross.	Piecers.	Net.		Flour per sack. *	Flesh per pound.	Pounds flour.	Pounds flesh.
								Cents.		
1804	12	180	$14 40	$6 60	$7 80	74 sup.	$19 92	12 to 14	117	62¼
	9	200	16 20	7 44	8 76	74 sup.	19 92	12 to 14	124	73
1814	18	180	17 28	6 60	10 68	74	16 92	16	175	67
	13½	200	21 60	7 20	14 40	74	16 92	16	239	90
1833	22½	180	13 12	5 04	8 08	69	10 80	12	210	67
	19	200	15 66	5 40	10 26	69	10 80	12	267	85

* The sack of flour was taken at 280 pounds.

The above is the result of an average of several men's work at the different periods. There were 111 spinners employed in the mill in 1833; their average net earnings were $7 98 each per week. There were in the same mill 917 persons employed in card-rooms, doubling, ruling, and piecing; their net earnings averaged $1 70 per week. To show the rate of wages at different periods in these departments, the following table has been obtained from the wage-books of the concern.

The following table gives the wages of carders, reelers, and doublers at different periods:

Occupations.	1806.	1811.	1815.	1818.	1824.	1833.
Card-room, males	$3 60	$3 60	$3 72	$3 60	$3 60	$3 60
Card-room, males	4 08	4 08	4 44	4 32	4 26	4 26
Card-room, males	8 40	8 40	9 60	9 60	9 60	7 20
Card-room, females	2 16	2 16	2 40	2 16	2 16	2 16
Reelers, females	4 56 to 7 20	3 60	3 60	3 60	3 60	2 88
Doublers, females	2 88	2 52	2 52	2 28	2 28	2 04

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a From tables of revenue, commerce, etc., by board of trade.

Piecers' wages, with the exception of those of big piecers, who constituted one-third of the whole, did not vary sixpence per week within twenty years from 1814–'33. Big piecers' wages in 1833 were from $2 04 to $2 28; in 1814, from $2 28 to $2 52.

Mechanics' wages, blacksmiths, turners, filers, machine-makers, and fitters-up, were, in 1833, from $6 48 to $7 44 per week; within the twenty years (1814–'33) they had been as high as $6 72 to $8 40; but then they worked half an hour to one hour per day longer.

The following is a statement of the clear weekly average earnings of spinners, dressers, and weavers in the employ of Mr. Thomas Ashton, of Hyde, in the county of Chester, cotton manufacturer, in the years mentioned:

Description.	1816.	1821.	1826.	1831.	1832.
Spinners, first class	$8 88	$8 52	$8 40	$8 34	$8 40
Spinners, second and third class	7 20	6 54	6 48	6 72	6 76
Spinners, fourth class	....	....	....	4 72	4 80
Dressers	7 20	7 20	7 20	7 32	7 32
Weavers	3 36	3 36	3 12	2 88	2 88

The weavers, all of whom were employed in attending the power-loom, were for the most part young girls.

In 1831 and the following year the total number of hands in Mr. Ashton's employ was 1,200, and their average earnings amounted to $2 88 weekly for every description of hands, 52 weeks in each year.

The following table shows the average prices paid by Messrs. Ashton, of Hyde, for weaving 72⅞ power-loom calico for each piece of 28 yards, and for uplands and Brazil cotton per pound, from which the same are made, with the average market price for which such pieces sold in the years undermentioned:

Year.	Weaving per piece.	Cotton per pound.	Market price per piece of 28 yards.	Year.	Weaving per piece.	Cotton per pound.	Market price per piece of 28 yards.
1814	$0 72	$0 60	$6 72	1823	$0 40	$0 21	$3 46
1815	72	40	6 12	1824	40	21	3 36
1816	60	40	5 28	1825	40	28	3 36 to 4 44
1817	60	44	4 95	1826	36	16	2 52
1818	60	44	5 07	1827	36	15	2 46
1819	48	28	4 24	1828	32	14	2 44
1820	48	26	3 80	1829	32	13½	2 10
1821	40	22	3 78	1830	32	13	1 98
1822	40	20	3 48	1831	32	13	2 10

The progress of wages under the factory system from 1835 to 1860 is shown by the following tables, the facts for which were collected by David Chadwick, esq., treasurer of Salford, England, in 1859, from the wage-books of the cotton factories.

The following table shows the average return of weekly wages in the years named:

Name of trade.	1839.		1849.		1859.	
	Hours weekly.	Net earnings.	Hours weekly.	Net earnings.	Hours weekly.	Net earnings.
Cotton manufacture.						
Steam-engine tender	69	$5 76	60	$6 72	60	$7 20
Stoker	69	3 84	60	4 08	60	4 32
Lodgekeeper	69	4 32	60	4 80	60	5 04
Warehouse boys, fourteen to eighteen years	69	1 80	60	1 80	60	1 92
Warehousemen, twenty-one years and upward	69	4 32	60	4 80	60	5 28
Night watchmen	69	3 89	60	3 84	60	4 32
Carding department.						
Scutchers (women and girls)	69	1 68	60	1 80	60	1 92
Strippers (young men)	69	2 64	60	2 88	60	3 36
Grinders	69	3 12	60	3 12	60	3 60
Overlookers	69	6 00	60	6 72	60	6 72
Card-winders, fourteen to eighteen years (boys)	69	1 44	60	1 56	60	1 68
Drawing-frame tenters (girls and women)	69	1 56	60	1 68	60	1 92
Bobbin and fly tenters (women)	69	1 80	60	2 04	60	2 16

Name of trade.	1839.		1849.		1859.	
	Hours weekly.	Net earnings.	Hours weekly.	Net earnings.	Hours weekly.	Net earnings.
Spinning upon self-acting mules.						
Minders:						
No. 4's to 24's	69	$3 84	60	$4 32	60	$4 80
No. 25's to 40's	69	4 32	60	4 44	60	5 28
Piecers (women and young men)	69	1 92	60	2 16	60	2 40
Overlookers	69	4 80	60	5 28	60	6 24
Throstle spinning.						
Spinners:						
Girls fourteen to eighteen years	69	96	60	1 08	60	1 20
Women eighteen years and upward	69	1 68	60	1 80	60	2 16
Overlookers	69	4 32	60	4 80	60	5 76
Doffers to spinners (boys)	69	1 20	60	1 32	60	1 44
Reeling.						
Throstle-reelers (women)	69	2 16	60	2 28	60	2 28
Cop-reelers	69	2 04	60	2 16	60	2 16
Pin-winders (girls)	69	1 32	60	1 44	60	1 32
Bobbin-winders (women)	69	2 16	60	2 28	60	2 16
Warpers	69	5 28	60	5 28	60	5 52
Drawers	69	4 44	60	4 44	60	4 56
Dressers	69	4 80	60	4 80	60	4 80
Sizers	69	5 52	60	5 52	60	6 00
Beamers	69	5 28	60	5 28	60	5 28
Doubling.						
Doublers (women)	69	1 68	60	1 80	60	2 16
Doffers to doublers (girls)	69	96	60	1 08	60	1 20
Overlookers	69	5 76	60	6 00	60	6 72
Jobbers (young men)	69	2 40	60	2 64	60	3 12
Gassing yarn.						
Gassers (young women)	....	....	60	1 02	60	2 28
Singers by oil	69	1 92	60	....	60	....

The following shows the wages paid for hand-mule spinning in the years named:

Work.	1839.		1849.		1859.		
	Net earnings.		Net earnings.		Net earnings.		
	Hours.	800 spindles.	Hours.	800 spindles.	Hours.	800 spindles.	1, 600 spindles.
Spinning upon hand mules.							
Spinners:							
No. 40's	69	$5 52	60	$5 04	60	$5 52	....
No. 60's	69	6 00	60	5 04	60	5 52	....
No. 80's to 100's	69	6 00	60	5 04	60	6 00	$7 20
No. 120's to 140's	69	9 60	60	8 64	60	....	9 60
No. 160's to 180's	69	10 08	60	8 64	60	....	10 08
No. 180's to 220's	69	10 80	60	9 60	60	....	10 80
Piecers, 14 to 18 years	69	1 32	60	1 32	60	1 44	1 44
Piecers above 18 years	69	1 92	60	2 04	60	2 16	2 40

The following shows the wages paid for power-loom weaving in the manufacture of cotton cloths, etc., in the years named:

Work.	1839.				1849.				1859.			
	Hours.	2 looms.	3 looms.	4 looms.	Hours.	2 looms.	3 looms.	4 looms.	Hours.	2 looms.	3 looms.	4 looms.
Power-loom weavers (principally women):												
72-reed printers' cloth	69	$2 16	....	$4 08	60	$2 16	$3 12	$3 84	60	$2 40	$3 60	$4 32
40-inch shirtings	69	2 16	....	4 08	60	2 16	3 12	3 84	60	2 58	3 84	4 80
38-inch domestics, 52 reed, 13 picks	69	2 40	....	3 84	....	2 40	....	3 84	....	2 40	....	3 84
Helpers (girls)	69	1 20	....	1 20	....	1 20	....	1 20	....	1 20	....	1 20
Bed-ticks	69	....	....	....	60	2 88	....	....	60	2 88	....	....
Small wares	....	....	....	....	....	....	....	....	....	....	....	....
Jaconets	....	....	....	....	60	2 64	....	....	60	2 64	....	....

The following shows the wages paid for power-loom weaving in the manufacture of velvets, etc., in the years named:

Work.	1839.		1849.		1859.	
	Hours.	Wages.	Hours.	Wages.	Hours.	Wages.
Power-loom weavers:						
Velvets	59	$2 88	59	$2 88	59	$3 36
Velveteens	59	2 88	59	2 88	59	3 36
Fustians	59	2 88	59	2 88	59	3 36

The following table exhibits the proportionate number of men, women, boys, and girls in a cotton-mill in Lancashire employing 500 persons, and the average amount of the wages paid weekly to each class in 1859:

Class of work.	Men.	Women.	Boys.	Girls.	Total.
Stokers, engineers, lodgekeepers, warehousemen, mechanics, and porters	20	2	5		27
Cotton mixing and blowing	7		1		8
Carding	17	36	4	15	72
Self-acting-mule spinning	24		10	1	35
Throstle spinning, winding, and warping	7	39	12	11	69
Power-loom weavers	10	173		92	275
Beaming, twisting, and sizing	10	1	1	2	14
Totals	95	251	33	121	500
Average of total wages of workers in all departments taken together	$421 80	$612 44	$55 44	$145 20	$1, 234 88
Average weekly wages to each person	4 44	2 44	1 68	1 20	2 47

It will be seen that of the total number 19 per cent. are men, 50.2 per cent. women, 6.6 per cent. boys, and 24.2 per cent. girls.

The wages of nearly all classes of factory operatives appear to have increased from 10 to 25 per cent. during the twenty years preceding 1859. This was mainly owing to the improvements in the construction of the machinery and the increased speed at which it was worked, and its consequently increased productive power.

Mr. Henry Ashworth, a manufacturer of Bolton, estimated in 1859 that—

> Before 1842 the operative spinner's wages for the production of 20 pounds of yarn, No. 70's, on a pair of mules of 400 spindles each, was $1 10, or 5½ cents per pound, and at this rate his net earnings amounted to about $4 80 per week; and that in 1859, with the improvements effected in the spinning-mule, by which each machine carries 800 spindles, the same workman, with a little extra assistance by piecers (boys), can earn $7 40 per week net, although the amount he receives in wages for 20 pounds of yarn is reduced from $1 10 to 94½ cents, or 0.77 of a cent per pound.

The reduced cost upon the production of a week by the working of a pair of mules with 800 spindles each (instead of 400 each) amounts to $5 72, which is shared in the following proportions, viz: to the operative, $2 60, leaving $3 12 for extra aid, the reduction of price to the consumer, and interest on additional capital, and profit to the master.

Mr. Ashworth also stated that the average rate of wages of a spinner on a pair of unimproved mules of 400 spindles each in producing No. 70's yarn had been as follows:

Year.	Per 20 pounds.	Gross earnings per week.	Piecer's wages per week.	Net.
1842	$1 10	$8 64	$3 84	$4 80
1846	1 18	9 12	3 84	5 28
1850	1 04	8 52	3 84	4 68
1859	1 22	9 84	3 84	6 00

The same workman, with a pair of "double deckers", with 1,600 spindles and more piecers, earned, in 1859, 94½ cents for 20 pounds, $14 36 gross per week, less $6 96 for piecers, or, net, $7 40.

The facts relating to the wages of the cotton-factory operatives of the west of Scotland for the years 1851, 1856, and 1858 were collected by Dr. John Strang in the latter year, and were published by him in the following table:

Occupation.	1851.	1856.	1858.
Power-loom weavers	$2 10	$2 58	$2 34
Spinners	6 00	7 20	6 48
Winders	1 92	2 16	2 16
Warpers	2 88	4 08	3 96
Dressers	7 68	9 60	8 40
Tenters	7 20	9 60	9 12
Twisters	2 16	2 88	2 88
Mechanics	5 76	6 48	6 24
Laborers	2 88	4 08	3 60

From this table it appears that wages increased very considerably between 1851 and 1856, but that after the financial panic of 1857 they fell off over 7 per cent.

The records of wages, and indeed of most data relating to manufactures since 1860, for England, have been very meager. From the facts collected by Dr. Edward Young, and published in the fifth annual report of the Massachusetts bureau of statistics of labor (1874), the following table, showing wages in 1870–1871, has been arranged:

Occupations.	Average weekly wages, standard gold.
CARDING.	
Overseer:	
First grade	$12 10
Second grade	10 89
Third grade	8 47
Fourth grade	7 26
Fifth grade	6 77
Sixth grade	6 29
Pickers, females	2 90
Strippers:	
First grade	5 32
Second grade	4 35
Third grade	3 87
Grinders:	
First grade	5 32
Second grade	5 08
Women:	
First grade	3 99
Second grade	3 55
Third grade	2 90
Fourth grade	2 18
Girls	1 57
SPINNING.	
Overseers:	
First grade	14 52
Second grade	9 68
Third grade	8 47
Fourth grade	7 26
Men:	
First grade	$15 73
Second grade	13 31
Third grade	9 68
Fourth grade	8 23
Back-boys:	
First grade	2 66
Second grade	1 93
Third grade	1 33
Men	6 29
Boys:	
First grade	1 45
Second grade	72
Women:	
First grade	2 42
Second grade	2 18
Half-timers	60
Young persons:	
First grade	3 87
Second grade	3 63
Third grade	2 39
Fourth grade	1 57
Spinners:	
Spare hands	2 42
Do	2 17
Hand-mule spinners who employ their own piecers, men:	
First grade	12 10
Second grade	10 89
DRESSING.	
Dressers	$5 32
Drawers, women:	
First grade	3 63
Second grade	3 20
Third grade	3 02
Fourth grade	2 66
Twisters, men	5 80
Slashers	6 29
SPOOLING.	
Rulers, women:	
First grade	3 15
Second grade	2 77
WEAVING.	
Weavers, men or women:	
First grade	6 05
Second grade	5 32
Third grade	4 43
Fourth grade	3 26
Fifth grade	2 66
REPAIR SHOP.	
Overseer	14 52
Mechanics:	
First grade	8 18
Second grade	7 74
Laborers	5 32
YARD HANDS.	
Laborers	4 35
Engineers	6 77

To show the present rates of wages in the cotton industry of Great Britain is a task more difficult than to ascertain rates for the past, for it seems to have been the settled policy of British manufacturers for the past fifteen or twenty years not to give their rates to the public.(*a*) However, the reports of Colonel Albert D. Shaw,

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a The forthcoming report of the board of trade will supply much valuable material in this respect.

American consul at Manchester, corroborated by the excellent reports of the British board of trade and my own recent inquiries in Lancashire, have enabled me to present the following table of wages for 1880–1882:

Wages per day in an East Lancashire cotton-weaving mill. (Hours of labor, 56 per week.)		Wages per day in an Oldham cotton-spinning mill. (Hours of labor, 56 per week.)		Wages per day in a Blackburn cotton-spinning mill. (Hours of labor, 56 per week.)	
Weavers, 3 looms	$0 64 to $0 72	Mule-overlookers	$1 60 to $2 00	Spinning masters and carders	$1 20 to $2 00
Weavers, 4 looms	80 to 96	Carders	1 60 to 2 00	Spinners	1 20 to 1 40
Weavers, 6 looms	1 20 to 1 44	Strippers	88 to 96	Piecers	46 to 56
Weavers, children, half-timers	14	Jobbers		Creelers	28 to 34
Beamers or warpers	70 to 90	Grinders		Rovers	58 to 66
Winders	50 to 80	Drawing and slubbing hands	65 to 76	Slubbers	50 to 60
Tapers or sizers	1 20 to 1 68	Intermediate and roving	62 to 76	Drawers	52 to 56
Tacklers or overlookers	1 12 to 1 68	Little-tenders (full-time)	36	Grinders	85 to
Engine drivers and firemen	96 to 1 68	Little-tenders (half-time)	16	Blow-room hands	48 to 85
				Engine drivers	84 to 2 00
				Firemen	64 to 84

The course of the rates of wages in America under the factory system cannot be given with the fullness with which I have been able, from a vast deal of matter, to present British rates. Still, with few breaks, I am able to trace the progress of wages quite satisfactorily from the inauguration of the system to the present time. For the past forty years the American record is very clear. The early American record is not complicated by the presence of the hand-loom weaver, as a class, and of course is free from the results of the contentions of the hand- and power-loom weavers, and the consequent reactions and fluctuations in wages which in England so trouble the investigators of wages.

The hand-loom weaver of America never earned much over 50 cents per day, if we take the ordinary shirtings as the test; for of this fabric a hand weaver could turn off from 40 to 50 yards per week, for which he received from 5 to 10 cents per yard. These statements I gather from the books of Mr. Samuel Batchelder, a manufacturer, kept by him in 1813, and put into my hands by his son, Mr. John M. Batchelder, of Cambridge, Massachusetts. According to his books weavers were paid for shirtings 5 to 10 cents per yard; sheetings, 12 cents; ginghams, 10 to 12 cents; ticking, 10 cents; the price varying according to the fineness of the fabric.

In 1815, before the power-loom had affected production in this country, the congressional committee on manufactures reported the average wages of cotton-mill operatives, for men, women, and children indiscriminately, at $1 50 per week, or $78 per year. The women and children constituted 66 per cent. of the whole number of persons employed, which was reported to have been 100,000. These statements are not of much value, but they are the first, so far as I am aware, to give the wages of cotton-factory operatives.

The first Lowell factory started operations in 1823. At that time but few spinning-mills were in existence. Few accounts are to be found which give rates of wages, cost, or amount of product. Doubtless many such statements are in existence, but they are rarely obtainable. Through the courtesy of Mr. Edward Atkinson, I have received authentic records of a large number of representative factories, covering the period from 1828 to 1842–'43. These records are manuscript statements regarding various factories, each statement being certified to by the agent or other officer of the corporation. The tabulations from these records, presented herewith, have not been in print before.

For 1828 we have this statement, showing the average wages of girls (women) per week for two of the best known factories in Massachusetts:

Carding	$2 55
Spinning	2 58
Weaving	2 61
Dressing	2 82
Of all	2 62

These were gross wages; that is, board, usually $1 25 per week, was deducted from the weekly pay as given. These rates did not vary much for several years; they were for sheetings and shirtings, No. 14 yarn. The same factory in 1836 paid wages to female operatives per week as follows:

Speeders, etc	$2 44
Drawers	1 87
Warp spinners	2 21
Filling spinners	2 13
Weavers	2 05
Warpers	2 43
Dressers	3 11

Average for all females: highest, August, 1836, $2 53; lowest, May, 1836, $2 19 per week. Same conditions as to board as in 1828. These rates show some falling off after 1830–'31, but this is readily accounted for. When the factories of Lowell made calls for operatives, they made a bid for the best by offering wages in excess of those paid for domestic service, which ranged from 50 cents to $1 per week, including living; the women who went from house to house to spin and weave, or help in making the clothes of the family, could not earn much more than 75 cents per week. There was a widespread feeling that the factory might degrade, and thus a prejudice grew up against it which could not be removed except by wages liberal in comparison to those paid for other services. The financial difficulties of 1837, too, had an influence unfavorable to wages. In 1842–'43 they had not changed much, as will be seen from the following table, giving wages for men and women for a very large number of factories in New England. I have used a number for each establishment instead of the name of the corporation or firm:

	Kind of goods.	No. of yarn.	CARDING.		SPINNING.		WEAVING.		DRESSING.		CLOTH-ROOM.		SHOP.	YARD AND WATCH.	OVERSEERS.
			Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Men.	Men.
			Average wages per day, gross.	Average wages per week, net.	Average wages per day, gross.	Average wages per week, net.	Average wages per day, gross.	Average wages per week, net.	Average wages per day, gross.	Average wages per week, net.	Average wages per day, gross.	Average wages per week, net.	Average wages per day, gross.	Average wages per day, gross.	Average wages per day, gross.
1	Drillings	14	$0 91	$1 41	$1 17	$1 44	$0 99	$1 37	$1 46	$1 63	$0 90 to 1 50	$1 87	$1 26 to 4 00	$1 00 to 2 00	$2 08
2	Drillings	15	92	1 52	1 10	1 39	1 19	1 80	1 19	1 98	1 00 to 2 00	1 62	....	84 to 1 25	2 20
3	Drillings	14, 15	77	1 49	1 10	1 45	1 29	1 31	1 22	1 81	( )	(*)	1 33	94	2 30
4	Drillings, shirtings	14	80	1 41	95	1 11	1 15	1 42	1 56	1 82	1 08	1 50	1 55	1 06	1 94
5	Drillings	14	76	1 42	1 00	1 32	1 36	1 65	1 15	1 63	1 13	1 71	1 33	60 to 1 16	1 88
6	Drillings, shirtings	13, 14	77	1 50	1 10	1 46	1 07	1 91	1 08	1 35	1 20	1 60	1 33	1 00	1 94
7	Drillings	14	87	1 42	1 25	1 41	1 16	1 39	1 40	1 60	1 42	1 75	1 30	1 16	2 00
8	Drillings	14	91	1 42	1 13	1 42	1 11	1 47	1 11	1 79	1 19	1 78	1 47	1 13	2 25
9	Drillings, twilled goods	14	99	1 54	1 23	1 42	1 45	1 58	1 25	1 66	1 12	1 63	1 40	1 15	1 93
10	Sheetings	12½, 14	90	1 42	1 14	1 43	1 10	1 34	1 33	1 78	1 10	1 87	1 64	1 00 to 2 00	2 08
11	Shirtings	14	86	1 42	1 17	1 45	1 04	1 40	1 34	1 60	1 10	1 87	1 64	1 00 to 2 00	2 08
12	Sheetings	14	90	1 57	1 40	1 37	1 26	1 35	1 23	1 72	93	1 51	1 38	1 06	1 97
13	Sheetings, shirtings	14	89	1 87	1 15	1 33	1 50	1 35	1 36	1 96	93	1 51	1 38	1 06	1 97
14	Sheetings	14	74	1 39	1 05	1 30	1 09	1 85	85	1 50	1 25	1 75	1 42	79	1 80
15	Sheetings	14	61	1 53	67	1 20	80	1 59	71	1 64	(†)	(†)	1 25	80	1 87
16	Sheetings	14	80	1 39	82	1 21	1 18	1 40	1 58	1 63	1 08	1 50	1 55	1 06	1 94
17	Sheetings	14	83	1 52	98	1 40	1 25	1 47	1 14	1 63	(*)	....	1 33	94	2 15
18	Sheetings, shirtings, drillings	14, 15	88	1 61	1 29	1 39	1 02	1 51	1 29	1 92	1 00 to 2 00	1 62	....	84 to 1 25	2 37
19	Sheetings	14	90	1 39	1 18	1 37	1 26	1 30	1 27	1 67	1 00	1 75	1 25	1 04	2 00
20	Shirtings	14	88	1 45	1 19	1 39	1 20	1 27	1 42	1 57	1 00	1 75	1 25	1 04	2 00
21	Sheetings	14	89	1 36	1 20	1 40	1 37	1 30	1 36	1 81	1 02	1 75	1 32	1 03	1 95
22	Sheetings, drillings	14	88	1 45	1 01	1 36	1 37	1 62	1 24	1 76	1 29	1 50	1 43	94	1 95
23	Drillings, print cloths, lawns	22	75	1 47	95	1 27	1 28	1 53	1 54	1 99	1 08	1 50	1 55	1 06	1 94
24	Drillings, twilled goods	20	91	1 51	1 23	1 43	1 15	1 71	1 21	1 45	1 12	1 63	1 40	1 15	1 93
25	Print cloths, drillings	22	98	1 44	1 24	1 51	1 22	1 49	1 33	1 85	1 33	1 95	1 15	1 05	2 00
26	Shirtings, drillings, print cloths	24	74	1 44	93	1 39	1 09	2 07	1 19	1 74	1 25	1 75	1 42	79	1 80
27	Print cloths, drillings	24	62	1 54	72	1 20	93	1 72	71	1 61	(†)	(†)	1 25	80	1 87
28	Sheetings, drillings	26	90	1 61	1 22	1 50	1 33	1 73	1 62	2 07	1 33	1 95	1 15	1 05	2 00
29	Print cloths, drillings	30	97	1 50	1 25	1 48	1 33	1 53	1 63	1 73	1 33	1 95	1 15	1 05	2 00
30	Shirtings, print cloths	30	94	1 23	1 41	1 40	1 22	1 50	1 25	1 66	1 02	1 75	1 32	1 03	1 95
31	Sheetings, shirtings	30	87	1 48	1 32	1 38	1 31	1 57	1 63	1 67	1 02	1 75	1 32	1 03	1 95
32	Drillings, sheetings	30	78	1 30	89	1 25	1 04	1 70	84	1 36	(†)	(†)	1 25	80	1 87
33	Drillings, print cloths, sheetings	35, 38	83	1 37	1 03	1 40	1 20	1 88	1 37	1 76	1 13	1 71	1 33	60 to 1 06	1 87
34	Drillings, shirtings	36 to 39	74	1 43	1 26	1 45	96	2 45	1 54	2 02	1 20	1 60	1 33	1 00	1 94
35	Drillings, shirtings	40	91	1 60	1 29	1 54	1 20	1 68	1 37	1 65	1 19	1 78	1 47	1 13	2 25
36	Drillings, print cloths	40	98	1 61	1 16	1 51	1 18	1 69	1 32	1 90	1 19	1 78	1 47	1 13	2 25
37	Print cloths	38	95	1 42	94	1 54	1 37	1 95	1 66	2 01	1 33	1 95	1 15	1 05	2 00
38	Drillings, shirtings, sheetings	22, 36	92	1 53	1 22	1 37	1 24	1 56	1 38	1 77	1 12	1 63	1 40	1 15	1 93
	Averages	....	85	1 47	1 11	1 39	1 19	1 59	1 29	1 73	1 19	1 71	1 43	1 07	2 00

* Four and three-fourths cents per bale.

† Eight mills per hundred weight.

The following elaborate table, giving a record of the progress of wages in the United States from 1840 to 1880, I have compiled from original returns kindly loaned me by Mr. Edward Atkinson. In considering them it should be remembered that the period of 1870–'75 was one of inflated prices, and due allowance should be made. This table, or series of tables, represents the whole country, the variation in different localities being quite marked. Under "Males", second hands and overseers are excluded:

Occupations.	1840.	1850.	1860.	1870.	1875.	1880.
MAINE.						
ESTABLISHMENT No. 1.						
Males.						
Common laborers	......	......	......	$8 76	$9 12	$7 50
Mechanics	......	......	......	11 52	11 94	10 00
Picker tenders	......	......	......	7 00	6 60	5 40
Carders	......	......	......	7 00	6 60	5 40
Spinners	......	......	......	11 16	10 26	9 72
Weavers	......	......	......	......	7 74	6 42
Dresser or slasher tenders	......	......	......	9 66	11 64	9 60
Watchmen	......	......	......	10 00	10 00	10 00
Females.						
Weaving only	......	......	......	6 60	7 38	6 90
All departments, including weaving	......	......	......	5 94	6 42	5 76
NEW HAMPSHIRE.						
ESTABLISHMENT No. 1.						
Males.						
Common laborers	......	......	$6 00	9 78	9 75	7 08
Mechanics	......	......	9 42	12 54	11 96	10 98
Picker tenders	......	......	4 65	6 96	8 46	7 20
Carders	......	......	4 26	7 86	6 72	6 12
Spinners	......	......	4 62	7 02	6 48	6 12
Weavers	......	......	......	......	......	......
Dresser or slasher tenders	......	......	4 64	10 35	11 82	10 00
Yard and watch	......	......	8 16	10 50	11 20	10 99
Females.						
Weaving only	$3 79	$4 71	3 28	5 40	5 75	5 82
All departments, including weaving	3 50	3 40	3 25	5 37	5 41	5 40
ESTABLISHMENT No. 2.						
Males.						
Common laborers	......	......	......	......	......	......
Mechanics	......	......	......	15 25	14 00	12 85
Picker tenders	......	......	......	8 00	7 00	6 60
Carders	......	......	......	8 00	7 00	6 60
Spinners	......	......	......	13 00	10 00	9 00
Weavers	......	......	......	8 00	7 25	6 25
Dresser or slasher tenders	......	......	......	12 00	10 50	10 00
Yard and watch	......	......	......	10 00	9 00	9 00
Females.						
Weaving only	......	......	......	8 00	7 25	6 25
All departments, including weaving	......	......	......	7 25	6 50	5 75
ESTABLISHMENT No. 3.						
*Males.**						
Common laborers	3 00	4 50	5 00	7 00	6 50	6 00
Mechanics	6 00	7 50	9 00	10 50	10 00	9 72
Picker tenders	3 00	4 50	5 00	7 00	6 50	6 00
Carders	2 75	4 25	4 75	6 75	6 25	5 75
Spinners, mule	5 00	6 72	7 50	11 50	11 00	9 60
Weavers	5 00	5 75	6 00	7 00	6 33	6 75
Dresser or slasher tenders	10 00	10 50	10 50	11 00	11 00	10 00
Yard and watch	6 00	7 00	8 00	9 00	9 00	9 00
Females.						
Weaving only	......	......	......	6 00	7 25	7 00
All departments, including weaving	......	......	......	5 34	5 67	5 50
ESTABLISHMENT No. 4.						
Males.						
Common laborers	......	......	6 00	9 00	9 00	7 00
Mechanics	......	......	9 08	11 82	12 54	10 44
Picker tenders and carders	......	......	4 62	7 14	7 50	7 14
Dresser or slasher tenders	......	......	......	......	......	9 57
Yard and watch	......	......	6 00	9 00	9 00	8 10
Females.						
Weaving only	......	......	3 81	4 85	5 02	5 02
All departments, including weaving	......	......	3 56	4 67	4 67	4 44
NEW HAMPSHIRE—Continued.						
ESTABLISHMENT No. 5.						
Males.						
Common laborers	......	$5 00	$6 00	$9 00	$8 25	$7 50
Mechanics	......	8 00	9 00	12 00	11 00	10 50
Picker tenders	......	3 30	5 00	7 50	6 00	5 50
Carders	......	3 75	5 50	8 00	6 00	5 00
Spinners	......	3 24	2 87	5 25	4 80	4 75
Weavers	......	3 71	3 92	6 19	4 92	5 00
Dresser or slasher tenders	......	4 25	4 50	8 00	12 00	10 00
Yard and watch	......	5 00	6 00	8 00	8 00	7 00
Females.						
Weaving only	......	3 71	3 92	6 19	4 92	5 06
All departments, including weaving	......	3 12	3 18	5 46	5 16	4 92
MASSACHUSETTS.						
ESTABLISHMENT No. 1.						
Males.						
Common laborers	......	5 52	4 98	8 40	7 56	6 00
Mechanics	$7 98	8 52	9 00	13 50	12 12	10 62
Picker tenders	4 68	4 80	4 98	9 00	7 80	6 60
Carders	4 50	4 50	4 56	8 28	7 26	6 30
Spinners	......	......	5 58	10 86	10 68	8 88
Dresser or slasher tenders	......	......	......	12 00	11 16	9 30
Yard and watch	6 60	6 36	5 64	8 40	7 02	6 96
Females.						
Weaving only	2 75	3 52	3 73	5 90	5 35	5 33
All departments, including weaving	2 84	3 22	3 26	5 42	5 05	4 88
ESTABLISHMENT No. 2.						
Males.						
Common laborers	......	......	......	10 50	9 00	7 50
Mechanics	......	......	......	14 28	12 48	11 88
Picker tenders	......	......	......	7 50	6 75	5 25
Carders	......	......	......	9 36	7 68	7 20
Spinners	......	......	......	13 40	12 25	12 00
Weavers	......	......	......	13 20	10 56	10 16
Dresser or slasher tenders	......	......	......	15 00	11 52	11 22
Yard and watch	......	......	......	12 00	10 05	9 24
ESTABLISHMENT No. 3.						
Males.						
Common laborers	......	5 52	6 00	9 36	10 02	7 80
Mechanics	......	8 58	8 40	13 83	12 36	11 78
Picker tenders†	6 00	7 02	6 00	9 42	9 06	8 40
Carders	4 50	4 98	4 98	8 04	8 04	7 50
Spinners, mule	2 63	2 58	2 40	8 37	12 30	10 50
Weavers	4 20	6 00	5 68	10 00	9 78	8 07
Dresser or slasher tenders	7 02	9 79	11 04	17 40	12 82	13 30
Dyers	6 25	6 21	6 15	10 29	10 02	8 91
Yard and watch	6 00	6 36	7 00	9 78	9 96	9 60
Females.						
Spinners, frame	......	2 68	3 21	4 23	4 95	3 91
Weaving only	4 61	4 99	4 54	7 48	7 80	7 38
All departments, including weaving	4 11	4 02	3 78	6 36	6 72	6 15
ESTABLISHMENT No. 4.						
Males.						
Common laborers	......	......	......	7 50	6 00	4 80
Mechanics	......	......	......	13 75	12 00	10 50
Picker tenders	......	......	......	7 50	6 00	5 40
Carders	......	......	......	8 75	7 50	6 12
Weavers	......	......	......	8 25	7 00	6 00
Dresser or slasher tenders	......	......	......	15 00	10 90	8 40
Yard and watch	......	......	......	9 00	7 50	6 00
Females.						
Weaving only	......	......	......	7 65	6 50	5 40
All departments, including weaving	......	......	......	6 90	5 18	4 80

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* In the wages for males board is included.

† The wages in first column are for 1848.

Occupations.	1840.	1850.	1860.	1870.	1875.	1880.
MASSACHUSETTS—Continued.						
ESTABLISHMENT No. 5.						
Males.						
Common laborers				$8 10	$8 10	$7 68
Mechanics				13 50	15 00	14 10
Picker tenders				8 52	9 00	9 00
Carders				6 30	5 40	6 30
Spinners, mule				8 52	7 98	9 24
Thread-dresser tenders				12 00	12 00	11 40
Yard and watch				9 00	9 00	9 00
Females.						
Weaving only						
All departments, including weaving				6 00	5 70	6 00
ESTABLISHMENT No. 6.						
Males.						
Common laborers			$5 00	9 00	7 50	7 00
Mechanics			8 70	12 50	12 75	13 00
Picker tenders			3 75	6 75	6 00	6 00
Carders			3 75	6 75	7 00	7 25
Spinners			5 12	8 67	8 50	9 00
Weavers			4 00	8 00	7 75	7 50
Dresser or slasher tenders			5 62	10 92	9 20	8 70
Yard and watch			[illegible] 00	9 00	8 00	8 00
Females.						
Weaving only			3 05	6 50	6 25	5 75
All departments, including weaving			3 00	6 00	5 75	5 20
RHODE ISLAND.						
ESTABLISHMENT No. 1.						
Males.						
Common laborers				7 50	7 25	6 00
Mechanics				11 10	10 80	9 00
Picker tenders					5 75	6 00
Carders					5 50	5 90
Spinners, mule				9 00	8 75	7 95
Weavers				9 00	8 80	7 60
Dresser or slasher tenders				9 60	9 80	8 50
Yard and watch					6 50	6 00
Females.						
Weaving only				6 80	6 55	5 50
All departments, including weaving				6 00	4 60	4 75
ESTABLISHMENT No. 2.						
Males.						
Common laborers *			$8 66		9 00	8 41
Mechanics			12 25	10 60	13 34	12 84
Picker tenders				6 00	6 12	5 25
Carders				7 58	9 00	8 50
Spinners			9 55	9 30	8 61	7 53
Dresser or slasher tendors			12 90	11 59	10 00	9 33
Yard and watch			9 00	8 62	9 33	8 87
Females.						
Weaving only			5 62	6 75	6 05	7 08
All departments, including weaving			5 39	5 89	5 28	6 57
ESTABLISHMENT No. 3.						
Males.						
Common laborers			6 00	8 50	8 25	7 00
Mechanics			9 00	13 00	13 00	11 50
Picker tenders and carders			5 00	8 25	7 00	5 50
Spinners, mule			6 75	10 00	9 75	8 50
Weavers			5 50	8 50	7 00	6 50
Dresser or slasher tenders			11 50	13 50	12 00	12 00
Watchmen			7 50	9 50	11 00	9 75
Females.						
Weaving only			4 25	7 00	6 25	6 75
All departments, including weaving			3 75	6 25	5 75	5 87

Occupations.	1840.	1850.	1860.	1870.	1875.	1880.
CONNECTICUT.						
ESTABLISHMENT No. 1.						
Males.						
Common laborers		$5 00	$6 00	$7 00	$6 00	$6 50
Mechanics				12 75	10 50	12 75
Picker tenders			4 50	7 00	5 50	6 00
Carders			4 50	7 00	6 00	5 50
Spinners, mule			6 30	9 00	8 50	8 50
Weavers			5 50	6 75	6 25	6 75
Slasher tenders				12 00	12 00	11 50
Yard and watch			6 00	9 00	8 00	8 00
Females. †						
Weaving only			4 75	6 25	5 75	6 25
All departments, including weaving			4 13	5 50	5 25	5 75
ESTABLISHMENT No. 2.						
Males.						
Common laborers			6 60	9 00	9 00	7 50
Mechanics			9 00	15 00	15 00	13 50
Picker tenders			5 00	7 50	7 50	7 50
Carders			7 50	7 50	7 50	9 00
Spinners			5 00	9 50	10 50	10 50
Weavers						
Dresser or slasher tenders			7 00	10 80	12 00	12 00
Yard and watch			7 00	10 00	10 00	10 00
INDIANA.						
ESTABLISHMENT No. 1.						
Males.						
Common laborers		6 00	5 40	7 50	6 75	6 00
Mechanics		8 75	10 80	12 66	14 10	11 28
Picker tenders		4 50	5 40	7 86	7 14	6 00
Carders		5 25	6 00	9 06	8 94	7 08
Spinners		2 76	2 64	3 75	3 90	4 50
Weavers		4 46	3 96	3 72	3 63	
Dresser or slasher tenders		8 00	6 00	11 00	10 80	9 00
Yard and watch		6 00	5 40	7 50	6 75	6 00
Females.						
Weaving only		3 00	3 12	3 60	3 90	4 04
All departments, including weaving		2 05	2 88	3 24	3 78	3 78
NORTH CAROLINA.						
ESTABLISHMENT No. 1.						
Males.						
Common laborers ‡		§ 2 50	250 00	2 50	2 50	3 60
Mechanics		4 50	450 00	6 00	6 00	6 00
Picker tenders		2 75	300 00	4 00	4 00	4 50
Carders		3 00	350 00	3 60	3 60	3 00
Spinners		1 25	65 00	2 00	2 00	2 50
Weavers		3 50	68 00	3 50	3 50	
Dresser or slasher tenders				4 50	4 50	
Yard and watch		6 00	100 00	6 00	6 00	6 00
Females.						
Weaving only		3 50	40 00	3 50	3 50	
All other departments, excluding weaving		1 25	68 00	1 50	1 50	2 50
ESTABLISHMENT No. 2.						
Males.						
Common laborers						3 60
Mechanics						6 00
Picker tenders						4 50
Carders						5 00
Spinners						2 50
Weavers						
Dresser or slasher tenders						
Yard and watch						6 00
Females.						
Weaving only						
All departments, including weaving						2 50

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* The wages in third column are for 1865.

† Wages of females estimated.

‡ For 1865, in confederate currency.

§ These wages are for 1852.

Occupations.	1840.	1850.	1860.	1870.	1875.	1880.
NORTH CAROLINA—Continued.						
ESTABLISHMENT No. 3.						
Males.						
Common laborers	$2 25	$3 00	$4 50	$4 50	$3 90	$3 90
Mechanics	6 00	6 00	9 00	10 50	10 50	10 50
Picker tenders	3 00	3 00	5 25	5 25	5 25	4 80
Carders	3 60	3 60	5 25	5 25	5 25	4 80
Dresser or slasher tenders	......	......	......	5 25	5 25	5 25
Yard and watch	3 60	3 60	4 00	4 02	4 02	4 02
Females.						
Weaving only	......	......	......	......	......	......
All departments, including weaving	1 50	1 50	1 50	2 40	2 40	2 40

Occupations.	1840.	1850.	1860.	1870.	1875.	1880.
GEORGIA.						
ESTABLISHMENT No. 1.						
Males.						
Common laborers	......	......	......	......	$6 12	$4 32
Mechanics	......	......	......	......	16 02	12 42
Picker tenders	......	......	......	......	6 48	5 40
Carders	......	......	......	......	6 00	5 40
Spinners	......	......	......	......	3 96	3 12
Weavers	......	......	......	......	5 76	7 20
Dresser or slasher tenders	......	......	......	......	11 25	9 00
Yard and watch	......	......	......	......	7 50	7 00
Females.						
Weaving only	......	......	......	......	7 20	5 76
All departments, including weaving	......	......	......	......	......	......

Last year I published the wages paid in various industries in Massachusetts for the years 1860, 1872, 1878, 1880–'81, giving rates in gold values. From the returns published then I have compiled the following tables, showing average wages in cotton manufactures for the years named. The averages given are drawn from the actual wages paid a large number of operatives of each grade, as shown by the wage-books of the various factories visited:

Occupations.	AVERAGE WEEKLY WAGES; STANDARD, GOLD.				Increase or decrease for 1881, as compared with 1878.
	1860.	1872.	1878.	1881.	
Openers and pickers	$4 76	$7 35	$6 23	$6 67	+$0 44
Openers and pickers, boys	2 57	4 55	3 45	3 45	....
Strippers	4 48	7 00	5 06	6 21	+ 1 15
Grinders	6 51	7 50	7 34	8 42	+ 1 08
Frame-tenders	3 48	5 65	4 47	4 90	+ 43
Drawers	2 33	....	3 70	4 52	+ 82
Railway and alley boys	2 70	....	3 45	4 41	+ 96
Slubbers	3 50	3 30	4 80	5 90	+ 1 10
Overseers of carding	16 70	26 67	18 72	17 80	— 92
Section hands	12 00	....	11 40	10 62	— 78
Second hands	8 00	16 00	10 00	10 18	+ 18
Overseers of spinning	17 70	26 67	19 45	18 06	— 1 39
Second hands	7 00	14 67	8 00	11 71	+ 3 71
Section hands	9 00	....	11 40	10 01	— 1 39
General hands	6 00	....	6 44	5 96	— 48
Young persons	3 46	4 59	3 72	4 11	+ 39
Spare hands	3 45	4 53	4 00	3 77	— 23
Mule spinners	6 33	10 70	7 41	10 09	+ 2 68
Mule spinners, women	....	6 30	4 00	8 52	+ 4 52
Back-boys	2 07	3 68	2 32	2 97	— 65
Doffers	3 00	....	4 65	4 27	— 38
Frame spinners	3 28	....	3 96	5 38	+ 1 42
Frame spinners, boys and girls *	2 68	4 55	3 34	2 95	— 39
Frame spinners, girls	2 37	....	3 52	4 38	+ 86
Frame spinners, boys	....	....	2 70	3 00	+ 30
Ring spinners, overseers	11 52	....	18 00	13 80	— 4 20
Ring spinners, second hands	7 50	....	9 00	10 51	+ 1 51
Ring spinners, third hands	4 00	....	5 50	8 61	+ 3 11
Ring spinners, girls	3 60	....	4 20	4 95	+ 75
Doffers, boys	2 56	4 00	2 80	2 70	— 10
Fly and jack-frame tenders	3 50	....	5 80	7 05	+ 1 25
Reeling and warping, overseers	9 00	14 67	15 00	16 05	+ 1 05
Reeling and warping, second hands	4 50	9 33	9 00	9 44	+ 44
Reeling and warping, spare hands, girls.	2 40	4 48	4 20	4 33	+ 13
Reeling and warping, spoolers	2 62	4 85	3 96	5 21	+ 1 25
Reeling and warping, young persons	$2 53	$4 53	$3 00	$5 10	+$2 10
Beamers	7 35	....	9 25	5 57	— 3 68
Warpers	4 22	5 90	5 30	6 23	+ 93
Dressers	8 19	15 47	11 27	10 23	— 1 04
Dressers, overseers	21 91	21 33	20 40	18 00	— 2 40
Slasher tenders	....	10 00	9 79	7 50	— 2 29
Drawers	4 56	5 64	5 55	5 49	— 06
Drawers, section hands	6 25	10 67	8 34	6 78	— 1 56
Drawers, third hands	6 00	8 80	6 90	6 86	— 04
Drawers, room hands	5 00	....	6 00	8 19	+ 2 19
Twisters, women	4 50	5 33	5 00	5 85	+ 85
Weavers	4 44	....	5 88	6 44	+ 56
Weavers, overseers	17 41	....	20 00	16 39	— 3 61
Weavers, second hands	7 00	....	9 00	10 91	+ 1 91
Weavers, section hands	7 74	10 67	9 71	9 18	— 53
Weavers, spare hands	4 50	6 61	5 25	6 06	+ 81
Weavers, four looms	....	5 78	3 96	5 64	+ 1 68
Weavers, five looms	....	7 81	4 50	5 66	+ 1 16
Weavers, six looms	....	9 50	5 01	6 74	+ 1 73
Weavers, eight looms	....	11 33	6 30	8 23	+ 1 93
Bobbin-boys	4 00	....	4 50	3 78	— 72
Cloth-room overseers	18 10	14 67	17 25	11 50	— 5 75
Cloth-room second hands	7 17	8 64	9 30	10 00	+ 70
Cloth room, men	5 44	8 16	6 45	7 69	+ 1 24
Cloth room, women and boys	4 06	4 80	4 27	5 20	+ 93
Packing room, girls and boys	4 03	....	4 70	5 59	+ 89
Dyers	5 87	8 93	8 13	6 30	— 1 83
Bundlers	6 00	8 69	8 88	8 27	— 61
Overseers of repairs	17 10	17 33	20 00	18 39	— 1 61
Mechanics	8 35	12 16	10 72	13 51	+ 2 79
Mechanics, laborers	5 47	8 72	6 94	7 09	+ 15
Engineers	9 00	....	11 37	17 75	+ 6 38
Firemen	7 09	....	8 33	9 33	+ 1 00
Overseers of yard	11 56	....	16 05	17 37	+ 1 32
Yard hands	5 22	8 76	6 32	7 69	+ 1 37
Watchmen	6 83	....	8 12	9 23	+ 1 11

* Braiders.

Between 1860 and 1878 there was an increase of 19 per cent. in the wages paid in the cotton-mills of Massachusetts; between 1878 and January, 1881, there was an increase of 9.1 per cent. An apparent decrease took place in the wages paid certain overseers. This probably was not as a rule true, but the wages of this class vary very much even in the same locality, rates depending on skill, length of service, etc., and not on market rates.

From an original investigation, conducted in 1880 in the New England states and New York, I am able to give the wages paid in many representative cotton factories, with various collateral facts important in their consideration. This series of tables gives the wages for various grades and kinds of goods. The side numerals indicate the establishment, which by this means can be traced through the tables of products given farther on for the states named, so that wages and products relative to the same factories can be compared.

MAINE.

	Goods manufactured.	PROPORTION OF EMPLOYÉS IN EACH 100.				AVERAGE PAY OF EACH CLASS PER WEEK.				PAY OF SPINNERS PER WEEK.		PAY OF WEAVERS PER WEEK.		PAY OF PIECE WEAVERS PER WEEK.		HOURS OF LABOR.		
		Men.	Women.	Male children.	Female children.	Men.	Women.	Male children.	Female children.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Five days.	Saturday.	Per week.
1	Cotton cloth	30	60	5	5	$8 50	$6 00	$3 00	$2 50	$7 50	$3 00	......	......	$7 68	$5 00	11	11	66
2	Cotton cloth	33	55	7	5	7 50	6 00	2 25	2 25	11 00	9 00	......	......	8 00	5 50	11	11	66
3	Cotton cloth	34	51	11	4	7 00	5 00	3 00	2 00	11 00	8 00	$6 00	$3 00	8 00	3 00	11	11	66
4	Cotton cloth	34	51	11	4	7 00	5 00	3 00	2 00	11 00	8 00	6 00	3 00	8 00	3 00	11	11	66
5	Cotton cloth	29	42	11	18	......	......	......	......	6 00	2 70	......	......	7 15	4 42	11	11	66
6	Cotton cloth and bags	32	56	8	4	7 50	5 00	2 75	2 75	11 00	9 00	4 00	4 00	7 89	5 32	11	11	66
7	Cotton goods	30	55	9	6	7 00	5 50	......	......	11 00	9 35	8 50	4 50	......	......	11	11	66
8	Cotton goods	40	50	6	4	7 00	5 00	2 75	2 75	10 50	9 00	......	......	8 00	5 40	11	11	66
9	Cotton goods, colored	31	64	2	3	7 50	5 50	4 75	3 50	10 50	9 00	6 00	4 50	10 00	5 00	10¾	10¾	64½
10	Print cloths, silesia, and cambrics.	65	25	7	3	8 00	6 00	3 00	3 00	12 00	10 00	......	......	10 00	5 00	11	11	66
11	Sail and overall duck	30	50	15	5	7 50	7 00	3 50	3 00	12 00	10 00	......	......	10 00	5 00	11	11	66
12	Sheetings	40	50	7	3	7 25	7 00	3 00	3 00	10 50	9 50	8 00	5 00	8 00	5 00	11	11	66
13	Sheetings	33	55	7	5	7 25	7 00	2 50	2 50	11 00	9 00	8 00	5 50	8 00	5 50	11	11	66
14	Sheetings	32	56	8	4	7 50	7 00	2 25	2 25	11 00	9 00	8 00	5 75	8 00	5 75	11	11	66
15	Sheetings	33	55	7	5	8 00	7 00	2 25	2 25	11 50	10 00	......	......	8 00	5 50	11	11	66
16	Sheetings, etc	34	51	11	4	7 00	5 00	3 00	2 00	11 00	9 00	6 00	3 00	8 00	4 00	11	11	66
17	Sheetings and shirtings	32	56	8	4	7 25	7 00	2 25	2 25	11 00	9 00	8 00	5 75	8 00	5 75	11	11	66
18	Warps and grain bags	40	50	5	5	7 50	5 40	3 00	3 00	6 00	4 20	......	......	9 00	6 00	11	11	66
19	Warps and grain bags	36	54	6	4	7 50	5 00	3 00	2 90	6 00	4 20	......	......	9 00	6 00	11	11	66

NEW HAMPSHIRE.

	Goods manufactured.	Men.	Women.	Male children.	Female children.	Men.	Women.	Male children.	Female children.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Five days.	Saturday.	Per week.
1	Cotton goods	33	60	7	......	$7 50	$5 40	$2 40	......	$10 00	$8 00	$7 50	$4 00	......	......	10¾	10¾	64½
2	Cotton goods	30	45	12	13	7 50	5 50	3 00	$3 00	10 00	8 00	......	......	$8 00	$5 00	11	9½	64½
3	Cotton goods	31	44	13	12	7 50	5 50	3 00	3 00	10 00	8 00	......	......	8 00	5 00	11	9½	64½
4	Cotton goods	31	55	9	5	7 50	5 30	3 30	3 30	12 00	9 00	8 00	4 25	......	......	10¾	10¾	64½
5	Print cloths	40	40	12	8	7 00	5 50	50	50	11 00	9 00	8 50	4 25	......	......	11⅓	11⅓	69
6	Yarns and fine sheetings	33	34	17	16	7 50	5 50	3 00	3 00	6 50	6 50	......	......	8 00	5 00	11½	11½	69

MASSACHUSETTS.

	Goods manufactured.	Men.	Women.	Male children.	Female children.	Men.	Women.	Male children.	Female children.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Five days.	Saturday.	Per week.
1	Cottonades	35	45	10	10	$8 00	$5 50	$2 50	$2 50	$10 00	$4 86	......	......	$10 00	$3 50	10	10	60
2	Cotton cloth	46	30	14	10	10 49	6 92	3 25	4 16	11 41	11 08	$10 18	$7 62	23 10	......	10	10	60
3	Cotton cloth	15	70	10	5	6 00	5 00	2 50	2 50	8 50	3 50	8 50	4 20	......	......	10	10	60
4	Cotton cloth	30	60	5	5	7 92	5 25	2 50	2 50	6 00	3 50	8 00	4 00	......	......	10	10	60
5	Cotton cloth	35	65	......	......	9 00	6 00	4 50	4 00	9 00	3 00	10 00	4 50	......	......	10	10	60
6	Cotton cloth	45	44	5	6	......	......	......	......	11 42	......	10 62	2 70	......	......	10	10	60
7	Cotton goods	24	63	6	7	7 92	4 98	2 28	2 28	11 01	9 60	......	......	9 70	3 50	10	10	60
8	Cotton goods	36	44	12	8	7 00	5 00	3 50	3 00	10 00	5 00	7 50	4 50	......	......	10	10	60
9	Cotton goods	45	45	5	5	7 00	4 50	4 00	3 00	10 00	5 00	7 00	4 00	......	......	10	10	60
10	Cotton goods	33	57	5	5	7 50	5 00	3 00	3 00	9 00	8 00	6 00	4 50	......	......	10	10	60
11	Cotton goods	20	30	30	20	9 41	5 84	3 83	3 02	9 50	7 25	10 71	5 81	......	......	10½	7½	60
12	Cotton goods	29	71	......	......	7 50	4 86	......	......	11 70	10 08	8 00	4 00	......	......	10¼	8¾	60
13	Cotton goods	36	44	10	10	9 50	6 00	3 50	3 50	12 00	8 00	11 00	7 50	......	......	10½	7½	60
14	Cotton goods	13	38	25	24	7 50	6 00	3 00	2 75	......	......	......	......	......	......	10	10	60
15	Cotton goods	25	50	11	14	7 50	4 50	3 00	3 00	10 00	9 00	7 20	4 50	......	......	10	10	60
16	Cotton goods and hosiery	26	40	16	18	7 75	6 00	3 50	3 50	9 00	6 60	......	......	9 00	3 60	10	10	60
17	Prints	25	55	12	8	9 00	5 00	2 50	2 50	9 60	8 40	9 00	4 50	9 00	4 50	10	10	60
18	Cotton and worsted goods	43	47	5	5	8 00	6 00	3 00	2 40	12 00	5 40	11 00	7 00	......	......	10	10	60
19	Cotton duck and yarn	25	10	30	35	11 00	7 00	4 00	4 50	4 20	3 65	10 00	4 00	......	......	10	10	60
20	Cotton flannel	35	45	10	10	7 50	5 50	2 50	2 50	......	......	9 00	3 50	9 00	3 50	10	10	60
21	Ginghams	10	70	8	12	......	......	......	......	10 00	7 50	10 00	6 00	......	......	10	10	60
22	Print cloths	35	45	10	10	10 00	7 50	2 67	3 75	13 36	10 25	10 08	5 04	......	......	10	10	60
23	Print cloths	35	45	10	10	......	......	......	......	11 50	9 00	......	......	10 08	5 00	10	10	60
24	Print cloths	35	48	12	5	7 00	5 00	2 50	2 50	9 00	7 00	7 00	4 00	......	......	10	10	60
25	Print cloths	33	50	12	5	8 00	5 00	2 50	2 50	10 00	7 00	8 00	4 00	......	......	10	10	60
26	Print cloths	32	41	13	14	......	......	......	......	......	......	......	......	......	......	10	10	60
27	Print cloths	36	44	12	8	10 25	6 50	3 67	4 00	13 25	10 00	......	......	11 08	7 62	10½	7½	60
28	Print cloths	34	49	15	2	......	......	......	......	10 62	9 70	......	......	9 52	6 20	10	10	60
29	Print cloths	35	45	10	10	......	......	......	......	11 86	10 43	8 00	5 50	......	......	10	10	60
30	Sheetings, shirtings, etc	......	......	......	......	......	......	......	......	9 30	7 20	7 50	5 30	......	......	10	10	60
31	Sheetings, silesias, and fancy cottons.	15	75	6	4	8 00	7 00	3 00	3 00	9 00	4 50	8 25	6 00	9 50	7 00	10	10	60
32	Towels and cotton duck	30	60	5	5	9 00	6 00	3 50	3 50	6 00	3 50	7 00	4 00	......	......	10	10	60

RHODE ISLAND.

	Goods manufactured.	Proportion of employés in each 100.				Average pay of each class per week.				Pay of spinners per week.		Pay of weavers per week.		Pay of piece weavers per week.		Hours of labor.		
		Men.	Women.	Male children.	Female children.	Men.	Women.	Male children.	Female children.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Five days.	Saturday.	Per week.
1	Cotton goods	24	60	10	6	$9 00	$6 72	$4 00	$3 00	$8 50	$6 00	$9 00	$6 00	......	......	11	11	66
2	Cotton goods	24	60	10	6	9 00	6 72	4 00	3 00	8 50	6 00	9 00	6 00	......	......	10½	10½	63
3	Cotton goods	32	47	9	12	7 50	6 50	3 00	3 00	10 00	8 00	......	......	$9 25	$4 62	11	11	66
4	Cotton goods	25	61	9	5	10 00	7 00	3 50	3 00	10 30	8 00	9 00	4 50	......	......	11	11	66
5	Cotton goods	25	61	9	5	10 00	7 00	3 50	3 00	10 30	8 00	9 00	4 50	......	......	11	11	66
6	Yarns	30	30	10	30	8 00	5 75	3 00	3 00	9 50	8 50	......	......	......	......	11	11	66
7	Yarns	34	48	9	9	10 00	6 00	3 60	3 60	10 00	9 60	......	......	......	......	11	11	66
8	Yarns	10	80	......	10	9 00	6 00	......	2 50	5 50	4 00	......	......	......	......	11	11	66
9	Spool thread, yarns, etc	32	53	8	7	9 00	6 00	3 50	3 00	12 00	12 00	......	......	......	......	11	11	66
10	Spool thread, yarns, and knitting cotton.	20	50	10	20	......	......	......	......	8 00	8 00	......	......	......	......	11	11	66
11	Wadding, batting, and wiping waste.	90	5	5	......	9 00	6 00	5 00	......	......	......	......	......	......	......	10½	10½	63

CONNECTICUT.

	Goods manufactured.	Men.	Women.	Male children.	Female children.	Men.	Women.	Male children.	Female children.	Spinners highest.	Spinners lowest.	Weavers highest.	Weavers lowest.	Piece weavers highest.	Piece weavers lowest.	Five days.	Saturday.	Per week.
1	Fine cotton goods	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
2	Cotton duck	21	50	11	18	$7 20	$5 70	$3 30	$3 30	......	......	......	......	$9 00	$4 50	11	5	60
3	Cotton duck	......	......	......	......	......	......	......	......	......	......	......	......	6 00	4 00	11¼	9¾	66
4	Duck	100	......	......	......	7 50	......	......	......	......	......	$5 40	......	......	......	12	9	69
5	Cotton duck and sail twine	43	47	7	3	7 50	5 00	4 00	4 00	......	......	6 00	......	......	......	12	9	69
6	Ginghams and dress goods	44	34	14	8	8 50	6 00	3 60	3 60	$9 12	$6 75	......	......	10 80	4 68	11½	8½	66
7	Ginghams and dress goods	44	40	14	2	9 50	7 00	4 08	3 54	12 00	9 00	......	......	8 82	6 00	11	11	66
8	Hosiery yarn	63	22	15	......	10 08	6 00	4 00	......	11 00	9 00	......	......	......	......	12	9	69
9	Cottons, mosquito nettings, etc.	33	33	22	12	9 00	6 50	3 00	2 75	12 00	10 00	......	......	14 00	7 00	11¼	8¾	65
10	Print goods	50	25	13	12	6 00	5 50	3 00	3 00	11 50	8 00	......	......	10 00	4 50	11½	8½	66
11	Print goods	30	55	5	10	7 00	5 00	3 00	3 00	8 00	6 00	......	......	7 00	4 00	12	9	69
12	Print goods	60	25	5	10	7 50	6 36	2 30	2 50	7 92	7 50	......	......	8 00	4 00	12	9	69
13	Print cloths	45	38	9	8	7 32	6 00	3 25	2 85	7 20	......	......	......	6 55	5 25	12	9	69
14	Print cloths	......	......	......	......	7 02	5 50	2 50	2 50	6 60	......	......	......	9 00	4 00	12	9	69
15	Print cloths	33	33	17	17	7 50	6 00	3 00	3 50	8 00	7 50	......	......	12 00	4 00	11½	8½	66
16	Prints, sheetings, etc	30	60	7	3	8 00	5 50	2 25	3 00	9 00	8 00	......	......	6 50	5 40	12	9	69
17	Patent hard-laid twine	26	42	16	16	7 00	4 50	3 00	3 00	......	......	......	......	......	......	12	9	69
18	Seine twine	41	25	17	17	6 00	4 00	3 00	3 50	......	......	......	......	......	......	12	9	69
19	Seine twine and welting cord	22	72	6	......	6 00	4 50	3 50	......	......	......	......	......	......	......	12	9	69
20	Cotton seine twine	38	44	9	9	7 62	4 50	4 00	4 00	......	......	......	......	......	......	12	9	69
21	Cotton seine twine and netting	35	45	15	5	8 60	5 00	4 14	4 13	5 00	4 25	......	......	6 50	5 00	12	9	69
22	Sheetings	......	......	......	......	7 20	4 75	2 50	2 50	8 04	7 56	......	......	9 24	3 75	12	9	69
23	Sheetings	34	40	15	11	7 00	5 00	2 50	2 00	9 00	4 50	......	......	7 00	4 00	11	11	66
24	Sheetings	25	25	25	25	7 50	6 00	3 00	3 00	9 00	6 00	......	......	9 00	4 50	11	11	66
25	Sheetings	53	42	5	......	7 00	6 00	2 50	......	8 00	6 50	......	......	7 00	5 00	12	9	69
26	Sheetings	33	28	25	14	6 30	5 00	2 62	2 50	9 37	7 75	......	......	9 00	4 00	12	9	69
27	Light sheetings	36	34	17	13	8 10	5 10	3 00	4 00	9 50	8 00	......	......	8 00	4 00	11	11	66
28	Sheetings and print goods	43	36	11	10	8 52	5 40	3 00	3 60	11 24	9 14	......	......	7 58	5 77	11½	9	66½
29	Sheetings and drills	31	24	23	22	7 50	5 50	3 00	3 00	8 00	6 00	......	......	6 50	4 00	11½	8½	66
30	Cheviot shirtings, and blue and brown denims.	29	54	11	6	9 00	5 33	4 50	3 75	......	......	......	......	12 17	7 50	12	9	69
31	Fine shirtings, white vestings, etc.	29	21	33	17	6 75	5 75	4 25	3 25	9 80	8 10	6 50	$5 00	7 80	5 50	11	11	66
32	Spool cotton	40	50	6	4	9 00	7 00	5 00	4 00	14 00	6 00	......	......	......	......	10¾	6¼	60
33	Cotton tickings, blue drills, and shirting stripes.	28	56	6	10	9 00	5 00	4 00	3 50	10 00	7 50	......	......	8 00	3 00	11½	8½	66
34	Various kinds of cotton cloths.	40	34	15	11	7 25	5 75	2 75	2 50	8 35	7 12	......	......	8 50	5 00	12	12	72
35	Various kinds of fine cotton goods.	40	37	13	10	7 00	6 00	2 26	2 26	8 24	7 50	......	......	9 00	4 00	11½	8½	66
36	Cotton warps	50	44	3	3	10 50	5 00	3 00	3 60	......	......	......	......	......	......	11½	8½	66
37	Cotton warps	27	49	22	2	6 78	5 20	3 22	3 00	6 00	3 00	......	......	......	......	12	9	69
38	Cotton warps	50	25	12	13	9 00	4 80	5 10	4 50	6 00	......	......	......	......	......	15	15	90
39	Cotton warps and yarns	33	27	20	20	6 00	4 50	4 00	3 00	......	......	......	......	......	......	11¼	8½	66
40	Yarns	20	50	25	5	7 50	4 50	4 00	4 50	......	......	......	......	......	......	12	9	69
41	Cotton yarns	27	24	26	23	7 00	5 00	2 50	3 00	8 00	7 00	......	......	......	......	12	9	69

NEW YORK.

	Goods manufactured.	PROPORTION OF EMPLOYÉS IN EACH 100.				AVERAGE PAY OF EACH CLASS PER WEEK.				PAY OF SPINNERS PER WEEK.		PAY OF WEAVERS PER WEEK.		PAY OF PIECE WEAVERS PER WEEK.		HOURS OF LABOR.		
		Men.	Women.	Male children.	Female children.	Men.	Women.	Male children.	Female children.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Five days.	Saturday.	Per week.
1	Cotton goods	23	44	11	22	$8 16	$6 30	$3 42	$3 30	$11 62	$8 25	......	......	$9 98	$5 00	11	8½	63½
2	Fine shirtings and broad sheetings.	19	57	9	15	8 25	5 16	2 22	2 60	10 08	9 68	......	......	6 57	4 91	11⅙	10⅙	66
3	Knit underwear	40	60	......	......	6 50	4 00	......	......	5 75	4 00	......	......	3 50	3 50	11¼	9¾	66
4	Knit underwear	35	43	10	12	8 00	6 00	3 50	3 00	12 00	8 50	......	......	......	......	11½	8½	66
5	Knit underwear	34	56	5	5	6 00	6 00	3 00	3 00	8 22	5 00	......	......	6 00	4 00	11½	9	66½
6	Print cloths	26	57	14	3	7 13	4 45	2 80	3 25	9 60	5 64	......	......	6 96	3 73	11¼	9¾	66
7	Print cloths	33	38	22	7	5 60	4 00	2 87	3 17	4 50	3 25	......	......	5 25	2 66	12½	9½	72
8	Print cloths	41	43	10	6	6 76	5 18	2 30	2 93	9 00	6 00	......	......	7 44	3 38	11½	8½	66
9	Print cloths	21	35	18	26	6 90	4 22	2 23	2 60	6 20	5 00	......	......	6 70	4 50	11½	8½	66
10	Print cloths	31	41	16	12	6 73	5 03	2 50	2 71	4 68	3 56	......	......	6 65	3 60	11½	8½	66
11	Print cloths	20	47	18	15	9 75	5 00	2 83	2 50	10 00	5 10	......	......	6 75	5 00	11	11	66
12	Print cloths	30	46	15	9	7 01	4 95	2 90	3 36	......	......	......	......	6 78	4 38	11¼	9¾	66
13	Print cloths and cheese bandages.	41	46	11	2	4 87	4 22	2 95	4 00	4 80	3 00	......	......	5 78	4 25	12½	10	72½
14	Sheetings and denims	34	44	15	7	7 00	4 80	2 53	2 72	8 02	7 03	......	......	7 23	4 31	11¼	9¾	66
15	Sheetings	36	36	22	6	7 10	4 50	2 89	3 12	8 00	......	......	......	7 10	4 02	11½	8½	66
16	Sheetings	33	50	10	7	7 00	4 71	2 26	3 10	7 50	4 15	......	......	5 40	4 26	11⅓	9⅓	66
17	Sheetings	25	49	10	16	7 44	5 21	2 62	2 71	3 36	2 52	......	......	6 84	5 70	11⅓	9⅓	66
18	Light sheetings	45	44	9	2	5 18	3 90	2 39	3 48	4 11	3 30	......	......	6 16	2 51	12½	10	72½
19	Light sheetings	18	57	17	8	8 24	5 66	2 65	2 62½	8 60	8 10	......	......	6 96	4 55	11½	8½	66

These tables complete the wage exhibits for America. With all the facts obtainable for Great Britain and America, as presented herewith, covering the whole period during which the factory system has influenced wages, there seems but little necessity for extended analysis, yet a few points of value may be added. I realize the truth of a saying by Mr. G. R. Porter, one of England's best-known statisticians, that "no one, unless he shall have made the attempt to obtain information as to the rate of wages, can be aware of the difficulties opposed to his success". I am content, therefore, to state the facts, carefully compared and corroborated as far as possible, and leave the general treatment of them to other hands.

In England, in 1832, the men employed in the cotton trade constituted 29 per cent. of the whole number of persons employed; the women, 31 per cent.; the children, 40 per cent. In 1850 the proportion of men was 36 per cent.; of women, 56 per cent.; of children, 8 per cent. In 1868, of men, 30 per cent.; of women, 58 per cent.; of children, 12 per cent. I believe these last proportions hold very nearly the same at the present time. The proportion of men employed has not changed much since 1832; that of women has increased from 31 to 56 per cent.; while for children it has decreased from 40 to 12 per cent. The hours of labor have been reduced from twelve and one-half and thirteen per day to nine and one-half. An examination of the British tables will convince one that for most divisions of labor in cotton factories wages have very nearly doubled during the past half century.

For America, the proportions of men, women, and children employed cannot be stated for periods prior to 1870. For 1850 the males employed were 36 per cent. of the whole number, and the females 64 per cent.; for 1860 the males were 38+ per cent. and the females 61+ per cent. of the whole number. In 1870 the men constituted 31+ per cent., the women 51+ per cent., and the children 17+ per cent. of the whole number employed. In 1880 the men (males fifteen years of age and over) constituted 34 per cent., women (females sixteen years of age and over) 49 per cent., and children 17 per cent. of the whole. The proportions for 1870 and 1880 were very nearly alike. It is gratifying to know that the number of children employed does not increase in either country considered. The hours of labor have been reduced in this country, but not uniformly in all the states; but where they were formerly thirteen or fourteen hours per day they are now ten or eleven. The last table shows the difference in working time for New England and New York. It is true that, where ten hours prevail, not only wages but production per person equal if they do not exceed the rates and quantities in states where longer hours constitute a day's work.

The factory system has reduced the hours of labor; wages have about doubled in the United States during the past fifty years. In 1828 the average weekly wages of girls (women), as shown, were $2 62; now they are $4 84. The consideration of most of the specific divisions of labor which can be compared will demonstrate the truth of this conclusion. In many cases wages have more than doubled, but from the data no general average can be deduced.

In 1860 the average yearly wages for all, men, women, and children, was $196+; in 1880 it was $244—. The average for 1880 varies for different parts of the United States, it being $258 42 in Massachusetts, $255 77 for the eastern states generally, $235 19 for the middle states, $168 59 for the southern states, and $216 91 for the western states. A brief consideration of the effect the factory system has had upon prices and production, so far as this country is concerned, will answer all the purpose of a wider study. While wages have doubled during the real factory period, the past fifty years, the prices of goods have been decreased in greater proportion, as will be seen by the following table:

Year.	Price of heavy sheetings, per yard, in cents.	Price of printed calicoes, per yard, in cents.	Price of raw cotton, per pound, in cents.
1816	30	....	30
1819	21	....	$22\frac{3}{5}$
1826	13	22	$13\frac{3}{10}$
1829	$8\frac{1}{2}$	17	$10\frac{3}{5}$
1843	$6\frac{1}{2}$	12	$7\frac{1}{2}$
1845	7	11	6
1850	7	$9\frac{1}{4}$	$12\frac{1}{2}$
1855	$7\frac{3}{4}$	....	$10\frac{3}{4}$
1860	$8\frac{3}{10}$	....	$13\frac{1}{4}$
1870	$10\frac{4}{5}$	13	$14\frac{1}{2}$
1872	$13\frac{3}{4}$	15	19
1878	$7\frac{1}{2}$	6	11
1880	$7\frac{1}{2}$	7	$12\frac{1}{2}$

It will be observed that the prices of cloth fell faster than the price of cotton. The above table illustrates in a simple way the course of all prices under the factory system.

As to cost of production, a single illustration will suffice: The ratio of cost per pound, for labor, of common cotton cloth for the years 1828 and 1880, was as 6.77 to 3.31; wages being as 2.62 to 4.84. As to production, many facts can be given, although the data relative to hand work is fast passing from the region of positive personal knowledge. For this reason I have taken great pains to verify the statements which have been made to me.

A fair adult hand-loom weaver can weave from 42 to 48 yards of common shirting per week; from the six power-looms which the weaver in a factory would attend the product would be about 1,500 yards. On the hand-wheel (one spindle) a spinner can turn off 8 ounces of No. 10 cloth yarn in ten hours, or 3 pounds per week; the mule spinner about 3,000 pounds. The increase in the production of the most approved kind of spindles in 1880 over the production of those of ten or fifteen years ago is estimated by many careful manufacturers to be at least 20 per cent., and the estimate is usually the same for the production of the best looms of to-day over those of a score of years ago. I know of no systematic attempt to classify the production of looms and spindles on any extensive scale in the past. The results, therefore, of an original investigation in 1880 will be of value to the statistician. The following series of tables shows the product of looms and spindles in 1880 in the eastern states and New York:

MAINE.

	Goods manufactured.	Product of one hundred looms per week.	Number of looms attended by each weaver.	Steam or water power.	Product of one hundred spinners per week.	Hours of labor per week.
1	Cotton cloth	16, 500 yards.	4 to 6	Steam	60, 000 pounds.	66
2	Cotton cloth	20, 000 yards.	Mostly 5	Water	No. 33 yarn, 180, 000 pounds.	66
3	Cotton cloth	18, 000 yards.	4 to 6	Water	....	66
4	Cotton cloth	18, 000 yards.	4 to 6	Water	....	66
5	Cotton cloth	21, 194 yards.	6	Water	48, 737 pounds.	66
6	Cotton cloth and bags	40 inches, 17, 346 yards.	4 to 6	Water	....	66
7	Cotton goods	17, 000 yards.	4 to 6	Water	No. 39 yarn, 87, 500 pounds.	66
8	Cotton goods	16, 000 yards.	4 to 5	Water	90, 000 pounds.	66
9	Cotton goods, colored	22, 500 yards	2, 3, and 4	Both	....	$64\frac{1}{2}$
10	Print cloths and silesia cambrics	11, 406 to 23, 400 yards.	Average, 5	Water	110, 000 pounds.	66
11	Sail and overall duck	Sail cloth, 35, 000 yards. Overall duck, 25, 000 yards.	2 to 4	Water	50, 000 pounds.	66
12	Sheetings	No. 33 yarn, 15, 600 yards.	4 to 6	Both	No. 38 yarn, 90, 000 pounds.	66
13	Sheetings	18, 000 yards.	4 to 6	Water	160, 000 pounds.	66
14	Sheetings	20, 000 to 24, 000 yards.	5 to 6	Water	No. 23 yarn, 200, 000 pounds.	66
15	Sheetings	15, 000 yards.	4 to 6	Water	No. 33 yarn, 160, 000 pounds.	66
16	Sheetings, etc	18, 000 yards.	4 to 6	Water	....	66
17	Sheetings and shirtings	21, 000 yards.	4 to 6	Water	No. 23 yarn, 200, 000 pounds.	66
18	Warps and grain bags	30, 000 bags.	4	Water	....	66
19	Warps and grain bags	30, 000 bags.	4	Water	....	66

NEW HAMPSHIRE.

	Goods manufactured.	Product of one hundred looms per week.	Number of looms attended by each weaver.	Steam or water power.	Product of one hundred spinners per week.	Hours of labor per week.
1	Cotton goods	13,000 to 14,000 yards.	4 to 5	Water		64½
2	Cotton goods	19,500 yards.	6	Water		64½
3	Cotton goods	19,500 yards.	Average, 6	Water		64½
4	Cotton goods	17,000 to 21,000 yards.	4 to 6	Water		64½
5	Print cloths	27,900 yards.	4 to 8	Both	No. 37.30, 87,000 pounds.	69
6	Yarns and fine sheetings	18,000 yards.	4 to 6	Water		69

MASSACHUSETTS.

	Goods manufactured.	Product of one hundred looms per week.	Number of looms attended by each weaver.	Steam or water power.	Product of one hundred spinners per week.	Hours of labor per week.
1	Cottonades	¾ goods, 18,900 yards.	3 to 4	Both		60
2	Cotton cloth	64 × 64, 24,887 yards.	6 to 8	Steam	No. 33 yarn, av. 100,000 pounds.	60
3	Cotton cloth	17,850 yards.	4 to 8	Steam	No. 39 yarn, 70,000 pounds.	60
4	Cotton cloth	23,800 yards.	4 to 8	Steam	No. 39 yarn, 70,000 pounds.	60
5	Cotton cloth	20,250 yards.	2 to 4	Both		60
6	Cotton cloth		4 to 6	Steam	No. 64 yarn, 31,840 pounds.	60
7	Cotton goods		3 to 8	Both		60
8	Cotton goods			Steam		60
9	Cotton goods	27.50 yarn, 19,500 yards.	4 to 6	Steam	27.50 yarn, 120,000 pounds.	60
10	Cotton goods	From 19,800 to 27,000 yards.	4 to 6	Both	No. 5 to 36, 70,000 to 200,000 pounds; very coarse, 400,000 pounds.	60
11	Cotton goods	20,745 yards.	4 to 8	Both	77,100 pounds.	60
12	Cotton goods	17½ yarn, 24,000 yards.	4 to 6	Both	17½ yarn, 140,000 pounds.	60
13	Cotton goods		6 to 8	Steam		60
14	Cotton goods	20,000 yards.	4 to 8	Both		60
15	Cotton goods	28 inches, 19,000 yards.	4 to 8	Both	29¼ yarn, 25,000 pounds.	60
16	Cotton goods and hosiery	36-inch sheeting, 17,000 yards.	4 to 6	Both	24 yarn, 200,000 pounds.	60
17	Cotton prints	23,000 yards.	4 to 6	Both	115,000 pounds.	60
18	Cotton and worsted goods	Cotton, 32,800 yards. Worsted, 18,000 yards.	2, 3, and 4	Both		60
19	Duck and yarn	47,120 yards.	Average, 3	Steam		60
20	Flannels, cotton	From ⅜ to ⅞, 19,000 yards.	Average, 4	Steam		60
21	Ginghams	17,300 yards.	3	Both		60
22	Print cloths	23,756 yards.	Average, 6	Steam	120,000 pounds.	60
23	Print cloths	26,245 yards.	Average, 6	Steam	110,000 pounds.	60
24	Print cloths		Average, 6	Both		60
25	Print cloths	22,500 yards.	4 to 8; mostly 6	Both		60
26	Print cloths	3,500 pounds.	6 to 8	Steam	113,000 pounds.	60
27	Print cloths	26,700 yards.	6 to 8	Steam	100,000 pounds.	60
28	Print cloths		6 to 8	Steam	100,000 pounds.	60
29	Print cloths	24,500 yards.	Average, 6	Steam	110,000 pounds.	60
30	Sheetings, shirtings, etc	26,400 yards.	5 to 6	Both	No. 5 to 20 coarse, 250,000 pounds.	60
31	Sheetings, silesias, and fancy cottons	3,300 pounds.	3 to 6	Steam	Mule spinners, 78,600 pounds; frame or ring spinners, 72,222 pounds.	60
32	Towels and duck	Duck, 30,000 yards.	5	Both		60

RHODE ISLAND.

	Goods manufactured.	Product of one hundred looms per week.	Number of looms attended by each weaver.	Steam or water power.	Product of one hundred spinners per week.	Hours of labor per week.
1	Cotton goods	No. 34 yarn, 18,000 yards.	4 to 6	Both	No. 34 yarn, 118,000 pounds.	66
2	Cotton goods	No. 34 yarn, 18,000 yards.	Average, 5	Both	No. 34 yarn, 118,000 pounds.	63
3	Cotton goods	24,700 yards.	4 to 8	Mostly water	No. 38 yarn, 95,000 pounds.	66
4	Cotton goods	No. 36 yarn, 17,700 yards.	4 to 6	Both	No. 34 yarn, 117,900 pounds.	66
5	Cotton goods	No. 36 yarn, 17,700 yards.	4 to 6	Both	No. 34 yarn, 117,900 pounds.	66
6	Yarns			Both	Estimate, 160,000 pounds.	66
7	Yarns			Both		66
8	Yarns			Water		66
9	Yarns and spool thread			Steam	No. 40 yarn, 92,200 pounds.	66
10	Yarns, spool thread, and knitting cotton			Steam	115,000 pounds.	66
11	Wadding, batting, and wiping waste			Steam		63

CONNECTICUT.

	Goods manufactured.	Product of one hundred looms per week.	Number of looms attended by each weaver.	Steam or water power.	Product of one hundred spinners per week.	Hours of labor per week.
1	Cotton goods					
2	Duck		1 to 6	Water		60
3	Duck		1 to 2	Water		66
4	Duck		2	Water		69
5	Duck and sail twine			Water		69
6	Ginghams and dress goods	27 inches, 19,800 yards.	4 to 6	Both	100,000 pounds.	66
7	Ginghams and dress goods		3 to 4	Both		66
8	Hosiery yarn			Both		69
9	Mosquito netting, etc., cotton		3 to 6	Water		65
10	Print goods	25,800 yards.	4 to 8	Both		66
11	Print goods	27,850 yards.	4 to 6	Water	90,000 pounds.	69
12	Print goods	24,000 yards.	4 to 8	Both	No. 36 yarn, 60,000 pounds.	69
13	Print cloth	23,000 yards.	5 to 8	Both		69
14	Print cloth	23,077 yards.	4 to 8	Both		69
15	Print cloth	21,000 yards.	4 to 10	Water	No. 37 yarn, 70,000 pounds.	66
16	Prints, sheetings, etc	30,300 yards.	5 and 6	Both	No. 22 yarn, 144,000 pounds.	69
17	Patent hard-laid twine			Water		69
18	Seine twine			Water		69
19	Seine twine and welting cord					69
20	Seine twine, cotton			Water		69
21	Seine twine and netting cord			Water		69
22	Sheetings	24,000 yards.	4 to 8	Water	131,400 pounds.	69
23	Sheetings	20,000 yards.	4, 5, and 6	Water	No. 33 yarn, 124,400 pounds. No. 43 yarn, 82,000 pounds.	66
24	Sheetings	17,000 yards.	4 to 6	Water		66
25	Sheetings	38½ inches, 33,000 yards.	4 to 6	Both	120,000 pounds.	69
26	Sheetings, etc	38½ inches, 22,200 yards.	4 to 8	Both	No. 54 yarn, 50,000 pounds. No. 43½ yarn, 80,000 pounds.	69
27	Sheetings, light	22,000 yards.	4, 5, and 6	Both	No. 45 yarn, 70,000 pounds. No. 34 yarn, 80,000 pounds.	66
28	Sheetings and print goods	38 inches, 18,360 yards. 28 inches, 16,100 yards.	4 to 8	Water	78,300 pounds. 126,100 pounds.	66½
29	Sheetings and drills	30,000 yards.	4 to 6	Both		66
30	Shirtings, cheviot, and denims	32,400 yards.	4 to 6	Both		69
31	Shirtings, white vestings, etc	18,600 yards.	5	Mostly water		66
32	Spool cotton			Both		60
33	Ticking, blue drills, and shirting stripes, cotton.		3 and 4	Water		66
34	Various kinds of cotton cloths		4, 5, and 6	Both	No. 40 yarn, 84,000 pounds.	72
35	Various kinds of fine cotton goods	24,000 yards.	4 to 6	Water	No. 45 yarn, 56,700 pounds.	66
36	Warp, cotton			Water		66
37	Warp, cotton			Both		69
38	Warp, cotton			Water		
39	Warp and yarns, cotton			Water		66
40	Yarn (for carpets)			Water		69
41	Yarns, cotton				No. 36 yarn, 65,000 pounds.	69

NEW YORK.

	Goods manufactured.	Product of one hundred looms per week.	Number of looms attended by each weaver.	Steam or water power.	Product of one hundred spinners per week.	Hours of labor per week.
1	Cotton goods	Print cloths, 25,800 yards. Fine shirtings, 18,000 yards.	3 to 6	Water	Short mules, 62,500 pounds. Long mules, 80,000 pounds.	63½
2	Fine sheetings and shirtings	No. 32 yarn, 40 inches, 10,000 yards.	4	Steam	No. 35 yarn, 81,000 pounds. No. 21 yarn, 130,000 pounds.	66
3	Knit underwear			Both	150,000 to 180,000 pounds.	66
4	Knit underwear			Both	150,000 pounds.	66
5	Knit underwear			Both	105,000 pounds.	66½
6	Print cloths	30,000 yards.	4 to 6	Both	51,100 pounds.	66
7	Print cloths	22,000 yards.	4 to 6	Both		72
8	Print cloths	25,080 yards.	4 to 6	Steam	No. 28½ yarn, 80,000 pounds. No. 39½ yarn, 75,000 pounds.	66
9	Print cloths	22,000 yards.	4 to 6	Water	No. 36 yarn, 72,500 pounds.	66
10	Print cloths	26,400 yards.	4 to 6	Both		66
11	Print cloths		4 to 6	Water	No. 40 yarn, 83,700 pounds.	66
12	Print cloths	27,000 yards.	3, 4, and 5	Water	No. 42 yarn, 60,000 pounds.	66
13	Print cloths and cheese bandages	25,500 yards.	4 to 6	Water		72½
14	Sheetings and denims	24,000 yards.	3, 4, and 5	Water	No. 19 yarn, 135,600 pounds.	66
15	Sheetings	32,712 yards.	4 to 6	Both		66
16	Sheetings	32,600 yards.	4	Water	No. 20 yarn, 145,000 pounds.	66
17	Sheetings	30,720 yards.	5 and 6	Both	No. 25 yarn, 135,000 pounds.	66
18	Sheetings, light	Yard wide, 19,500 yards.	4 to 6	Water		72½
19	Sheetings, light	Yard wide, 31,560 yards.	Mostly 5	Both	No. 25 yarn, 121,030 pounds.	66

FACTORY LEGISLATION.

The factory system has stamped itself most emphatically upon the written law of all countries where it has taken root, as well as upon the social and moral laws which lie at the bottom of the forces which make written law what it is. With the exception, however, of laws relating to the purely commercial features of the factory system, the legislation which that system has produced has been stimulated by the evils which apparently have grown with it.

In a preceding chapter I have said that as a moral force and as a system the factory system of industry is superior to the domestic system, which it supplanted. Now, in order to consider intelligently the influence of this modern industrial system upon legislation, its evils must be brought into especial prominence, for in showing the effect of the system upon law its evils only are involved, not its merits as compared with the domestic system. It is the worst phases of society which gauge the legislation requisite for its protection. Laws other than those for the regulation of trade and the protection of rights and their definition are made for the restraint of the evil disposed, and do not disturb those whose motives and actions are right. We have a way of judging society by its worst products. This is very true of writers upon social topics; they are apt to select the worst by which to judge the whole. Parliamentary and legislative committees, raised with a view to passing or killing a factory measure and working for or against certain interests, have repeatedly adopted the plan of judging all by a few cases.

The social battles which men have fought have been among the severest waged for human rights, and they mark eras in social conditions as clearly as do field contests, in which more human lives have been lost, perhaps, but in which no greater human interests have been involved. Among these social contests may be classed the efforts of humane men to correct so-called factory evils.

At the time of the institution of the factory system there were but few laws relating to master and man upon the statute-books of England; those which did exist bore mostly upon criminal matters. One law was in force which had been considered by many an obstruction to advancement in the mechanic arts, but which under the factory system was to become the only point upon which, under prevailing sentiments, labor legislation could turn. This law was known as the "apprentice act", and was passed in 1562, during the reign of Elizabeth. It is to be found in 5 Elizabeth, c. 4. This law provided that no one should work in certain trades as journeyman until after an apprenticeship of seven years. It also instituted the custom of apprenticing pauper children by parish officers. Under the protection of law the worst practices grew up. The act referred to allowed apprentices to be worked from 5 a.m. to between 7 and 8 at night from March to September, and from September to March, as the law expresses it, "from the spring of the day" till the night closed in.

When the first cotton factories were erected in England, and before the steam-engine was sufficiently perfected to enable mills to be run by it, Derbyshire, Nottinghamshire, and Lancashire were selected as the best localities, because they abounded in water-courses sufficient for the supply of power. These factories became so numerous that the supply of children from their respective neighborhoods was soon found to fall far short of the demand. The reverse of this condition prevailed in the southern agricultural counties, where general misery existed on every side, and unprincipled poor-law guardians, anxious to rid their parishes as speedily as possible of pauper children, showed great eagerness to meet the requirements of large industrial establishments for cheap labor. Children were therefore transferred in large numbers to the north, where they were housed in pent-up buildings adjoining the factories and kept to long hours of labor. The work was carried on day and night without intermission, so that the beds were said never to have become cold, inasmuch as one batch of children rested while the other went to the looms, only half the requisite number of beds being provided for all.(*a*) Notwithstanding the evil diposition of poor-law guardians and of grasping employers, there is no doubt that the condition of these children was better under employment in mechanical industries than under a state of pauperism in agricultural districts. This, however, was no reason for the abuse of the innocents.

Another element entered into the causes which led to the employment of pauper children. When the first factories went into operation, it soon became apparent that there was in the minds of the people considerable repugnance to the employment of children in them; in fact, there was strong antipathy to factories themselves because they were innovations. The native domestic laborers considered themselves amply able to provide for their children, and so rejected the offers of liberal wages made by the mill-owners. For a long period it was by the working people themselves considered to be disgraceful for any father to allow his child to enter the factory; in the homely words of that day, that parent made himself "the town's talk", and the unfortunate girl so given up by her parents in after life found the door of household employment closed against her "because she had been a factory girl". It was not until the condition of portions of the working classes had been reduced that it became the custom with workingmen to eke out the means of their subsistence by sending their children to the mills. Until that sad custom prevailed the factories in England were worked by "stranger children", gathered together from the workhouses. Under the operation of the old apprentice system parish apprentices were sent, without remorse or inquiry, from the workhouses in England and the public charities of Scotland to the factories, to be "used up" as the "cheapest raw material in the market". This reprehensible method was systematically

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a *English Factory Legislation,* Edler von Plener, page 2.

practiced; the mill-owners communicated with the overseers of the poor for negotiations for supply. The general treatment of these apprentices depended entirely upon the will of their masters, and while some of the latter could not bury the natural feelings of sympathy for the unfortunate, and did all in their power to relieve want and suffering, the majority, in the infancy of the new system, did not comprehend the effects ill treatment of one generation might have upon the succeeding.

The introduction of steam as a motor in mills removed the necessity of erecting factories upon streams and allowed owners to build in or near populous towns, from which the needed supply of help could always be obtained. These towns were exempt from the general operations of the apprentice act, except as to parish apprentices.

Now for the first time appeared some of the consequences of congregated labor under the influence of simply natural forces without the restrictions of positive legislation. (*a*) A whole generation of operatives was growing up under conditions of comparative physical degeneracy, of mental ignorance, and of moral corruption. The great questions began to be asked, Has the nation any right to interfere? Shall society suffer that individuals may profit? Shall the next and succeeding generations be weakened, morally and intellectually, that estates may be enlarged?

These questions forced themselves upon the public mind, and the fact that pauper apprentices might be better off under such apprenticeship than in the workhouse could have no weight under the influence of the great religious and moral waves which swept over England in the last quarter of the last century. The truth began to dawn that in factories, as in nations or in families, if those who rule do so through the power of fear and the capacity to punish arbitrarily the result is a poor, cringing operative population or poor, cringing subjects.

The first man to ask such questions of parliament was Sir Robert Peel, in 1802. Sir Robert was a master manufacturer, to whom the new system had brought wealth and power and station, and to his immortal honor he sought to remedy the evils which he knew, from his own personal experience, had grown with the factory system. In 1802 he introduced a bill the object of which was to interfere by law with the natural tendencies of unrestricted competition in the labor of human beings. As the system which Peel's bill sought to regulate was from its infancy crude in its workings, so the legislation sought was crude and had no very far-reaching provisions; yet it aimed at the weakness of the new industrial order, and would, if successful, establish a principle in law which should influence the enactments of the legislatures of the world.

The friends of the new theory did not go beyond the regulation of the labor of parish apprentices. The bill was entitled "An act for the preservation of the health and morals of apprentices and others employed in cotton and other mills, and in cotton and other factories". Says the duke of Argyle:

> It is characteristic of the slow progress of new ideas in the English mind, and of its strong instinct to adopt no measure which does not stand in some clear relation to pre-existing laws, that Sir Robert Peel's bill was limited strictly to the regulation of the labor of apprentices; children and young persons who were not apprentices might be subject to the same evils, but for them no remedy was asked or provided.

Such is the power of precedent, which is too often only another term for tradition. "The notion," as to Peel's measure, was—

> that as apprentices were already under statutory provisions, and were subjects of a legal contract, it was permissible that their hours of labor should be regulated by positive enactment. But the parliament, which was familiar with restrictions on the products of labor, and with restrictions of monopoly on labor itself, which restrictions were for the purpose of securing supposed economic benefits, would not listen to any proposal to regulate "free" labor for the purpose of avoiding even the most frightful moral evils. These evils * * * were incident to the personal freedom of employers and employed. In the case of apprentices, however, it was conceded that restriction might be tolerated. And so through this narrow door the first of the factory acts was passed, (*b*)—

and the system, by unmistakable signs, stamped its influence upon the legislation of England. The conduct of men, both individually and collectively, as influenced by the natural course of events, is illustrated in the clearest light by the history of the first factory legislation.

In the first place, the principle which was deemed objectionable became prominent in factory legislation, for the old law of 1562, the apprentice act, heretofore an obstacle, became the very precedent the lawmakers of England must have before they could consent to protect human rights. Again, if the steam-engine had been invented earlier—if mills had not at first been erected upon streams away from the centers of population, thereby enabling poor-law guardians to reduce the pauperism of agricultural districts—it would be impossible to say how long the initiatory evils of the factory system would have been allowed to fester and impair the physical and moral well-being of a growing class, without even an assertion of the right of the nation to check the evils. The act of Sir Robert Peel, 42 and 43 Geo. III, cap. 73, while of no great practical value to the operatives, was of the greatest value to the world, for it made the assertion, which has never been retracted, that the nation did have the right to check not only open evils, but those which grow individually through the nature of employment. (*c*)

This first factory-legislation act of 1802 simply dealt with the unregulated employment of apprentices. By its provisions the employer was compelled to clothe his apprentices, whose work was now limited to twelve hours a day. Night work was entirely prohibited, with some minor exceptions, and every apprentice was to receive daily instruction during the first four years of his time, school attendance to be reckoned as working time. Religious

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a *Reign of Law*, p. 348. *b* *Ibid.*, p. 349. *c* *Reign of Law*.

instruction on Sundays was distinctly regulated, and some useful sanitary clauses were inserted in the law. Although this law was well digested, it proved inoperative in great measure, through want of the necessary provisions for carrying it into effect, the still undetermined state of the new manufacturing system, and the revolution wrought by the adaptation of steam to manufacturing purposes. This adaptation, as I have said, removed the necessity of erecting factories upon water-courses, and supplied a great desideratum, in many respects, by allowing their establishment in populous towns, whose needy inhabitants afforded a sufficient number of employés to satisfy the first requirements of manufacturers. Those children, therefore, whose parents resided in the neighborhood of such factories were admitted into them without participating in the protection provided in the act of 1802, because such children were not apprenticed under the act of 5 Elizabeth, or under the apprentice act.

The question of repealing this latter act now began to be agitated. Numerous petitions were sent to parliament for its repeal, both by masters and those who saw that if the apprentice act should be repealed a law must be passed that would protect all children at work in the factories; the masters saw that the repeal of the act of 5 Elizabeth rendered Peel's act of 1802 inoperative.

In 1814 the apprentice act was substantially repealed, and in 1815 Sir Robert Peel came back to parliament and told the country that the former act, that of 1802, "had become useless, that apprentices had been given up, but that the same exhausting conditions, from which parliament had intended to relieve apprentices, was the lot of thousands and thousands of the children of the free poor." In the following year (1816), pressing upon the house of commons a new measure of restriction, he added, that unless the legislature extended to these children the same protection which it had intended to afford to the apprentice class it had come to this, that the great mechanical inventions which were the glory of the age would be a curse rather than a blessing to the country. (*a*) The author of the *Reign of Law*, in commenting upon the early efforts in favor of the restriction of labor by legislation, says:

> Thus began the great debate which in principle may be said to be not ended yet; the debate, how far it is legitimate or wise in positive institution to interfere for moral ends with the freedom of the individual will? Cobbett denounced the opposition to restrictive measures as a contest of "mammon against mercy". No doubt personal interests were strong in the forming of opinion, and some indignation was natural against those who seemed to regard the absolute neglect of a whole generation, and the total abandonment of them to the debasing effects of excessive toil, as nothing compared with the slightest check on the accumulations of the warehouse. But the opposition was not due in the main to selfishness or indifference. False intellectual conceptions, false views both of principle and of fact, were its real foundation. Some of the ablest men in parliament, who were wholly unaffected by any bias of personal interest, declared that nothing would induce them to interfere with the labor which they called "free". Had not the working classes a right to employ their children as they pleased? Who were better able to judge than fathers and mothers of the capacities of their children? Why interfere for the protection of those who already had the best and most natural of all protectors? * * * Nor were there wanting arguments, founded on the influence of natural laws, against any attempt on the part of legislative authority to interfere with the "freedom" of individual will. The competition between the possessors of capital was a competition not confined to England. It was also an international competition. In Belgium, especially, and in other countries, there was the same rush along the new paths of industry. If the children's hours of labor were curtailed, it would involve of necessity a curtailment also of the adult labor, which would not be available when left alone. This would be a curtailment of the working time of the whole mill, and this would involve a corresponding reduction of the produce. No similar reduction would arise in foreign mills. In competition with them the margin of profit was already small. The diminution of produce from restricted labor would destroy that margin, capital would be driven to countries where labor was still free from such restrictions, and the result would be more fatal to the interests of the working classes of the English towns than any of the results arising from the existing hours of labor. All these consequences were represented as inevitable. They must arise out of the operation of invariable laws. Such were the arguments used in every variety of form, and supported by every kind of statistical detail, by which the first factory acts were opposed.

I have been quite explicit in stating these arguments, because in all subsequent movements they have been repeated again and again, and may be heard in debate in every session of legislatures in this country every time any proposition is made to protect labor.

The abolition of the apprentice system, by which the act of 1802 became useless, stimulated Peel and the friends of factory legislation to greater efforts, and in 1816 parliament instituted the first government inquiry into the condition of the factory population. It was not, however, till 1819 that a new law (59 Geo. III, c. 66) was enacted. This law established the right of the nation to limit the age at which children might be admitted to the factories. No child under nine years could be admitted, and the hours of labor were limited to twelve per day for children between nine and sixteen. This new law, unlike that of 1802, was applied to cotton-mills only, while the first applied to both cotton and woolen factories. While provisions of law relating to the education of factory children were to be commended, they were nevertheless what might be termed curiosities of legislation.

The greatest poverty and ignorance prevailed in the agricultural and mining districts of England, and after the reports of the poor-laws commissioners had exposed the demoralizing results of the want of education in the agricultural hamlets it was really a piece of singular effrontery on the part of the legislators to accuse the manufacturers of being the main authors of the miserable state of affairs found among the tillers of the soil, and to require the employers of factory labor, under heavy penalties, to be responsible for the education of all juvenile operatives whom they employed. Until a recent date law has insisted upon the education of factory children only, so far as England is concerned, and, whether from good or bad motives in the framers of such laws, the factory system has been made the central point upon which popular education in England has turned, and this accounts

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a Hansard's *Parliamentary Debates*, vols. xxxi, xxxiii.

in a large degree for the superior intelligence of the factory population of that country when compared with those engaged in agriculture. In this very direction the influence of the new order of industry upon legislation is clearly marked.

From 1816 to the present time there has been no cessation in the attempts to regulate by law some of the conditions of labor. All the wonderful reports from parliamentary committees make in themselves a vast library of information and misinformation which cannot be briefed in this volume, and, in fact, it is not essential; for, as I have said, every legislative contest took on the same general features of attack and defense. It was not till 1847 that the friends of labor succeeded in passing a ten-hour law. After 1847 the provisions of the English factory acts were extended first to one industry and then to another, until now they comprehend many of the leading lines of production.

The principles involved in the earlier legislation were made to apply to the working of mines, in which great abuses in the employment of women and young children had become the rule. The amelioration of the horrid condition of the workers in the mines was the result of the influence of the factory system upon law. The care of the pauper children of England became the subject of the deepest solicitude from the same influence. The same is true of the education of the masses. The legislative provisions relative to chimney-sweeps and various special employments are all due to the same influence. The continental governments of course have been obliged to make regulations covering kindred subjects, but rarely have they kept pace with English legislation. America has enacted progressive laws so far as the condition of factory workers has warranted. It should be remembered that the abuses which crept into the system in England never existed in this country in any such degree as we know they did in the old country. Yet there are few states in America where manufactures predominate or hold an important position in which law has not stepped in and restricted either the hours of labor or the conditions of labor and insisted upon the education of factory children, although the laws are usually silent as to children of agricultural laborers.

It is not wholly in the passage of purely factory acts that the factory system has influenced the legislation of the world. England may have suffered temporarily from the effects of some of her factory legislation, and the recent reduction of the hours of labor to nine and one-half per day, less than in any other country, has had the effect of placing her works at a disadvantage; but in the long run England will be the gainer on account of all the work she has done in the way of legislative restrictions upon labor. In this she has changed her whole policy. Formerly trade must be restricted and labor allowed to demoralize itself under the specious plea of being free; now trade must be free and labor restricted in the interests of society, which means in the interest of good morals. The factory system has not only wrought this change, but has compelled the economists to recognize the distinction between commodities and services. There has been greater and greater freedom of contract in respect to commodities, but the contracts which involve labor have come more and more completely under the authority and supervision of the state.

> Seventy-five years ago scarcely a single law existed in any country for regulating the contract for services in the interest of the laboring classes. At the same time the contract for commodities was everywhere subject to minute and incessant regulation. (*a*)

Factory legislation in England, as elsewhere, has had for its chief object the regulation of the labor of children and women; but its scope has constantly increased by successive and progressive amendments until they have attempted to secure the physical and moral well-being of the workingman in all trades, and to give him every condition of salubrity and of personal safety in the workshops.

The excellent effect of factory legislation has been made manifest throughout the whole of Great Britain. "Physically the factory child can bear fair comparison with the child brought up in the fields," and intellectually progress is far greater with the former than with the latter. Public opinion, struck by these results, has demanded the extension of protective measures for children to every kind of industrial labor, until parliament has brought under the influence of these laws the most powerful industries.

To carry the factory regulations and those relative to schooling into effect England has an efficient corps of factory inspectors. The manufacturers of England are unanimous in acknowledging that to the activity, to the sense of impartiality, displayed by these inspectors is due the fact that an entire application of the law has been possible without individual interests being thereby jeopardized to a very serious extent. It is also now freely admitted that factory legislation, wisely prepared, prudently applied, and ripened by experience, cannot be otherwise than productive of useful results nor do aught but exercise a salutary influence over the economical and moral conditions of labor. It is true that in a country where, in general, the moral condition of the working classes has presented the saddest of pictures such legislation has wrought an improvement in the morals and exerted a notable influence on the health and habits of the working classes. The field is still large, and all the virtues of public sentiment will be needed to influence wise regulations. Such legislation has also bestowed substantial advantages upon industry itself, since the work, being performed by cleverer hands, gains both in quality and in rapidity of execution.

While it may be impracticable to compel people by legislation to be moral, they can be surrounded by the best moral and sanitary conditions and their lives and their limbs can be protected. The legitimate field for legal

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[a] Hon. Francis A. Walker.

interference is very broad, and such interference has met with the highest judicial sanction. No argument of unconstitutionality can be made very effective in the premises.

The conditions belonging to the factory system are constantly forcing themselves into view as the levers which overturn old notions and establish precedents at variance with the opinions of judges. One of the greatest changes in the principles of law which the factory system has wrought is in relation to the liability of employers for injuries received by their workmen. The attempts to make employers thus liable have proceeded first from the factory, but have included the railroad in the list. A brief examination of this subject, one of the most interesting in relation to labor legislation, cannot be otherwise than profitable. The question as to how far employers shall be held liable in damages to their employés for accidents occurring through the negligence of co-employés is creating a good deal of discussion in England, and has, in a limited degree, already commanded attention in this country.

The common-law doctrine, both in England and in the United States, is that common employment relieves the employer from responsibility for the injuries which one employé may receive through the negligence of a co-employé, unless negligence can be shown in the employment of unfit agents. To be more specific, if a brakeman upon a train meets with an accident through the negligence of a switchman, although they are in no sense associated in their duties, the brakeman can have no redress against the company. A stranger, however, upon the same train could recover damages if an injury was sustained. The first time this doctrine was held by a court, so far as record shows, was in England, in Priestly *vs.* Fowler, in 1837, when it was laid down by Lord Abinger that the servant by implication contracts to run the risks incident to the service in which he engages. This doctrine, with that which holds that common employment relieves the employer of responsibility for damages resulting from negligence of co-employés, would have been held before, as the learned justice remarked, had the matter ever been brought before a court; that is, he held it to be the law, but occasion had not before offered for its announcement. The law, then, was judge-made, and it could not be overturned without legislation, for a precedent is sacred in the eyes of courts.

The same doctrine received a strong indorsement in the United States in 1842, in Massachusetts, in the case of Farwell *vs.* The Boston and Worcester Railway Company, when Chief Justice Shaw, in giving the decision of the supreme court, not only reiterated the doctrine laid down by Lord Abinger, but added much to the force of his lordship's reasoning by the extent of learning applied in the scope of the decision. To-day the ruling of Judge Shaw forms the leading citation, not only in this country, but in England. During the recent extended parliamentary contract for legislative interference with the doctrine of the courts Judge Shaw's decision constituted the main support of those who opposed any restriction of the doctrine. The language of this decision was incorporated into the report of a parliamentary committee raised to consider the question of employers' liability and used against a bill looking to legislative change in the common law.

The doctrine, as I have stated it, is the law of this land, with, I think, a single exception and some modifications. In Iowa, statute law provides that—

> Every railroad company shall be liable for all damages sustained by any person, including employés of the company, in consequence of any neglect of its agents, or by any mismanagement of its engineers or other employés of the company.

This law applies only to railroads, the common law applying in all other cases.

It is true in most countries that parties seeking work in factories or on railroads can make a special contract relative to damages in case of accident through the negligence of co-employés, but this privilege throws the burden on the shoulders of the workman.

The employer is now liable for two classes of injuries caused by fellow-workmen: when he has directly interfered in the act which caused the injury, and when by his negligence in selecting he has employed an incompetent workman. In all other cases, except where special legislative restriction exists, he is not liable for injuries to co-workmen unless by special contract he assumes to become liable; but the employer never, or rarely, suggests such contract; this must come from the workman.

It is now sought to change the status of the parties by legislative action and make the employer also liable for all injuries caused by his authorized agents in the legitimate performance of the duties which he has prescribed, such regulation to apply to industrial works and railroads. Such a law would place the necessity of proposing a special contract upon the employers, instead of upon the workman seeking employment. Legislatures in America have felt in some degree the influence brought to bear in favor of some law upon the subject.

In England the ancient doctrine has been reversed to a very large degree by the employers' liability act, passed in September, 1880. The new law is one of the most striking instances of the influence of the factory system upon legislation, for in its provisions it takes in various and important interests not strictly within the term. The English law of September 7, 1880, which falls far short of what was demanded, was the result of stormy debates and contests extending over a term of years, and its provisions mark a new era for good or evil in the great interests which have been developed through the perfection of the factory system. In brief, the law provides that when personal injury is caused to a workman by reason of any defect in the ways, works, machinery, or plant connected or used in the business of the employer; or by reason of the negligence of any person in the service of the employer who has any superintendence intrusted to him, while in the exercise of such superintendence; or by reason of the negligence of any person in the service of the employer to whose orders or directions the workman at the time of the injury was bound to conform, and did conform, when such injury resulted from his having so conformed; or by reason of the act or omission of any person in the service of the employer done or made in obedience to the rules or by-laws of the employer, or in obedience to particular instructions given by any person delegated with the authority of the employer in that behalf; or by reason of the negligence of any person in the service of the employer who has charge or control of any signal points, locomotive engine, or train upon a railway; in all these cases the workman shall have the same right of compensation and remedies against the employer as if he had not been a workman of or in the service of the employer. These are the main features of the latest legislative phase of factory agitation; and although the law provides for several exceptions, yet it completely reverses the old order of things—the judge-made law—which put the workman on a separate basis from the stranger.

The new doctrine must of course be recognized more fully in our courts, or more probably in our legislatures, and with such recognition there will come a change in the relations of employers and employed, the nature of which in its indirect and permanent effects it is difficult to foresee. It is the most difficult question of all those which have grown out of the factory system, and calls for much wise statesmanship. Every one admits the justice of some regulation; and to adjust all parts of it and do no great injustice will tax the ingenuity of our lawmakers. While the question of employers' liability is the most important one to grow out of the factory system, it is the latest one of magnitude.

A brief digest of the factory laws of different countries must be of value in a report upon the factory system as indicative of the influence of the system outside the channels of business.

In no other country is there so elaborate a code of factory laws as the "British factory and workshop act" of 1878, 41 Vict., chap. 16, it being an act consolidating all the factory acts since Sir Robert Peel's act of 1802.

GREAT BRITAIN.—The following is an analysis of the factory and workshop act of 1878 so far as it applies to textile factories:

Sanitary provisions.

Every factory to be kept in a cleanly state, free from effluvia, etc., to be well ventilated, not to be overcrowded.

If an inspector observe a nuisance, he must report to sanitary authority.

Inspector authorized to take medical officer of health, etc., with him into the factory.

Every factory to be limewashed once in fourteen months, unless painted in oil once in seven years, when it must be washed once every fourteen months.

The secretary of state may exempt from this provision any class of factory, or part thereof, not requiring it for the purpose of cleanliness.

A child, young person, or woman not to be employed in wet-spinning, unless means are taken to prevent their being wetted and to prevent the escape of steam.

Safety and accidents.

Hoist or teagle, steam-engine, water-wheel, and mill gearing to be securely fenced.

Inspector may give notice of machinery or of a vat or pan containing hot liquid, or metal, considered to be dangerous, or grindstone fixed in a faulty manner. Provisions made for submitting question to arbitration.

Employment of a child in cleaning machinery in motion, and of a child, young person, or woman in cleaning mill gearing in motion, prohibited.

Employment between fixed and traversing parts of a self-acting machine forbidden.

Notice of accidents to be sent to the inspector and certifying surgeon: if fatal; if caused by machinery moved by power, or vat or pan, and so as to prevent the injured person returning to his work for forty-eight hours after the accident, the certifying surgeon to report the same to the inspector.

If any person suffer bodily injury from neglect of fence, machinery, etc., required to be fenced, the occupier is liable to a penalty of £100, which may be applied by the secretary of state for the benefit of the injured person.

Employment and meal hours.

A child, young person, or woman not to be employed except during period of employment stated in notice.

Young persons and women.

The period of employment, inclusive of meal hours, shall be either between 6 a. m. and 6 p. m. or between 7 a. m. and 7 p. m.

On Saturday, when work commences at 6 a. m., if not less than one hour be given for meals, manufacturing processes must cease at 1 p. m. and all other work at 1.30 p. m. If less than one hour be given for meals, manufacturing processes must cease at 12.30 p. m. and all other work at 1 p. m.

On Saturday, when work commences at 7 a. m., manufacturing processes must cease at 1.30 p. m. and all other work at 2 p. m.

If the occupier of a factory be of the Jewish religion, and close his factory on Saturday until sunset, he can employ young persons and women until 9 p. m. on Saturday.

All young persons and women must have two hours for meals during the period of employment, of which one hour must be given before 3 p. m.

On Saturday at least half an hour must be given.

A young person or woman not to be employed for more than four hours and a half without an interval of half an hour.

Children.

Children are to be employed either morning or afternoon, or on alternate days.

The period of employment for a child begins and ends the same as for a young person.

Children in the morning set must cease work at the dinner hour, but not later than 1 p. m.

Children in the afternoon set begin at the end of the dinner time, but not earlier than 1 p. m.

Children may work on Saturdays as young persons.

A child shall not be employed on Saturday in two successive weeks, nor on Saturday in any week if on any other day in the week he has worked more than five hours and a half.

Children working on alternate days may work as young persons, but must not work on two successive days, nor on the same days in two successive weeks.

When a child is employed as a young person, he must have the same intervals for meals as a young person.

A child not to be employed more than four hours and a half without an interval of half an hour.

Holidays.

Every child, young person, and woman shall be allowed the following holidays:

The whole of Christmas day and the whole of Good Friday; or, instead of Good Friday, the next public holiday under the holidays extension act, 1875.

Notice must be given of such holidays, and be fixed up in the factory.

A half-holiday shall comprise one-half of the period of employment on some other day than Saturday.

A child, young person, or woman shall not be employed on any day or part of a day set apart for a holiday.

In Scotland, instead of Christmas day and Good Friday, two days shall be set apart for holidays, separated by an interval of three months, one of which shall be the day set apart for the Sacramental Fast of the parish, or some other day substituted therefor by the occupier.

Eight half holidays, or equivalent whole holidays, of which half shall be given between 15th March and 1st October following.

In the factory of a Jew, in which all the persons employed are Jews, two bank holidays may be given instead of Christmas day and Good Friday.

In Ireland the 17th of March must be given, and will reckon as two of the eight half-holidays.

Education of children.

The parent of a child shall cause such child to attend a recognized efficient school, which may be selected by himself.

A child, when employed in a morning or afternoon set, shall attend school for one school attendance on each day of every week during any part of which he may be employed.

A child when employed on alternate days must attend school for two school attendances on each alternate day.

Attendance at school must be between 8 a. m. and 6 p. m.

A child is not required to attend school on Saturdays, or on any holiday or half-holiday in pursuance of this act.

Non-attendance caused from sickness, etc.

When there is not a certified school within two miles of the child's residence, the child may attend some other school temporarily approved by an inspector.

A child who has failed to attend school regularly cannot be employed the following week unless the deficient attendances be made up.

The occupier shall obtain certificates from a schoolmaster of the school attendance of the children employed in his factory, and keep such certificates for two months and produce the same to the inspector.

The school managers may apply in writing to an occupier to pay the school fees, not exceeding 3*d.* per week, or one-twelfth of the wages of a child, which the occupier may deduct from the wages of the child.

When a child of thirteen has obtained a certificate of proficiency either of having passed the prescribed standard, or of having attended school the prescribed number of attendances, he is deemed to be a young person.

Certificates of fitness for employment.

A person under sixteen shall not be employed for more than seven, or, if the certifying surgeon resides more than three miles from the factory, thirteen working days, unless the occupier has obtained from the certifying surgeon a certificate in the prescribed form of the fitness of employment of such person.

A certificate of fitness shall not be given unless a certificate of birth be produced, or other proof of real age.

When an inspector considers any person under sixteen unfit to work, he may give notice to the occupiers, and the person shall not be employed more than seven days, unless certified by the certifying surgeon to be fit for work.

An inspector may annul a certificate of a certifying surgeon if certificate of age of the person named therein was not produced if he think the person under the age named in the certificate.

When a child becomes a young person, a fresh certificate of fitness must be obtained.

A certificate of fitness shall only be granted on personal examination.

The same certificate of fitness may be valid for all the factories in the occupation of the same occupier in the district of the same certifying surgeon.

A certifying surgeon shall examine persons only at the factory where such persons are employed, unless the number of children and young persons is less than five, or unless specially allowed by an inspector.

Certifying surgeons to be appointed by an inspector.

Fees to be paid to the certifying surgeon.

Where there is not a certifying surgeon within three miles, the poor-law medical officer to act as certifying surgeon.

Regulations as to meal times.

All children, young persons, and women to have the times allowed for meals at the same periods of the day.

A child, young person, or woman is not allowed to remain in any room where a manufacturing process is being carried on, or to be employed during a meal time.

Notice of meal hours to be fixed up—of hours of work, etc.

Prohibitions of employment.

A child shall not be employed under the age of ten years.

A child, young person, or woman shall not be employed on Sunday; but

If the occupier be of the Jewish religion, and close his factory on Saturday, both before and after sunset, a Jewish young person or woman may be employed on Sunday the same as if Sunday were Saturday.

Overtime and night-work.

Male young persons of sixteen years of age may be employed in lace factories between 4 a. m. and 10 p. m., under certain conditions.

If the occupier be of the Jewish religion and keep his factory closed on Saturday, both before and after sunset, he may employ the young persons and women one hour on every other week day, but not before 6 a. m. or after 9 p. m.

Secretary of state may authorize employment of young persons and women to recover lost time in water-mills at the rate of one hour per day, for not exceeding ninety-six days in case of drought and not exceeding forty-eight days in case of flood.

The secretary of state, where cleanliness, etc., is deficient, may, by order, direct the adoption of special means as a condition of the exceptional employment.

Where an exception has been authorized, and it is found to be injurious to health, the secretary of state may by order rescind such exception.

Miscellaneous regulations.

Notice to be hung up of times of work and meals:—Abstract of act. Names of inspectors and certifying surgeons. Clock by which hours of work are regulated.

Notice of special exception to be hung up, and notice to be sent to inspector.

When working under special exception, same to be entered in a register.

Register of young persons under sixteen years of age to be kept, with details, as prescribed by the secretary of state. Extracts to be sent when required to the inspector.

Hours of work to be regulated by a public clock.

Any person in a factory while machinery is in motion deemed to be employed, unless the contrary be proved.

Occupier of factory to send notice to inspector within one month of commencing to work a factory.

Inspectors of weights and measures authorized to examine weights and measures used for checking wages, etc.

AUSTRIA-HUNGARY.—The factory laws and regulations are found in the factory law of December 20, 1859, and the Hungarian trade and manufactory law of 1872, of which laws the following is an analysis:

The regulations relating to workmen employed in trading establishments have equal force in the case of factory workmen.

The proprietor of a factory is bound to keep a regular register, showing the name, age, birthplace, occupation, and wages of every workman employed by him, and to produce this register whenever called upon to do so by the authorities.

A table is to be hung up in each workshop, in which the following information is to be contained:

(*a*) The disposition and employment of the workmen, and particularly the manner in which the women and children are occupied as bearing upon their bodily strength, and, in the case of children, on their school duties.

(*b*) The duration of working hours.

(*c*) Regulations relating to the settlement of accounts and payment of wages.

(*d*) Rights accorded to the workmen.

(*e*) Treatment of workmen in case of illness or accident.

(*f*) Fines for transgression of the factory regulations.

(*g*) The period of giving notice and cases in which contracts may at once be declared void.

A duplicate of this table is to be given to the authorities.

Every proprietor of a factory is bound, at his own expense, to make all arrangements and to take all possible measures for securing the life and health of his workmen in the exercise of their duties.

The education laws require that children under ten years of age shall in no case be allowed to work in factories, and children over ten, but under twelve years, only with the consent of the authorities.

This consent is only to be given when regular attendance at school can be combined with factory employment, or when arrangements are made by the employer for the education of the children by establishing schools in accordance with the regulations of the educational authorities.

Children above twelve but under fourteen years of age may only be employed in factories at the most for eight hours a day.

Young workmen who have passed their fourteenth year, but are under sixteen, may only be employed for ten hours a day.

Workmen under sixteen years of age may, in general, only be employed on work which in no way injures their health and is not prejudicial to their physical development.

A law relating to night-work of apprentices is also applicable to factory workmen under sixteen years of age.

The workmen are to be allowed half an hour's rest in the morning and afternoon and a whole hour at midday.

In factories where work is carried on day and night the proprietor is bound to take proper precautions for the employment by relays of workmen whose services are required at night.

Day-work may not begin before 5 a. m. nor be extended beyond 9 p. m.

The employer is bound to pay his wages in ready money, and regularly once a week, unless some other arrangement is made. He may not supply the workmen with goods or spirits on credit; but he may furnish his workmen, should the latter agree, with lodging, firewood, use of the soil, regular board, medicines, and medical assistance, and deduct the cost on payment of the wages. He may also, on the same conditions, supply his workmen with the tools and materials necessary for the make of articles produced in his factory, in cases where the workmen are bound by contract to supply such tools and materials on their own account.

Claims for goods supplied to workmen on credit, contrary to the existing regulations, cannot be enforced by the employer by legal measures, nor by reckoning them against wages that may be due.

Contracts which contain any clauses contrary to the last three provisions have no binding force.

Arrangements, too, concluded between employer and workmen, according to which the latter are obliged to obtain their daily wants at particular shops, or to expend part of their wages for any purposes other than the amelioration of the position of the workmen, are not considered valid.

The factory authorities are bound to allow the establishment to be visited from time to time by persons sent for that purpose, and to assure themselves that the regulations of the law are duly observed.

Certain articles in proposed new factory law (1882).

Children under twelve years of age must not be employed in regular trades. Children between the ages of twelve and fourteen can be employed at the most for six hours a day, and their employment must not interfere with their attendance at school.

Young workmen who have passed their fourteenth year, but are under sixteen, and also women between the ages of sixteen and twenty-one, can only be employed for ten hours daily.

In the event of any unforeseen occurrence or accident interfering with the regular course of business or necessitating increased work, the trade authorities can permit an extension of time, not exceeding an hour, for a period of four weeks at the most.

The minister of commerce is empowered to prohibit or restrict the employment of young workmen and women in trades which are dangerous or injurious to health.

Young workmen or women between sixteen and twenty-one must not be employed before 5 o'clock in the morning or after 9 o'clock in the evening, and there must be an interval of an hour's rest between the hours of labor.

The minister of commerce can, however, modify this rule for certain trades, in conjunction with the chambers of commerce and trade inspectors and the sanitary authorities, but the total time of employment must never exceed the maximum fixed as above.

Women must not be employed during the six months following their confinement.

Young workmen and women between the ages of sixteen and twenty-one must not be employed on Sundays and holidays, except in cases where the work cannot possibly be interrupted or deferred.

Traders who employ young workmen must keep a register showing their names and ages and the names and addresses of their parents or guardians, and also the dates of their first employment and discharge. This register must be hung up in the place where the work is carried on, and the trade authorities must be furnished with a copy.

FRANCE.—The hours of labor for adults in factories, etc., permitted by the laws of France are twelve daily.

A bill to reduce them to ten was last year submitted to the legislature by a deputy, but it was rejected; and the same deputy thereupon introduced a measure (not yet carried) to provide for the more strict fulfillment of the law as it stands. In Paris the law is executed, and is fairly applied in most of the northern and eastern departments, at least as regards the large mills, but doubts seem to exist as to its strict observance in the Lyons and Marseilles districts, and supervision would appear to be thought inadequate for insuring its proper application in the smaller workshops in the provinces.

The employment of children is prohibited until they have attained the age of twelve in the case of boys and sixteen in that of girls, except in certain specified descriptions of labor, in which it is allowed to employ boys between the ages of ten and twelve, on condition, however, of the working hours not exceeding six daily and being divided by a period of rest.

Night-work, viz, between the hours of 9 p. m. and 5 a. m., is forbidden for boys below the age of sixteen and for girls under twenty-one years of age. But under exceptional circumstances this restriction may be temporarily suspended and permission extended to the employment of boys under twelve years of age, such exceptional circumstances to be determined by the local committee or by the inspector. On Sundays and holidays children are not allowed to work, but an exception is made in the case of factories where it is necessary to keep fires going continuously, indispensable labor being then permissible on such days, and also at night.

Female labor is forbidden underground, nor is such work allowed for boys below the age of sixteen. Certain exceptions exist, however, where boys of twelve may be employed below the surface, but the duration of their labor must not exceed eight hours out of the twenty-four, with an interval of at least one hour's rest.

GERMANY. (*a*)—The settlement of relations between trade employers and their work-people is a subject for free agreement, subject to the restrictions founded by imperial law.

Employers cannot oblige their work-people to work on Sundays and holidays. Works of such a nature as not to permit of an interruption or postponement do not come under the above provision.

The local governments are to determine as to what days are holidays.

Children under twelve years of age may not be employed in factories.

The employment of children under fourteen years of age may not exceed the period of six hours a day.

Children who are obliged to attend the national school may only be employed in factories if they are present at least three hours a day in the national school, or in a school approved of by the educational inspectors, and where a regular course of education is conducted in a manner approved by the latter.

Young persons between the ages of fourteen and sixteen may not be employed in factories for more than ten hours a day.

Women may not be employed during the three weeks following their confinement.

The hours of labor for juveniles (children under twelve) may not begin before 5.30 a. m. nor continue after 8.30 p. m. Regular intervals must occur between the hours of labor on every working day. These rests must be of half an hour's duration for children and of an hour's for young persons between the ages of fourteen and sixteen, at midday, and of at least another half hour both morning and afternoon.

During the "rests" the juvenile work-people may not be employed at all in the work of the factory, and may only remain in the working rooms if those portions of the machinery or business in which juveniles are employed are completely stopped during the period of the rest.

On Sundays and holidays the juvenile working people may not be employed during the hours appointed by the regular clergyman for instruction in catechism, confirmation, confession, or communion.

The employment of a child in a factory is not permitted unless a "work-card" has been first sent in to the employer. A "work-book" is not necessary in addition to this. Work-cards are issued free of cost and stamp by the local police authorities, on the request or with the permission of the father or guardian; should the father's statement not be obtainable, the communal authorities may supplement his consent. They must state the name, day and year of birth, as well as the religion of the child, the name, occupation, and last residence of the father or guardian, and, in addition, the steps taken to comply with the legal educational requirements.

The employer must keep the work-card, produce it at any moment on an official demand, and at the completion of the term of agreement return it to the father or guardian. If the father's abode cannot be discovered, the work-card must be returned to the mother or nearest relations.

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[a] Law respecting trades regulations, July 17, 1878.

When juvenile work-people are to be employed in a factory, the employer must inform the local police authorities in writing before the commencement of their term of employment.

In the announcement of the factory, the week days on which they are to be employed, the beginning and end of the hours of work, and the rests, as well as the nature of the work, must be given. No change in the above may be made, except postponements, consequent upon the replacement of workmen in individual branches of the work before the necessary further notice has been given to the authorities.

The employer must take care that in every factory in which juvenile work-people are employed a list must be hung in a conspicuous place in the rooms they are working in, containing the names of the juvenile work-people, as well as the days on which they are employed, the hours of commencement and termination, and the rests. He must also provide that a table be hung up in these rooms containing an extract, in the form determined on by the central authorities, and clearly written, of the regulations relative to the employment of juvenile work-people.

Should any natural occurrence or accident interrupt the regular work of the factory, exceptions to the limitations prescribed may be admitted by the administrative authorities during a period of four weeks, and by the chancellor for a still longer time. In important cases of this nature, and for the prevention of accidents, the local police authorities can also permit such exceptions, but at the utmost for not more than fourteen days.

If the nature of the work or consideration for the work-people in separate factories makes it appear desirable that the working hours for juveniles should be settled otherwise than in the manner prescribed above, a further regulation relative to the "rests" may be allowed on request by the administrative authorities, and in other respects by the imperial chancellor. In such cases, however, juveniles must not be employed for longer than six hours, unless "rests" of at least an hour in all are allowed between the working hours.

Orders issued in accordance with the above conditions must be made in writing.

The employment of juveniles or women in particular branches of manufacture which are attended with danger to the health or morals may be altogether forbidden by decision of the bundesrath or made dependent on certain conditions. Night-work, especially for women, may be forbidden in certain branches of manufacture.

Exceptions to the restrictions prescribed as to children can also be admitted by decision of the bundesrath as regards spinning-mills, factories worked with uninterrupted furnaces, or which, from the nature of the work, have a regular course of day and night labor, and also as to those whose working does not permit of a division into regular shifts of equal duration, or whose nature limits them to certain seasons of the year. In such cases, however, the working hours for children must not exceed 36 hours a week, and for young persons 60; in spinning-mills, 66.

The steps taken in accordance with the decision of the bundesrath must be laid before the reichstag at its next session, and are to put out of force should the reichstag so desire.

Special officials, inspectors, named by the governments, either alone or in addition to the ordinary police authorities, are charged with the supervision of the carrying out of these conditions. In the execution of this supervision they have the same official rights as the local police authorities, especially that of inspecting the factory at any time. They are bound, except as to giving notice of illegalities, to keep secret any knowledge which they may obtain officially connected with the business or working of the factories under their supervision.

Matters of competency between these officials and the ordinary police authorities are left to the several states of the union to be determined constitutionally.

The said officials must send in yearly reports of their official proceedings. These reports, or extracts from them, must be laid before the bundesrath and the reichstag.

Districts in which no factories, or factories only to a limited extent, exist may, on the petition of the government of the country, be excepted by the decision of the bundesrath from the appointment of such special officials.

The employers must allow the inspections, in accordance with the provisions of law, of factories to take place at any hour when they are at work, even in the night.

A brief summary of the factory laws of the different states will indicate to what extent the principles of English factory legislation have been adopted in America. The states named are the only ones in which factory laws exist.

MAINE.—No child can be employed or suffered to work in a cotton or woolen manufactory without having attended a public or private school, if under the age of twelve years, four months; if over twelve and under fifteen years of age, three months of the twelve next preceding such employment each year. A teacher's sworn certificate of attendance, filed with the employer, constitutes the proof of schooling. A fine of $100 is imposed for a violation on the part of the employer of the provision of the law.

No person under the age of sixteen years can be employed by any corporation more than ten hours of a day. The penalty for violating this provision is $100.

Factories more than two stories in height, where workmen are employed above the first story, must be provided with outside fire-escapes satisfactory to municipal officers. (See chap. 48, Revised Statutes; chap. 221, acts of 1880; chap. 49, acts of 1881.)

NEW HAMPSHIRE.—No child under fifteen years of age shall be employed more than ten hours per day without written consent of parent or guardian. No person to be employed more than ten hours per day, except in pursuance of express contract requiring longer time. No child under ten to be employed by any manufacturing corporation. Children under sixteen not to be employed in factories unless they have attended school twelve weeks during preceding year, and no child under said age shall be employed (except in vacation time) who cannot write legibly and read fluently in the readers of third grade. No child under fourteen to be employed unless he has attended school six months, or the school of his district the whole time it was kept; and no child under twelve who has not attended the school of his district the whole time it was kept. (See General Statutes, chap. 187; chap. 21, acts of 1879; chaps. 42 and 56, acts of 1881.)

VERMONT.—Children under ten not to be employed at all; under fifteen, not more than ten hours per day; between ten and fifteen, not to be employed in mill or factory unless they have received three months' schooling the preceding year. (See General Statutes, chaps. 40 and 202.)

MASSACHUSETTS.—No child under ten years of age shall be employed in any manufactory, mechanical, or mercantile establishment in the commonwealth. No child under fourteen years of age shall be so employed, except during the vacations of the public schools, unless during the year preceding such employment he has for at least twenty weeks attended some public or private day school; nor shall such employment continue unless such child in each and every year attends school as aforesaid; and no child shall be so employed who does not present a certificate, made by or under the direction of the school committee, of his attendance at school as provided.

Employers shall require and keep on file a certificate of the age and place of birth of every child under sixteen years of age employed and the amount of his school attendance during the year next preceding such employment.

The penalty for employment of children contrary to these provisions is not less than $20 nor more than $50. Truant officers are obliged to visit establishments and inquire into the situation of the children employed, and may demand the names of children and the certificates of age and school attendance. Children under fourteen years of age who cannot read and write are not to be employed while public schools are in session; parents or guardians permitting such employment are subject to a fine of not less than $20 nor more than $50.

Employers requiring from employés, under penalty of forfeiture of wages earned, a notice of intention to leave shall be liable to like forfeiture if employé be discharged without similar notice.

Whoever by intimidation or force prevents or seeks to prevent a person from entering into or continuing in the employment of a person or corporation shall be punished by fine of not more than $100.

Employers are not to contract with employés for exemption from liability for injuries resulting from employers' own negligence.

No minor under eighteen years of age and no woman shall be employed in laboring in any manufacturing establishment more than ten hours in any one day, except when it is necessary to make repairs to prevent the interruption of the ordinary running of the machinery, or when a different apportionment of the hours of labor is made for the sole purpose of making a shorter day's work for one day of the week; and in no case shall the hours of labor exceed sixty in a week. The penalty for a violation of this provision is not less than $50 nor more than $100.

The belting, shafting, gearing, and drums of all factories, when so placed as to be dangerous to persons employed therein while engaged in their ordinary duties, shall be as far as practicable securely guarded. No machinery, other than steam-engines, in a factory shall be cleaned while running, if objected to in writing by an inspector. All factories shall be well ventilated and kept clean. The openings of all hoistways, hatchways, elevators, and well-holes upon every floor of a factory or mercantile or public building shall be protected by good and sufficient trap-doors or self-closing hatches and safety-catches. All elevator cabs or cars shall be provided with some suitable device for securely holding the cabs in case of accident to the hoisting machinery.

All manufacturing establishments, three or more stories in height, in which forty or more persons are employed, unless supplied with a sufficient number of tower stairways, shall be provided with sufficient fire-escapes, properly constructed upon the outside thereof, and connected with the interior by doors or windows, with suitable landings at every story above the first, including the attic, if the same is occupied for workrooms. Such fire-escapes shall be kept in good repair and free from obstruction.

Every room above the second story in factories or workshops in which five or more operatives are employed shall be provided with more than one way of egress by stairways on the inside or outside of the building; and such stairways shall be, as nearly as may be practicable, at opposite ends of the room. Stairways on the outside of the building shall have suitable railed landings at each story above the first, and shall connect with each story of the building by doors or windows opening outwardly; and such doors, windows, and landings shall be kept at all times clear of obstruction. All main doors, both inside and outside, must open outwardly, and each story must be amply supplied with means for extinguishing fires.

Every building three or more stories in height, in whole or in part used for a tenement for more than four families or a lodging-house, shall be provided with a sufficient means of escape in case of fire. No explosive or inflammable compound shall be used in any factory in such place or manner as to obstruct or render hazardous the egress of operatives in case of fire.

Persons violating these provisions as to buildings are liable to a fine of not less than $50 nor more than $100. Females employed in manufacturing establishments must be provided with seats and be permitted to use them when not engaged in the duties for which they are employed. This also applies to stores.

For the enforcement of all these provisions the governor appoints two or more members of the district police (a state force) to act as inspectors of factories and public buildings. They may enter all buildings used for public or manufacturing purposes, examine methods of protection from accident, means of escape from fire, and make investigations as to the employment of women and children. Fire-escapes, etc., are to be constructed under the approval of one of the inspectors. (See chaps. 48, 74, 103, 104, Public Statutes; and 150, 208, 266, acts of 1882.)

RHODE ISLAND.—No child under twelve years of age can be employed in any manufacturing establishment; no child under fifteen, unless he has attended school at least three months the preceding year; and no such child shall be employed for more than nine months in any year. No child between twelve and fifteen years of age shall be employed in any factory more than eleven hours in any day, nor before 5 o'clock in the morning, nor after half-past 7 in the evening. The violation of these provisions is punished by fine of $20.

Ten hours' work in any one day constitutes a legal day's work, unless otherwise agreed by the parties to the contract for same. Town and city councils may pass ordinances requiring fire-escapes on factories in which workmen are employed above the second story. (See General Statutes, chap. 38.)

CONNECTICUT.—No child under fourteen shall be employed in any business, unless such child shall have attended some day-school for sixty days during preceding year, six weeks of such attendance to be consecutive. It is the duty of "school visitors" in every town once or more in each year to examine into the situation of children employed in manufacturing establishments, to see if provisions of law are complied with. Parents and guardians must send children to school the legal time; violation punishable by fine of $5 for each week's neglect. Employer of child under fourteen must have a certificate of child's attendance at school according to law. No child under fifteen to be employed in factories more than ten hours per day or fifty-eight hours per week, under a penalty of $50.

Each story above the second story of factories and workshops must be provided with more than one flight of stairs inside, or outside fire-escapes, satisfactory to selectmen or fire marshal of town.

Eight hours constitute a legal day's work, unless otherwise agreed upon. (See General Statutes, title 14, chap. 6; chap. 37, acts of 1880; chap. 80, acts of 1882.)

NEW YORK.—Children under fourteen are not to be employed during school hours unless they have attended school at least fourteen weeks during year preceding; the employer to have certificate of such school attendance. Eight hours constitute a legal day's work, except for farm and domestic labor. Overwork for extra compensation is permitted. (See chap. 385, laws of 1870; chap. 421, of 1874, and chap. 372, of 1876.)

NEW JERSEY.—No child under ten years of age shall be admitted to work in any factory; and no minor shall be holden or required to work more than ten hours on any day or sixty hours in any week; penalty for violation of latter provision is $50. Ten hours per day constitute a legal day's work in all cotton, woolen, silk, paper, glass, and flax factories, and in manufactories of iron and brass. (See acts of 1851, chaps. 17 and 18.)

PENNSYLVANIA.—Eight hours constitute a legal day's work, in absence of special contract, except for farm labor and labor by the year, month, or week. Ten hours constitute a legal day's work in cotton, woolen, silk, paper, bagging, and flax factories. No minor under thirteen shall be employed in any such factory under penalty of $50. No child between thirteen and sixteen years of age shall be employed more than nine months in any one year who shall not have attended school at least three consecutive months in the same year. No minor shall by any contract be employed in any of said factories for more than sixty hours per week, or an average of ten hours per day. Penalty for violation of this provision not to exceed $50. Factories in which employés are at work in third or higher story must have permanent external fire-escapes, satisfactory to fire commissioners and fire marshal of district. (See acts of 1849, 1868, 1879.)

MARYLAND.—The law prohibits the employment of children under sixteen years of age in factories for more than ten hours per day under penalty not exceeding $50.

OHIO.—No child under fourteen shall be employed in mills or mines during school hours unless he has received at least twelve weeks' schooling during the year preceding, and employers must have certificate to that effect; two weeks' attendance at a half-time or night school to be considered equivalent to one week at a day school. Whoever compels a woman, or a child under eighteen, or permits a child under fourteen to labor in a mechanical or manufacturing business more than ten hours per day shall be fined not less than $5 nor more than $50. (See Revised Statutes, sections 4023, 4024, 4029, 6986.)

THE HOMES OF FACTORY OPERATIVES.

The institution of the factory system changed the workshop-home of the domestic system to the home proper by transferring work to the factory. This change, as I have said in another part of this report, had its advantages and its disadvantages, but on the whole the advantages predominated. Whatever there was that was good in the old household plan of industry, so far as keeping the family together at all times and working under the care of the head, was, if the head was good, temporarily lost when the factory system took its place, in so far as the old workers entered the factory. It is also true that under the domestic system the head of the family, or the young man desiring to become such, had a motive to urge him to own the tools with which to work, but this motive actuated but few; the many were not moved by it. Now, while the few are deprived of such incentives, the many are furnished with elaborate tools with which to labor, and the homes are left free to be used as homes; so that the homes of the operatives under the new system have undergone a great change, and are still undergoing changes which are making the English significance of the word "home" a reality to the poorest.

It is perfectly true that in every large factory town one can find loathsome dwellings occupied by groups of loathsome persons called families. In the most enlightened factory towns, both in America and in Europe, it is easy to find dwellings occupied by factory operatives which are a disgrace, not only to the parties owning them, but to the municipality which permits them to exist or to be inhabited by human beings. It is true, too, that there are some families whose members are factory operatives who will not keep the best of tenements in decent order, and who, in spite of boards of health and of owners, persist in treating a house as if it were meant for swine.

All these things exist, and may be seen by any one who cares to take the pains to visit large factory towns. Yet, taking the operative population of such towns as a class, they are very comfortably housed, and about as well housed in one country as in another. The personal inspection of more than a thousand homes of factory operatives leads me to this conclusion. Perhaps a brief account of homes in different localities will best illustrate this chapter.

In Bradford, in Yorkshire, England, the seat of the woolen trade, a man earning $7 per week, having a wife and one child, occupies a good house with three rooms, for which he pays $1 25 per week; the house is comfortable, carpeted, and well furnished, with some mahogany furniture; meat is used once a day, and all the meals are ample and of fair quality. Another family, the husband a warp dresser, the wife a weaver, two children, occupy a house, consisting of living room and two bedrooms, for rent of $1 36 per week, including gas. This family has a piano, good haircloth furniture, vases, pictures, and books; a good medium home, with a jolly English wife and a sober, industrious English husband; the husband on full time could earn 30*s.* per week, the wife 10*s.*, and one of the little girls, as doffer, 2*s.* Among scores of these homes, taken at random, I found a few where the family earned as much as the others, but lived in two rooms usually, and these constituting a dark, smoky, and odorous den, for which 72 cents per week was paid as rent and very little was spent for bread, the bulk of all earnings going for beer and spirits. Such places in Bradford are rare, for the town is a model town, certainly so far as its neat, individual cottages are concerned.

I will remark here, what is true of all British factory houses, that, being floored with stone as a rule, if not carpeted, they present a cold and cheerless look to one not accustomed to them; and these stone floors are often quoted in this country to the disparagement of the English house. Homes of much higher grade are floored with stone or brick, being much cheaper than wood. The dimensions of the British house are much smaller than factory houses in America. The tenements of three rooms have much less space than tenements of the like number of rooms here. This is generally true of all European factory towns. But the houses of the operatives are as a rule separate houses, the tenement house being quite unknown, except where what is termed the "model workingmen's houses" are being tried. The boarding-house is not an institution for factory operatives.

At Saltaire, near Bradford, the homes of the work-people are very excellent, rents being from $30 to $100 per year for three- to five-room houses. The results of good treatment are easily discernible in this village. The facilities furnished for intellectual improvement rival those of any factory town in the world; and while the expenditures of Sir Titus Salt were made on such a lavish scale as to render his investments unprofitable, yet the principle incorporated in his work has told wonderfully upon the character of the people employed in Saltaire, and in no way is this more apparent than in the neat, tidy, and prettily furnished and adorned homes of the poorest paid operative in the works. These statements are true of the village of Queensbury, where John Foster & Son have works considered as the rival of Saltaire. The weavers at Queensbury earn from 15*s.* to 18*s.* per week on full time, and rents are 3*s.* 6*d.*, or 84 cents, per week for three rooms. The operatives are healthy, and offer the best evidence of the results of the moral tone with which the firm tries to impress all connected with the work.

Some of the best houses in England are to be found at Copley Village, in Halifax, built by James Akroyd & Sons. These houses, which are shown in the plates, are very excellent. They rent, three rooms, for £10 per year, and the operatives are helped to acquire a freehold. The Akroyds believe in raising the moral condition of the people, and their efforts have met with success. They would not work under any other rule than that which recognizes the power of moral forces.

The Crossleys at Halifax have taken the same path. They employ 5,000 people, and take every pains to have them progress in all that makes good men and women. At Ashton-under-Lyne, in one of the worst streets of the town, I found a home of the old type, where a girl of fourteen was in charge of two babies; the mother dead, the father and sister at work in the factory; the family living in a house of four rooms, two above and two below, rent at 84 cents per week, the house poorly furnished and everything in bad condition; but few such places can be found in the town. Here Hugh Mason, esq., M. P., has brought the factory people as a rule up to the line of self-respect. The difference in the homes of those whose employers take an interest in the people and of those whose employers do not is very marked indeed. Rents run from 84 cents to $1 12 per week, according to rooms, for ordinary houses, and the spinners (mule) earn from 35*s.* to 40*s.* per week.

The homes of Salford and Manchester do not equal those of the other places named, although they are very much improved as regards their condition a quarter of a century ago. The poorest houses rent for 84 cents per week, many of them, with four rooms, for $1 08. In Oldham a good house of four rooms rents for 96 cents per week.

Blackburn, which has seen so much turmoil in the past, is passing out of its old condition, and the good results of factory inspection are to be seen. The dwellings of the operatives are of a lower grade than usual in Lancashire; rents are about the same, the poorest houses of three rooms renting for 96 cents per week, while some are as low as 68 cents, including water rates; but many of them are barren-looking houses inside, with but few of those adornments which accompany better moral and intellectual conditions. The houses of the English operative, as a rule, present a wide contrast to those occupied by their insular neighbors. This is true of the factory towns of England generally. At Bolton the houses are excellent, one of four rooms good, but of the lower grades, renting for 84 cents per week. These are usually well supplied with good furniture, pictures, and books. Bolton is the great center for fine cotton-spinning. The model establishment of Messrs. Tootal, Broadhurst & Lee has had a most excellent influence in the town, and shows what can be accomplished when the management recognizes the better operative as the result of a better moral condition. The wages of spinners in Bolton range from 15*s.* to 20*s.* per week.

The factories at Paisley are excellent evidences of the good influence which comes from proper interest in employés. The works of the Messrs. Clark and of the Messrs. Coates are moral establishments, and the influence of model works extends to the homes of the people employed, which are here very comfortable. Rents vary from 72 cents to $2 per week, according to number of rooms.

In Glasgow no cellarages can now be found, and the factory city, which only a few years ago saw more drunkenness, comparatively, than any other, has greatly changed. Wide streets have been cut through the worst quarters, and the dwellers have been driven to the suburbs, where they have changed their cramped city abodes for clean and light homes. This process is constantly going on in Glasgow, and the factory operatives are reaping the benefit of the attempts to purify the town. Belfast, Ireland, a beautiful and prosperous town, is doing much to improve the dwellings of the linen-factory operatives. The cleanliness of the factories has an influence upon all connected with them, and this influence is far-reaching. The houses of the operatives in Belfast are very tidy, the windows, as a rule, being adorned with flowers in summer. Rents are from 48 to 60 cents per week for four rooms. There are houses with flats in Belfast. In the west and east of Scotland the operatives live very largely in flats; rents in Dundee and Dunfermline being, for two rooms, from $15 to $30 per year, and for three or four rooms from $30 to $50 per year.

Upon the continent the observer is happily disappointed, for he finds much better housing for the factory operatives than he could have reasonably expected. The flat prevails to a great extent. At Verviers, in Belgium, the men get from 3 to 4 francs per day wages and the women from 1 franc 75 centimes to 3 francs per day, and pay for rent for four rooms and small garden about $60 per year; for two rooms on second floor, $1 80 per month; for two rooms on third floor, 90 cents per month. These tenements, although small, are comfortable, fairly well furnished, and are adorned with lace curtains, window-gardens, etc. As a rule, the dwellings are very good, but the cottages are much better in every respect than the flat tenements. Many of the houses, with four rooms, cellar, and scullery, rent for $3 per month. This class of houses is very excellent, having separate hallways and being well and neatly furnished.

Among the most substantial houses for workingmen will be found those of Herr Krupp, at Essen, in Rhenish Prussia. These houses compare well with the men employed in the celebrated steel-works at this place. Herr Krupp by his system of employment has the selection of the best mechanics in Europe. This system comprehends all the advantages to be found in model industrial establishments, including excellent tenements and gardens at low rents. A foreman, a gun-maker, earning $45 per month, secures four rooms, a drying-place on the roof, a cellar and a garden for $45 per year. A workman with wages at 75 cents per day pays $37 per year for three large rooms, drying-place, cellar, and garden. These are fair tenements, in two- or three-story blocks, situated in colonies just outside the town. For $100 per year one can obtain a most excellent tenement of seven large rooms, cellar, garden, etc. All the houses in the colonies are owned by Herr Krupp; in fact, he believes that he secures better results by owning everything, and by being able thereby to control the sanitary surroundings of the dwellings of his people. These colonies, each having its name, are laid out with parks, schools, churches, supply stores, etc. Here the working people use a great deal of black bread, but this bread is very sweet and nutritious, and is often found on the tables of those above the operative class, the same as our graham bread is found upon the tables of the rich.

The housing of single men at Essen is on the barrack plan, and is far below the American corporation boarding-house style of housing our single operatives. In the hosiery town of Chemnitz, in Saxony, where men earn in the factories from $2 50 to $5 per week and the women from $1 50 to $2 50 per week, working twelve hours per day, very fair flats of three rooms and a drying-place can be secured on second or third floors for $36 per year. These flats are in high buildings in the center of the town, and, looking at the outside and observing the curtained and gardened windows, a stranger would not take them for the abodes of the factory operatives; but the appearance of the operatives in the mills does not harmonize with the appearance of their dwellings, which are very excellent.

Mulhouse, in Alsace, has had the benefits to be derived from the efforts of active industrial societies, and the dwellings here, which are separate, show the care of the employers. The usual plan of the Mulhouse cottage is to erect four separate houses under one roof, upon a square, each fourth of the square constituting one dwelling. This is illustrated by the plates. The houses have gardens attached; and rents are low, as will be seen from the description of the plates. The Alsatian factory operatives constitute a class by themselves in many respects. They are very neat, the females wearing pretty dresses and having their hair nicely done up, and when they leave the mills they put on a tidy sack, while the men put on a coat, that they may look well upon the street. Bread and vegetables are the chief articles of food, meat not being used so much as in England.

Rouen and Amiens, France, are perhaps typical factory towns, though in all respects not model ones. In the former place the operatives live in all sections of the town, many in what is known as the "poor quarter", and it is well named. This locality contains the oldest houses in Rouen, and they are very poor indeed. By far the greater proportion of the operatives live in quite comfortable houses, some flats, some cottages, but there is not much attempt to improve them. The factories, in fact, are not as clean and tidy, free from dust, and well ventilated, as are those at Amiens, where the houses and the factories are very good; in fact, the poorest dwellings in Amiens are as good as the better ones in Rouen. The operatives of Amiens use good food, and their tables at tea time presented, with white bread and neat table furniture, an inviting appearance. The window-gardening of the operatives' houses adds much to their attractiveness, and gives a thrifty appearance to the humblest home.

In this brief notice of the homes of operatives I have intended to call attention to types only. It should be stated that the houses in Great Britain and on the continent are of stone or brick, as the locality may afford, and the neat wood cottage of America cannot be found.

The operatives constitute a study in themselves. They differ in appearance as much as in nationality. In the British factory they wear woolen clothes, and do not change them as they go upon the streets; but of a Saturday afternoon or evening they are found well dressed and usually well behaved. In the factories their woolen clothes give them an untidy appearance. In Belgium and Germany the blue linen blouse prevails; it looks clean, and is so, but it constitutes the street as well as the factory dress for the men, while the women wear loose, untidy clothes. In France, as stated, the female operatives take pride in their dress and hair, and in the mills they look as bright and as comely as do the bonny operatives in the thread-mills at Paisley, Scotland, perhaps the finest body of operatives in the world.

It is quite impossible to compare the homes of European factory operatives with those of the same class in America. The great mass of the former are, generally speaking, quite as well housed as the latter, so far as the quality of house is concerned; but, so far as quantity of room and excellence of living are concerned, the advantage is with the operatives of America. The European has, as a rule, the advantage of lower rents. It is also difficult to make a comparison, because systems differ. In American factory towns the corporation boarding-house was a necessity when the factory was assured, because the employés were largely single people from the farming towns. These boarding-houses offered and continue to offer good rooms and good and ample food. I had the pleasure a few years ago of taking a British manufacturer into one of these boarding-houses at dinner time, and he was extravagant in his praise of the table. It would be impossible to find in an operative's home in Europe a table half as well spread as that of a corporation boarding-house in New England.

The boarding-house led to the corporation tenement-house for families, and this, too, is quite unknown in Europe; it is oftener met with on the continent, where the higher classes take to flats, than in Great Britain; but it cannot be compared to the small, compact, individual houses of the British operatives.

In Europe, too, the operatives have been of one nationality, generation succeeding generation. The English operative's home is the type of the English workingman's order of being; so with the home of the French, the German, and the Belgian operatives respectively. In America we have not kept the operatives of one nationality long enough to develop a type. And yet when the operative of this country steps out of the boarding- or the tenement-house he steps into an individual home the equal of which cannot be found in the factory towns of the Old World. The plates presented with this chapter clearly illustrate this fact. The cottage of the American factory operative, when he sees fit to occupy one, is superior to the cottage of the workingman of any other country. It is most gratifying to know that the individual homes are not only increasing in number very rapidly in this country, but that they are increasing in influence. In Lowell, Lawrence, Fall River, Pawtucket, Cohoes, and in fact in all the leading factory towns, this is the course of progress. And the more rapidly the increase takes place the more rapidly will the filthy, crowded places called homes, which some of our operatives insist upon inhabiting, disappear.

In this country the individual house usually has a few thousand feet of land about it, and the operative is stimulated by the prospect of proprietorship to save his money and become the owner of the estate. Our land laws offer no obstacle, and when the corporation gives encouragement the success of the operative in becoming the owner is easily assured. If he will let beer alone and he and his family live cleanly, the operative can thrive; if he says he cannot, let him see that others can, and learn that the fault is his own, when his employer is willing to encourage by easy terms his way to ownership. In too many instances no inducements are offered by the corporation for the operatives to better their condition in these respects. In such cases there is excellent opportunity for building societies, as at Mulhouse, Halifax (England), Philadelphia, and many other places. There never was a time in the United States when so much was being done to house the operatives as at present, and it is to aid this work everywhere that I have dwelt to such length upon the homes of the operatives and given so many details of such homes in other lands. That the model dwellings of different countries may be studied and compared, I have had a series of plates prepared, which truthfully and accurately represent the best houses occupied by operatives in England, Belgium, Germany, France, and the United States. With two exceptions I have examined the houses represented, and can testify to the faithfulness with which the plans have been drawn.

PLATE I. *Operatives' houses built by James Akroyd & Son, at Akroydon, near Halifax, England.*—The plate shows a block of ten houses, each independent as to entrances, yard accommodations, etc. The houses are built of rubble masonry, and the yards contain water-closets and receptacles for rubbish. Two arrangements of tenements are contained in this block, as will be seen from the plan. The minimum accommodation afforded is three rooms per tenement, including the chambers on the second floor. The plate also shows plans of operatives' cottages at Copley Village, near Halifax, England.

PLATE II. *Workingmen's houses of M. Menier, at Noisiel, Seine-et-Marne, France.*—The cost of a house is $855 60. The houses are not sold. The walls are of brick, with apparent joints. The roof-covering is of tiles. The chimney necks or caps are of brick, and are covered with a piece of earthenware, which receives the chimney-pots. The fences on the streets are 5 feet 2 inches high. They are composed of a little brick wall, 4½ inches thick and 2 feet 7 inches high, supporting a trellis of the same height. Each water-closet has its cask refilled, when there is need for it, at the cost of the works. Each house is inhabited by a single family. The garden is used for raising vegetables. The cellars are ventilated by tubes placed in the middle or partition walls. The water from the kitchen runs into dirt-holes or heaps in the rear of the houses. There is no sewer in the middle of the street. The streets are shaded by trees placed on the sidewalk. The houses are perfectly ventilated. Water is obtained at the water-posts.

PLATE III. *Workingmen's houses at Verviers, Belgium.*—The selling-price of a house is $744, payable part down and the rest annually. The roofs are covered with Holland tiles. The gutters are of zinc. The window-sills and the stairways are of stone. The society erecting these houses furnishes to workmen a house consisting of four rooms and a kitchen at the price usually charged for the rent of two rooms. The price of the houses has been raised, to prevent speculators from buying them in the name of workingmen, which has been too often done, and also to prevent subletting. The heating is done by stoves. Two chimney-pipes go up in channels in one of the walls. The floors of the third story are of pine; the interior stairway is of beech. The ceiling or floor above the cellar is plastered. The kitchen is paved with tile or brick. The refuse is employed in the garden. The principal room can serve for a shop or a workshop. Two styles of houses are shown, but this general description applies to both.

PLATE IV. *Workingmen's houses in Mulhouse.*—The cost of a house is $433 65; the price of 192 square yards of land is $29 76; total, $463 41. Price of a group of four, built in 1864, $1,734 63. The yearly rent is $34 88. The tenant becomes owner at the end of fifteen years by paying $1 12 more a month. The houses are coated with mortar made of hydraulic stone and river sand. The stone is colored white, yellow, or gray. The sills of the windows are of stone, as well as the thresholds of the doors. The lintel-bars are of round iron. The houses are separated by lattices made of oak laths. The framing of the windows is of stone without projections. The area covered by the house is 38.69 square yards. The chimney-shaft is of brick. The roof is covered with tiles. The gutter is of tin, with three coats of paint. A ventilating-pipe runs from the drain to the roof. The stairway is lighted by means of a glazed skylight upon the roof. In Alsace the workingmen generally prefer to have the privies in the garden. The inside of the drains is covered with a coating of cement; the bottom is of concrete. The people generally use the house refuse with the remains of vegetables and straw for their gardens. The partitions of the privies are of wood, and they are covered with tiles. The refuse water of housekeeping runs into the city sewer. Water is furnished by pumps set over well-holes dug 26 feet deep, and disposed along the sidewalks. The 144 square yards of garden supply vegetables, worth, at market prices, $11 16 yearly. The smoke-pipe, of sheet-iron, leaving the stove in the dining-room, connects with a pipe of double-burnt earthenware, to avoid condensation in going through the kitchen.

PLATE V. *Workingmen's houses in Mulhouse.*—The price of a group of houses is $1,971 60. The area covered by a house is 52.76 square yards; the total area covered by a house and garden is 180 square yards. The

monthly rent is $2 60. The lintels and window-sills are of stone. On all the stone lintels there are delivery-pipes. The walls are covered with a speckled rough coating in hydraulic stone and mortar. The rain-water, with that for the kitchen, runs away through paved trenches near the sidewalks until it reaches a sewer. The houses are embanked outside. By paying $3 72 a month, instead of $2 60, the tenant becomes the owner at the end of fifteen years.

PLATE VI. *Workingmen's houses of Mr. Krupp, colony of the Three Linden Trees.*—The price of a group of four houses is $4,185. The price for one house, including the land, is $1,046 25. The annual rent of two rooms with a cellar varies from $20 93 to $25 11 yearly in a house with stories. The rent of a house in this group is from $37 20 to $41 85 a year. The refuse matter is taken by the peasants of the surrounding country, who use it as compost. The roof is covered with tiles. The exterior walls are of rubble stone or ashler; the interior partitions are of wood. The window-sills and the stairways are of stone. In 1876 Mr. Krupp, to accommodate his workmen, constructed 3,277 tenements, which are occupied by 16,700 persons. On account of the rapid development of his works he has been obliged to build houses with stories. They are obliged to give every family a separate entrance. This plate also shows a group of two houses arranged for four families. In this group the annual rent of a tenement composed of four rooms is $41 85. The employés of Mr. Krupp pay their rent once in three months. The rent of the workingmen is regulated by reserves made from their pay, which is carried into effect every fifteen days. The rent of widows is paid by the benefit societies. The inspectors prevent the workingmen from crowding themselves in the tenements. They expel workingmen who live in too small tenements.

PLATE VII.—This illustrates other houses erected by Mr. Krupp at Essen, in which the framework shows upon the outside.

PLATES VIII, IX, X, XI.—The plates represent wooden cottages built by the Willimantic Linen Company at Willimantic, Connecticut. With each cottage there is quite a garden of several thousand feet of land. The rent is from $60 to $125 per year, according to size. These houses are located in such a way as to exhibit variety of styles; that is, two of like architecture are never placed side by side. The company has about 40 of these houses at the present time, occupied by operatives and overseers.

PLATES XII, XIII.—These represent houses of the Ludlow Manufacturing Company, at Ludlow, Massachusetts. They have erected thirty of these, which they sell to overseers and operatives or rent to them when they show a disposition to take good care of the tenements. But in the tenement-houses of the corporation recently erected the rooms are fully as large as shown in the cottages, and each tenement has a separate front and rear entrance and a cellar. The cottages shown on the plates have from one-quarter to one-half an acre of land each, and they rent as follows: Cottages shown as Fig. 1 of each plate rent for $8 per month; those shown as Figs. 2 and 3 of Plate XII and Fig. 3 of Plate XIII, at $7 per month; that shown as Fig. 2 of Plate XIII, at $6 per month. In case these cottages are rented to parties not operatives the rents are higher.

Very many more cottages might be shown, which have been built by concerns whose managers feel that they owe something beside wages to the labor which they congregate in the factory. The efforts to secure good homes for their operatives made by the Cheney Brothers, at South Manchester, Connecticut; the Fairbanks Company, at Saint Johnsbury, Vermont; the Hazards, at Peace Dale, Rhode Island, and by hundreds of firms and establishments might be described; but the instances given and the plans shown will illustrate the spirit which is finding emphatic expression all over our country wherever the factory system prevails and men have seen the necessity of improving the generation which will soon occupy our factories and workshops. If the typical houses shown are reproduced by building societies and manufacturing corporations the very best results will follow.

THE FUTURE OF THE FACTORY SYSTEM.

Whether the factory system can be made the ideal system of industry depends upon the men in charge of great industrial enterprises. Whether it can be made the ideal system or not, it will remain, for the large system of production cannot fall back to the small method. Industrial copartnership, or co-operation even, must find a foothold with the factory system, not without it.

The fact that the factory has stimulated the growth of such magnificent model industrial establishments as the Familistère at Guise or the printing works at Tours, France, is sufficient to convince one not too sordidly disposed that the factory is capable of producing the very highest results in raising the lowly. When we consider what the first century of the system has accomplished—and really its work has been done in half a century—we may well speculate as to the future of so powerful an element in our social and industrial conditions.

It is obvious, from all the facts presented, that the factory system has not affected society so badly as has been generally believed; and if in its introduction it has brought evils to light, it has at the same time not only sought to remove them, but has done much to remove others. The unheard-of power it has given labor, the wealth that has sprung from it, are not the sole property of any class or body of men. They constitute a kind of common fund, which, though unequally divided, "as are all the gifts of nature to finite understandings," ought "at least to satisfy the material and many of the moral wants of society". (*a*) The weal or the woe of the operative population

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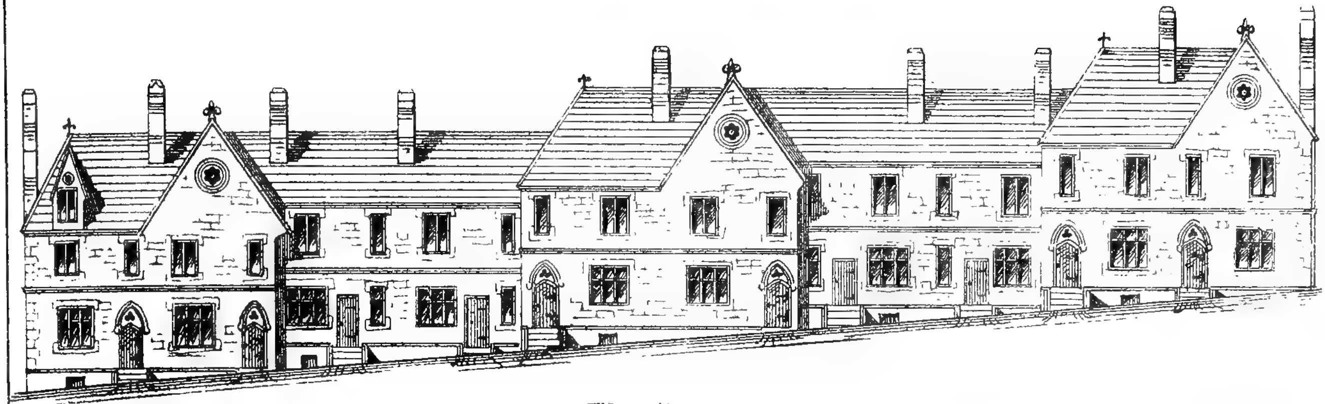
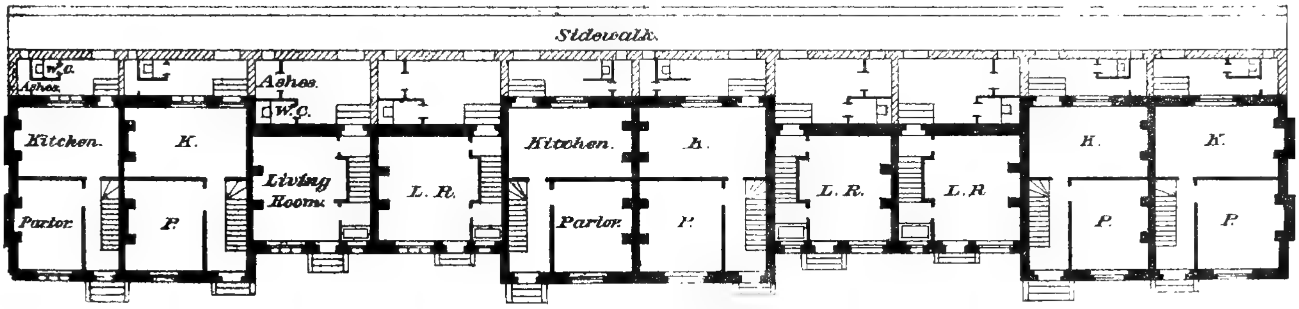
a Reybaud.

PLATE I

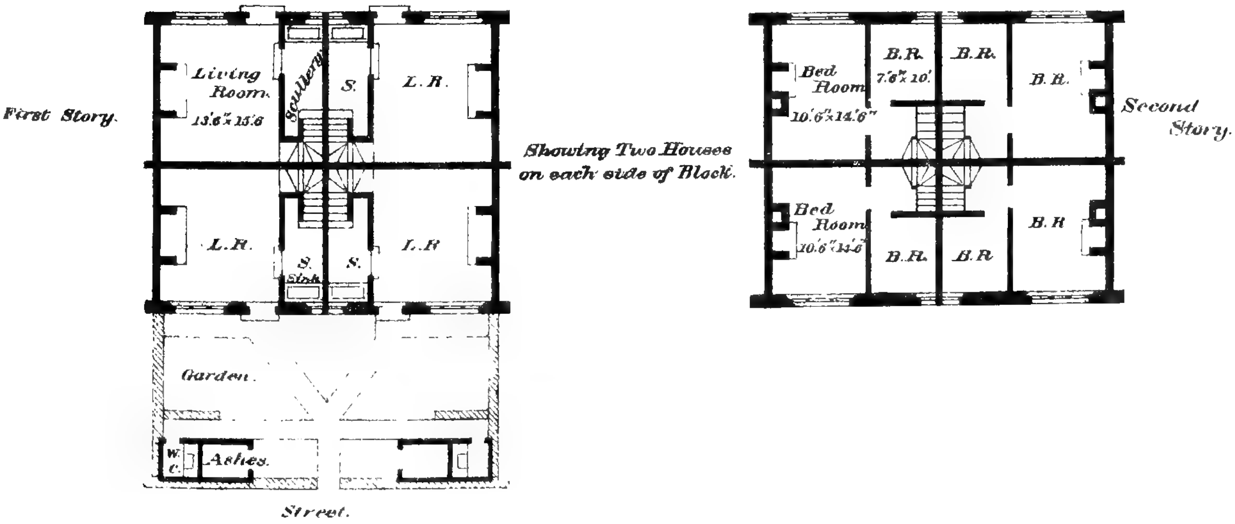


Elevation.

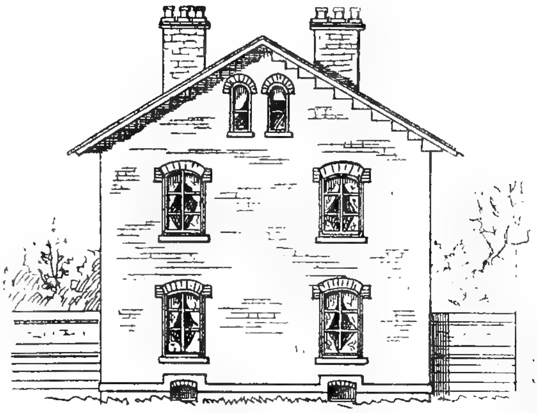
HOUSES AT AKROYDON, NEAR HALIFAX, ENGLAND



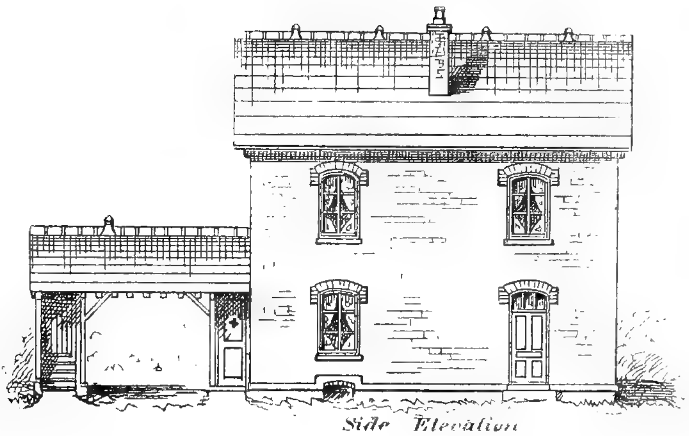
Plan of Ground Floor.



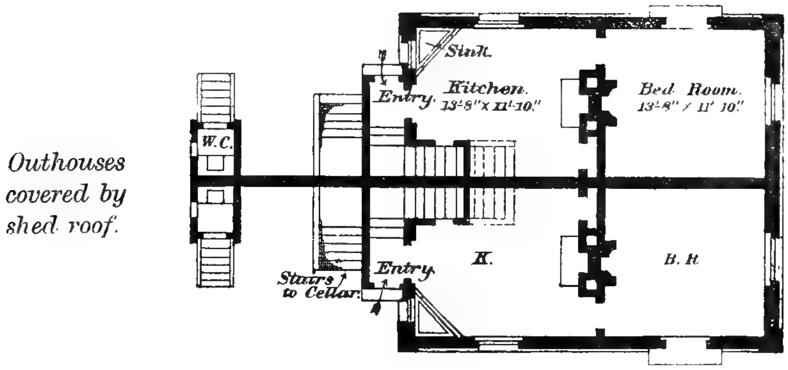
HOUSES AT COPLEY, NEAR HALIFAX ENGLAND



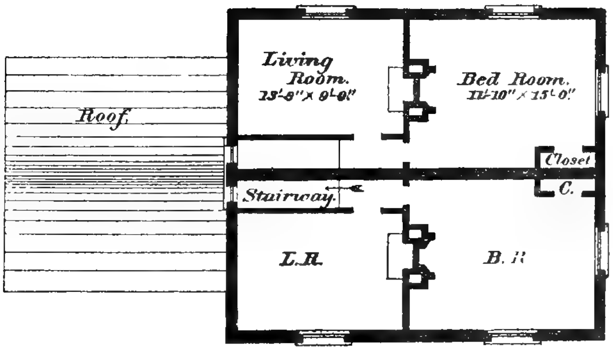
End Elevation.



Side Elevation


Outhouses covered by shed roof.
W.C.
Sink.
Entry.
Kitchen. 13'-8" x 11'-10."
Bed Room. 13'-8" x 11' 10."
K.
B. R.
Entry.
Stairs to Cellar.

Plan of First Story.

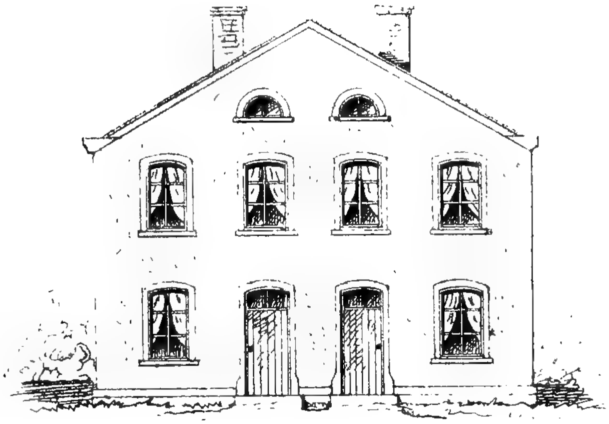


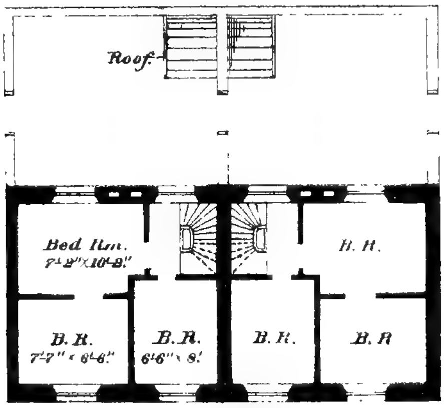
Plan of Second Story.

GROUP OF TWO SEMI-DETACHED HOUSES

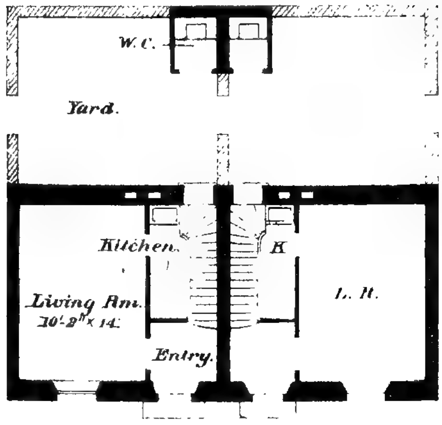
AT NOISIEL, (Seine-et-Marne), FRANCE

PLATE III.


Elevation.

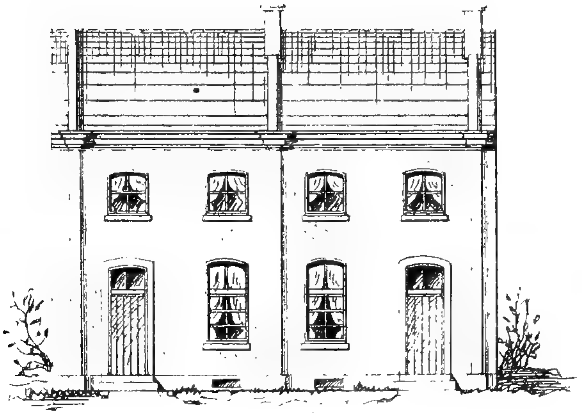


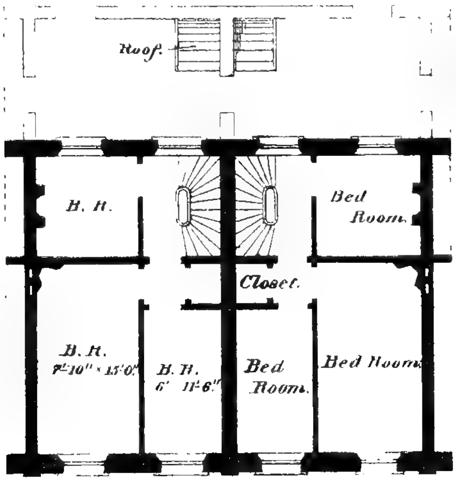
Second Story



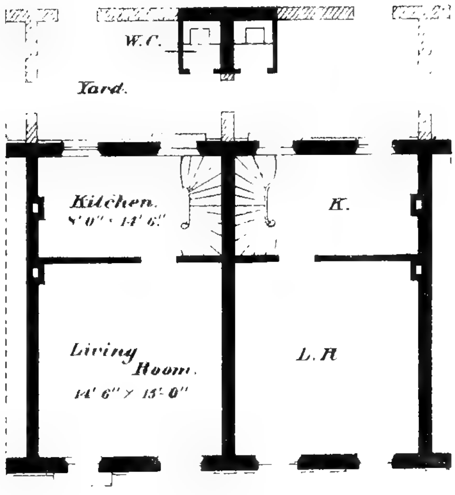
First Story.

Two semi-detached houses


Elevation.



Second Story.

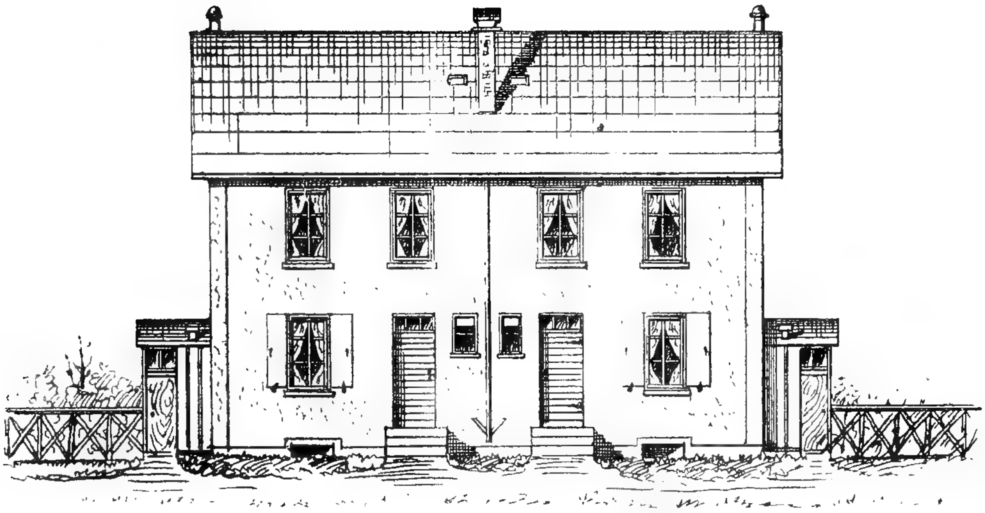


First Story.

Two houses of a group contained in a block

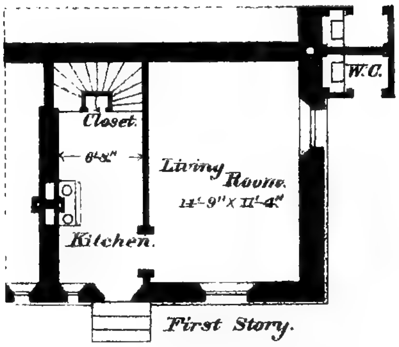
WORKMEN'S HOUSES AT VERVIERS

PLATE IV.

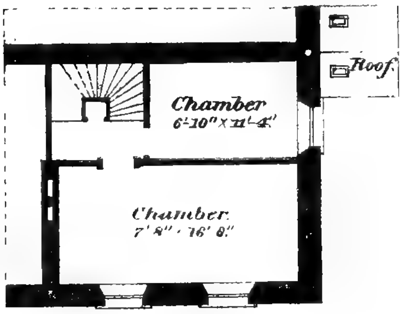


Elevation.

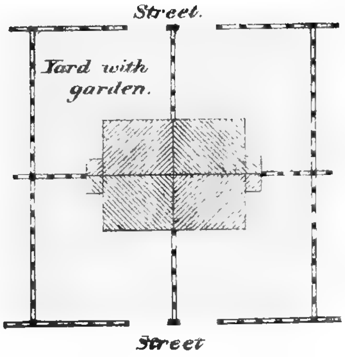
HOUSES AT MULHOUSE.



First Story.



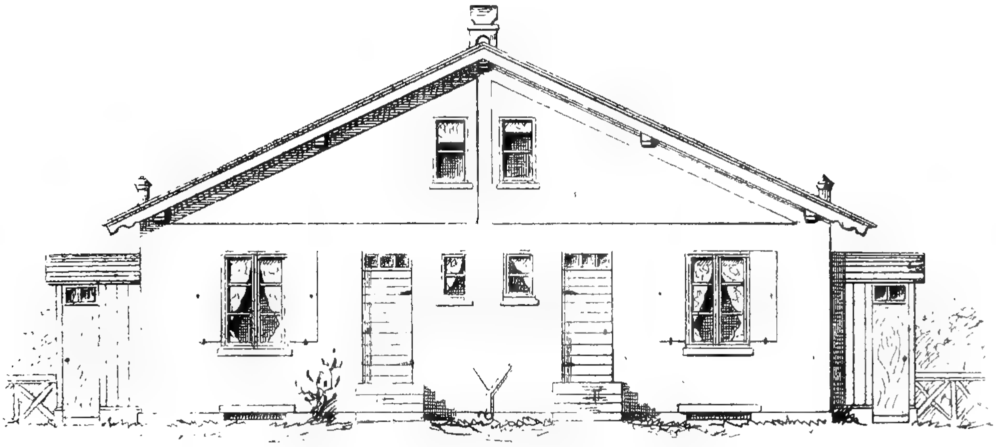
Second Story.



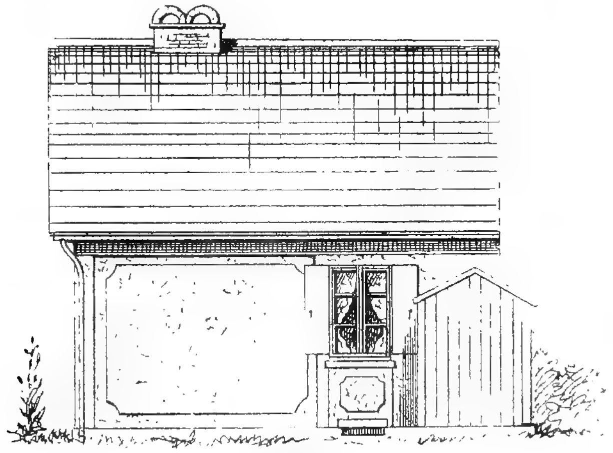
Block plan, showing arrangement of block upon the lot.

Each block contains four houses.

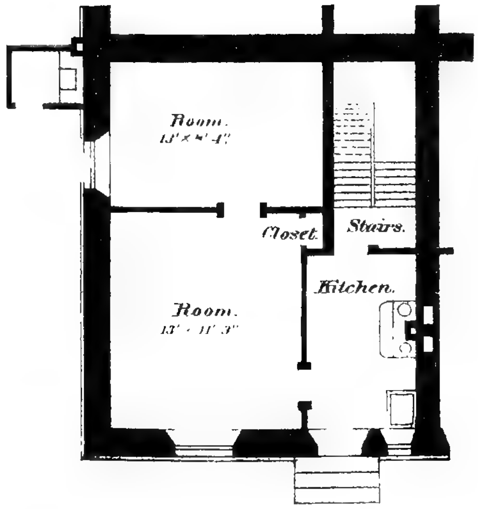
PLATE V.

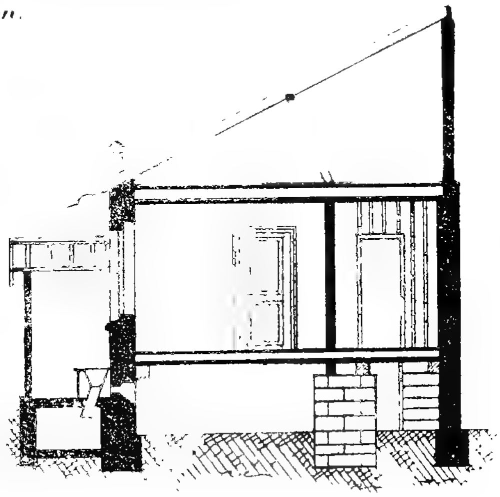


Elevation.
Front.



Elevation.
Side.





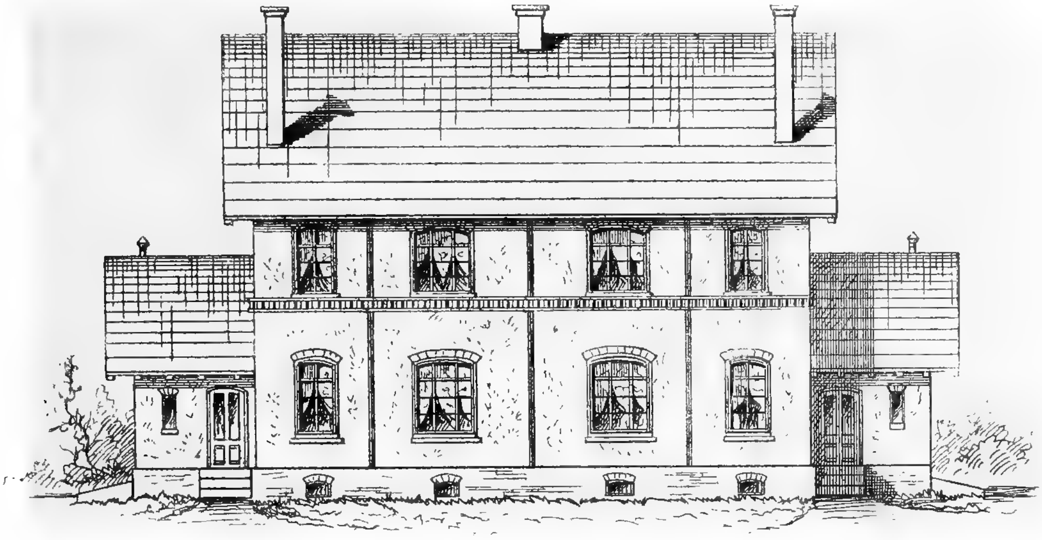
Section

Plan.
One-fourth of block.

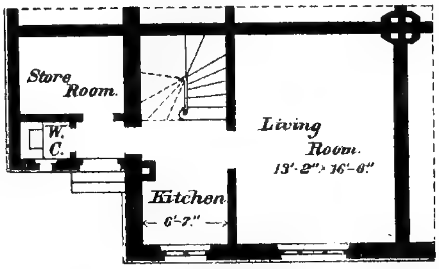
HOUSES AT MULHOUSE

(Four houses in each block)

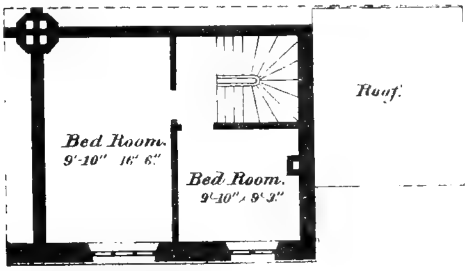
PLATE VI.



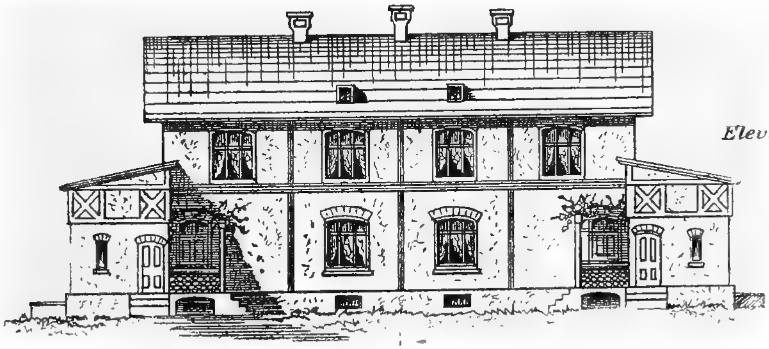
Elevation.



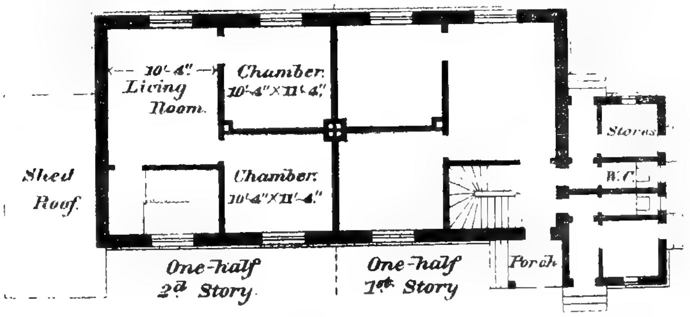
First Story.



Second Story.



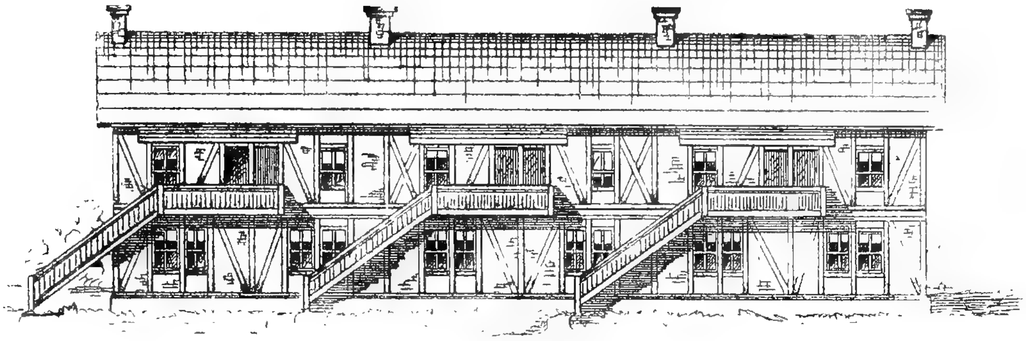
Elevation

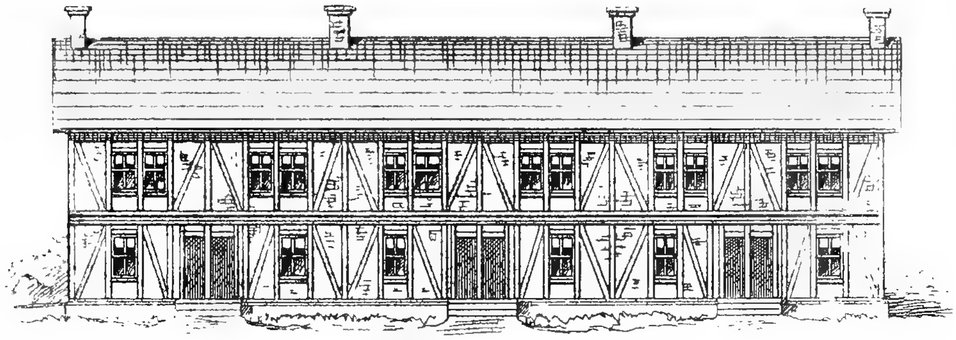


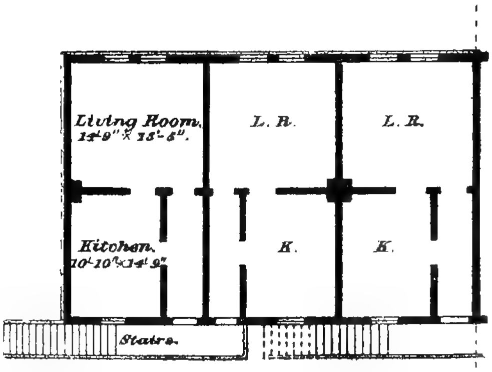
HOUSES AT THE WORKS OF F. KRUPP

(Each tenement forms one-fourth of the block.)

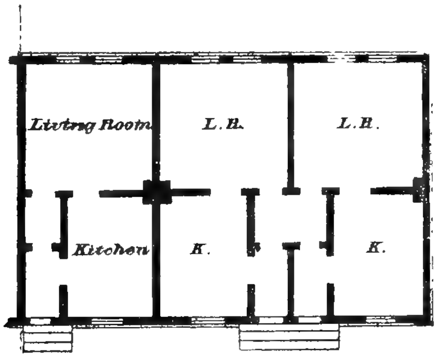
PLATE VII


Front Elevation


Rear Elevation.



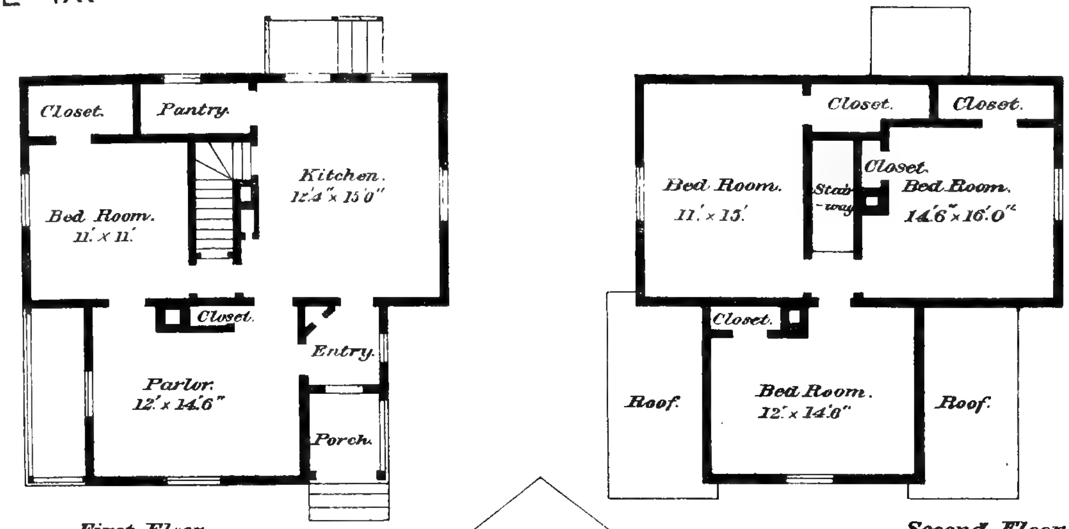
One-half Plan of Second Story



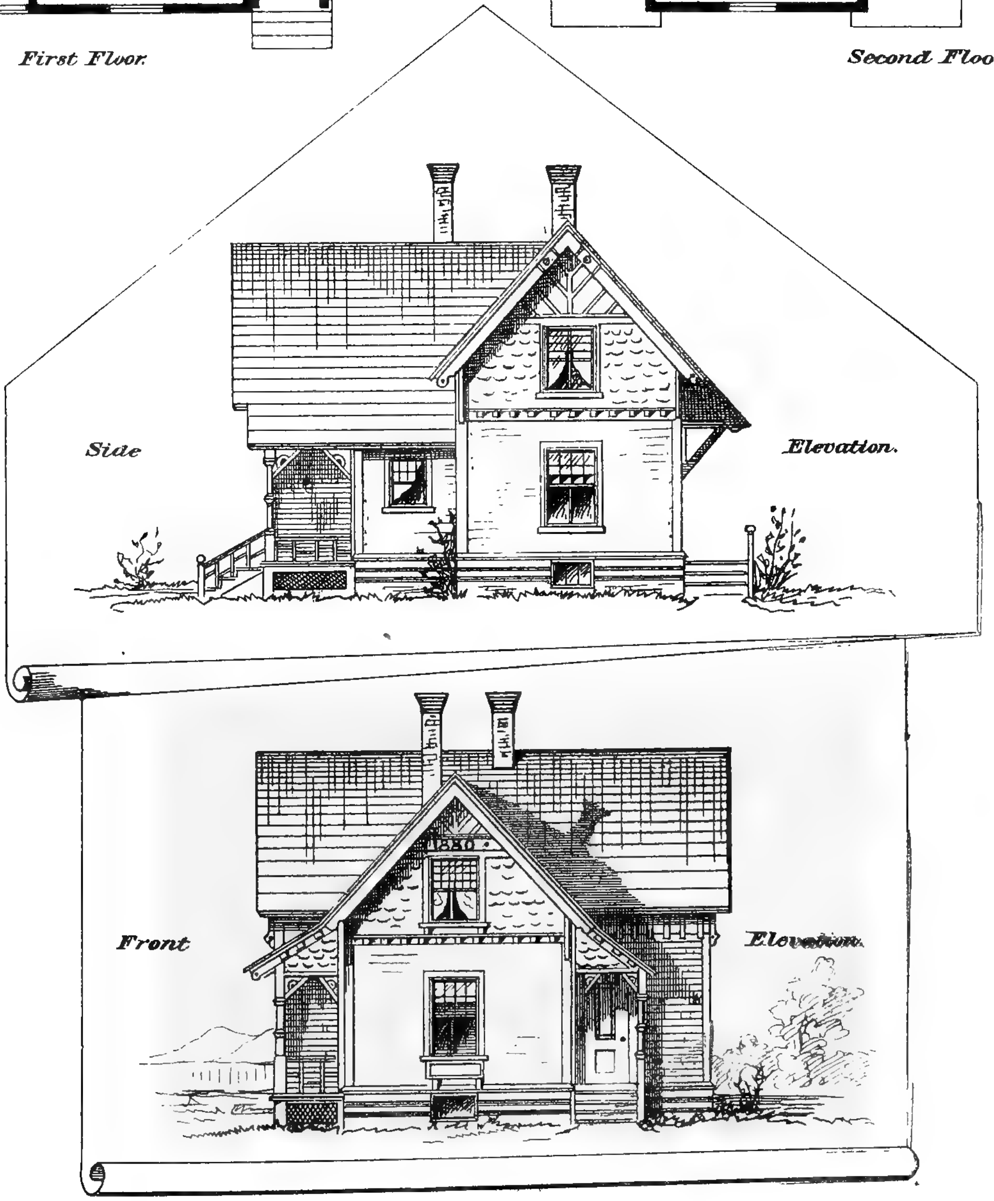
One-half Plan of First Story.

HOUSES AT THE WORKS OF F. KRUPP

PLATE IX.



First Floor. *Second Floor.*



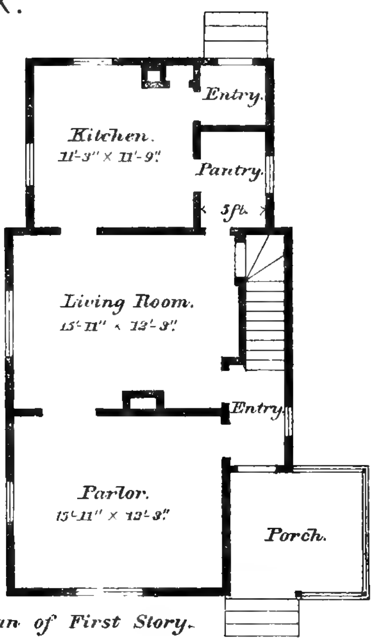
Side Elevation.

Front Elevation.

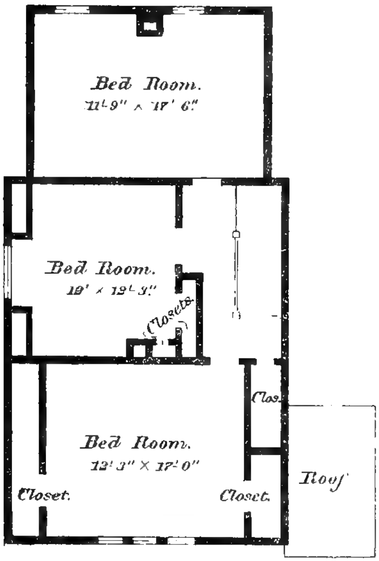
COTTAGES FOR THE OPERATIVES OF THE WILLIMANTIC LINEN COMPANY,

WILLIMANTIC, CONNECTICUT.

PLATE X.



Plan of First Story.



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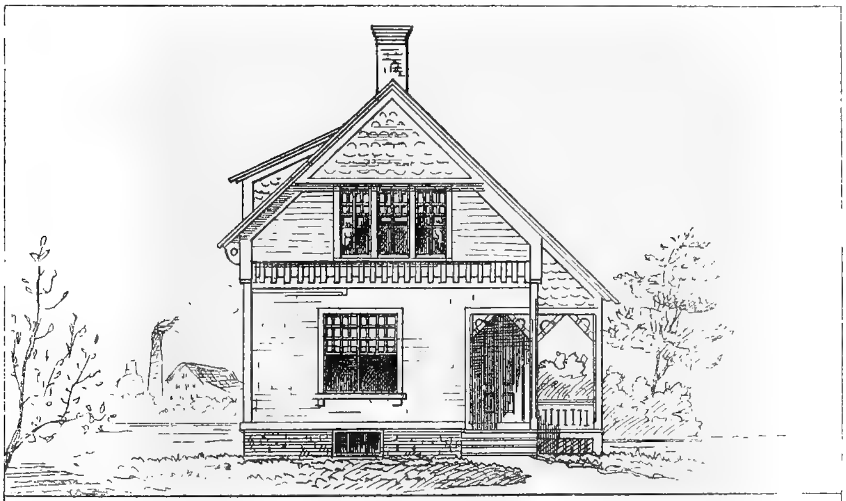
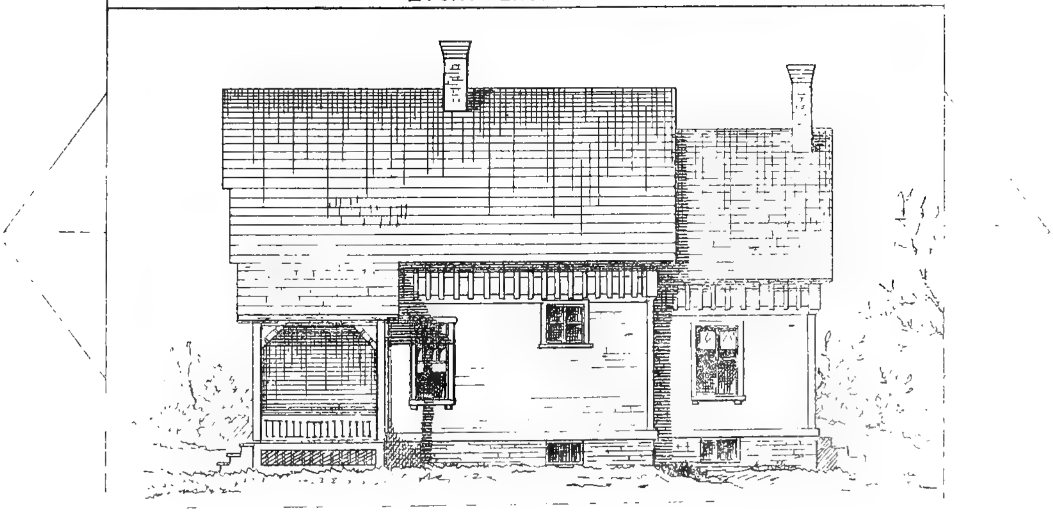


Front Elevation.



Side Elevation.

OPERATIVES' COTTAGES AT WILLIMANTIC, CONNECTICUT.

ERECTED BY THE WILLIMANTIC LINEN COMPANY

HOUSES AT LUDLOW, MASS.

ERECTED BY THE LUDLOW MANUFACTURING COMPANY

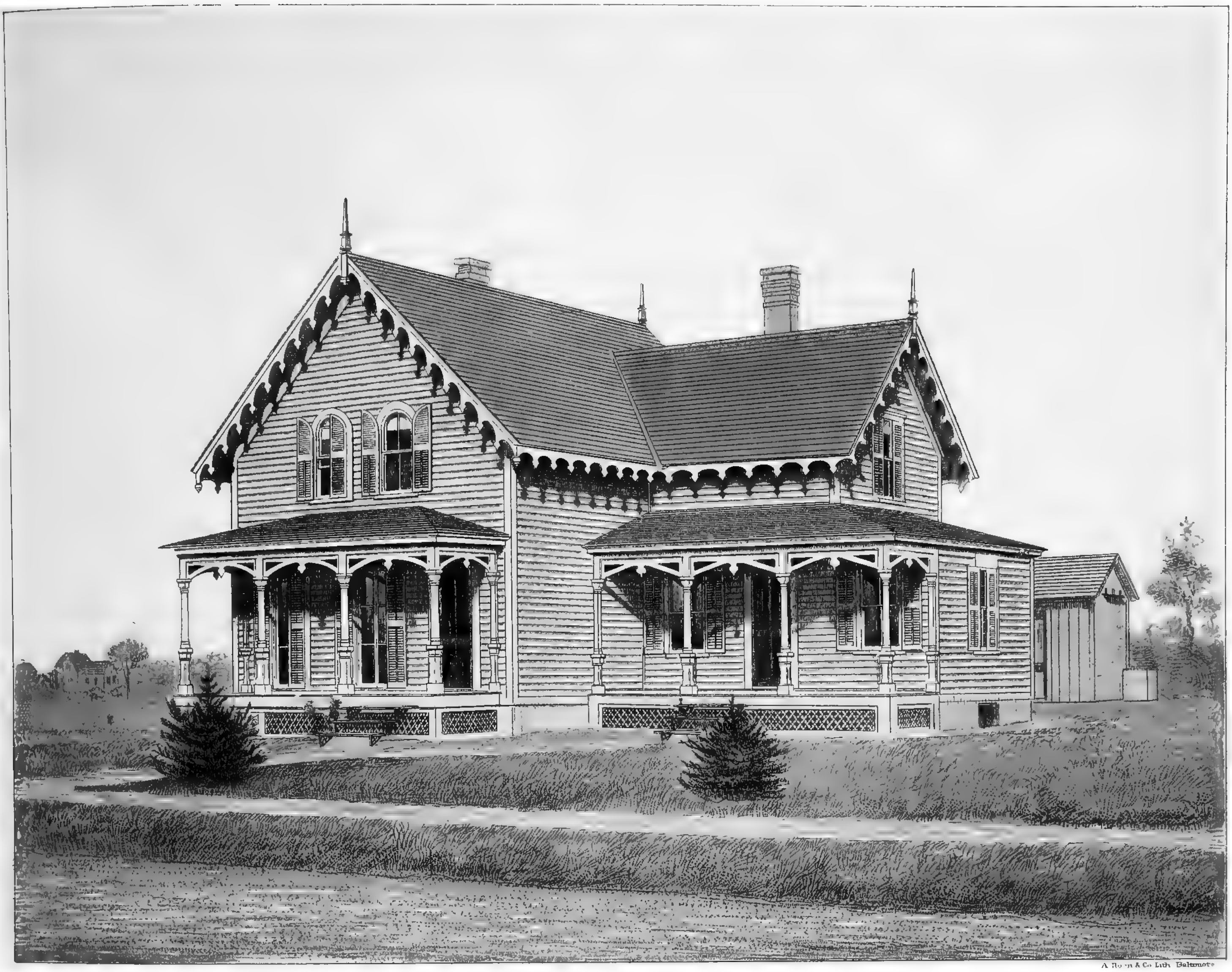


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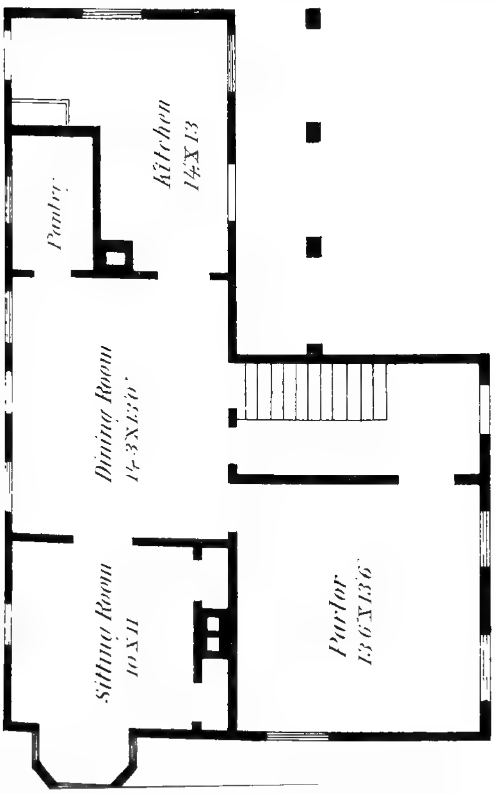
FIG 1 PERSPECTIVE VIEW



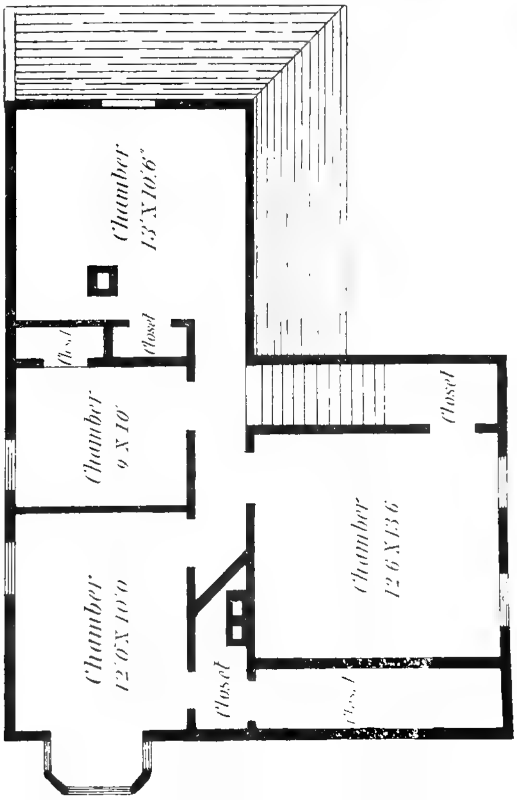


PLATE XII

HOUSES AT LUDLOW, MASS.

ERECTED BY THE LUDLOW MANUFACTURING COMPANY

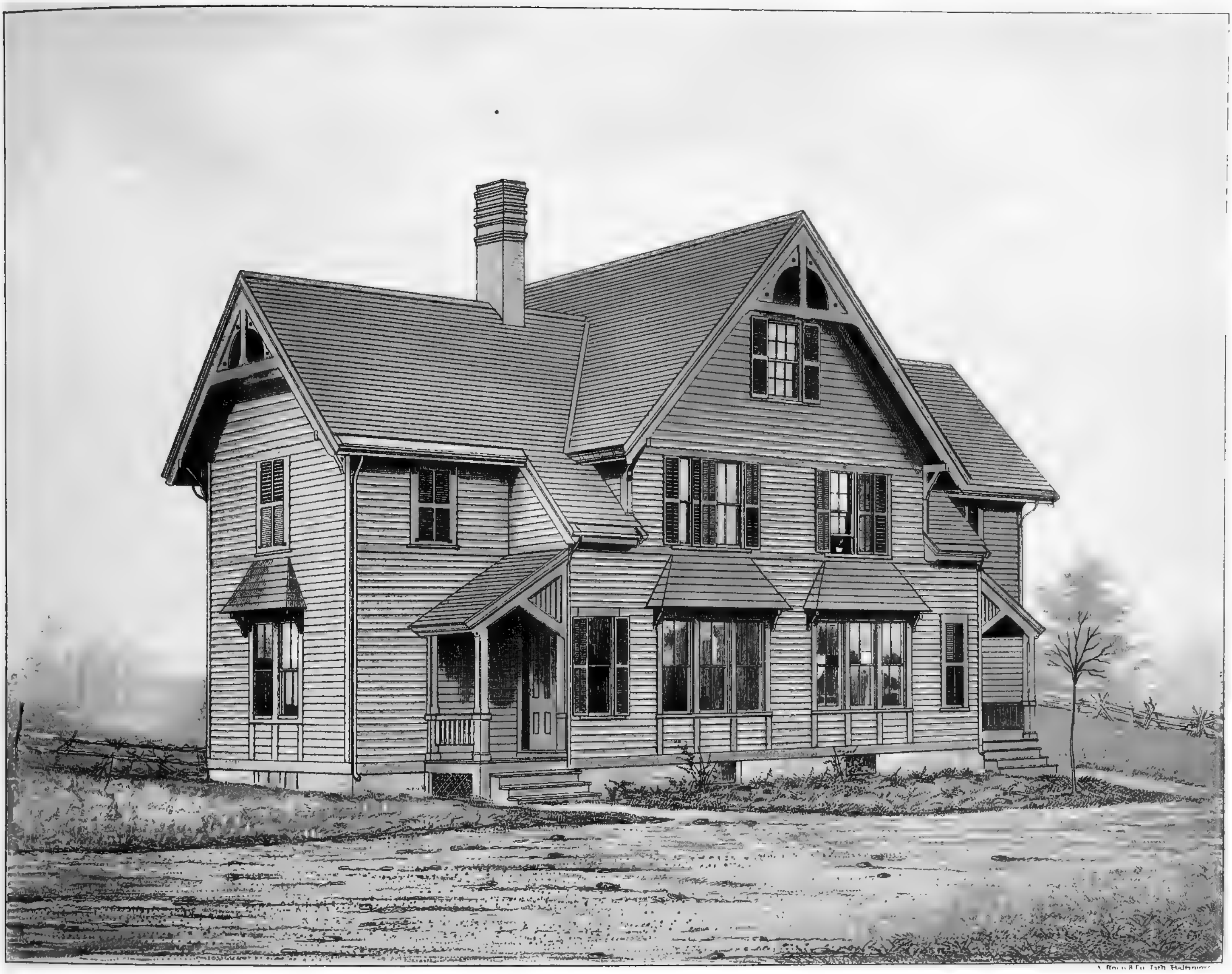
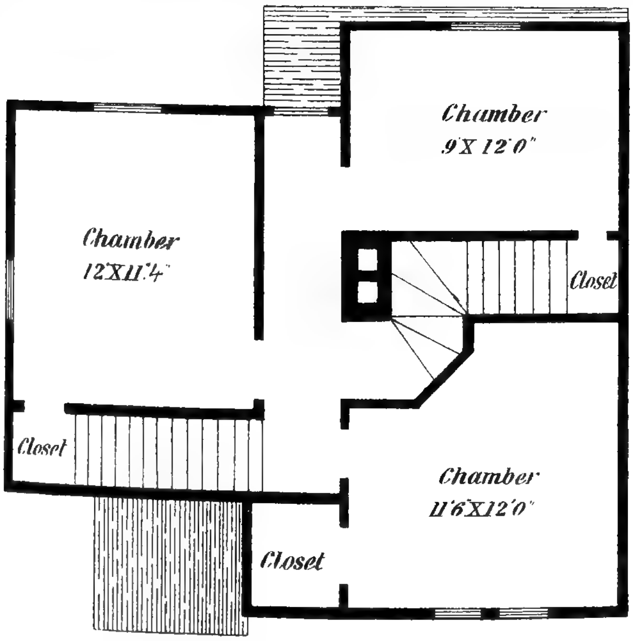
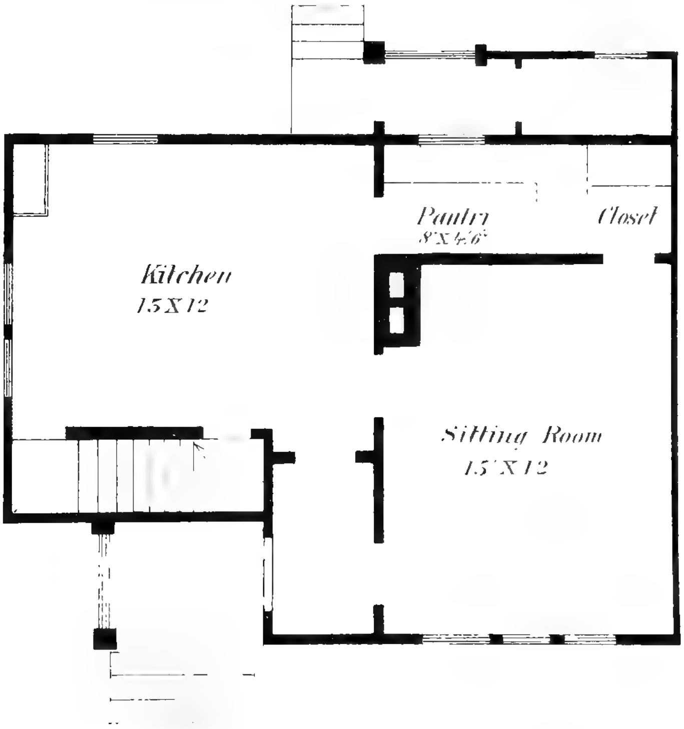


FIG 2 PERSPECTIVE VIEW





HOUSES AT LUDLOW MASS.
ERECTED BY THE LUDLOW MANUFACTURING COMPANY

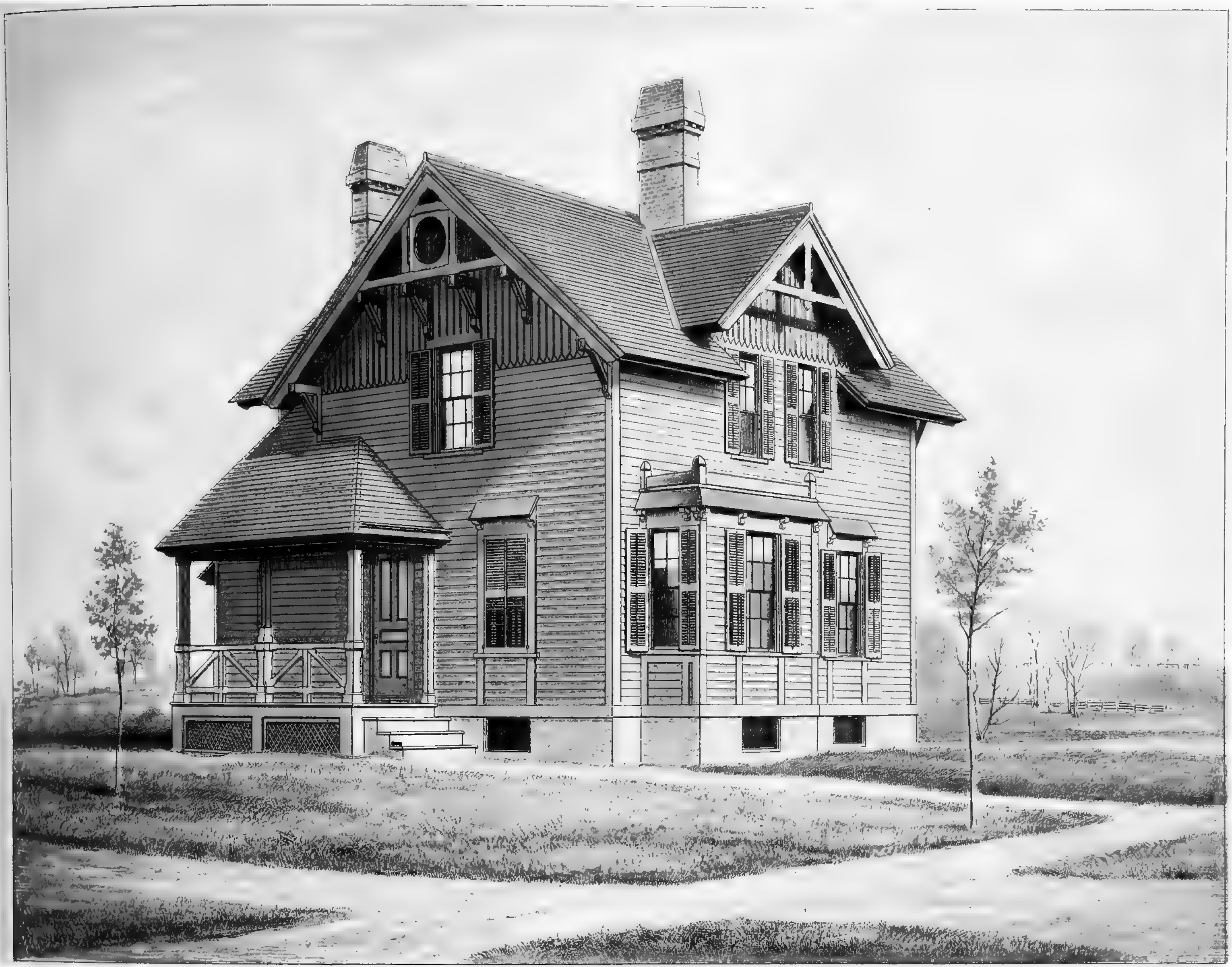


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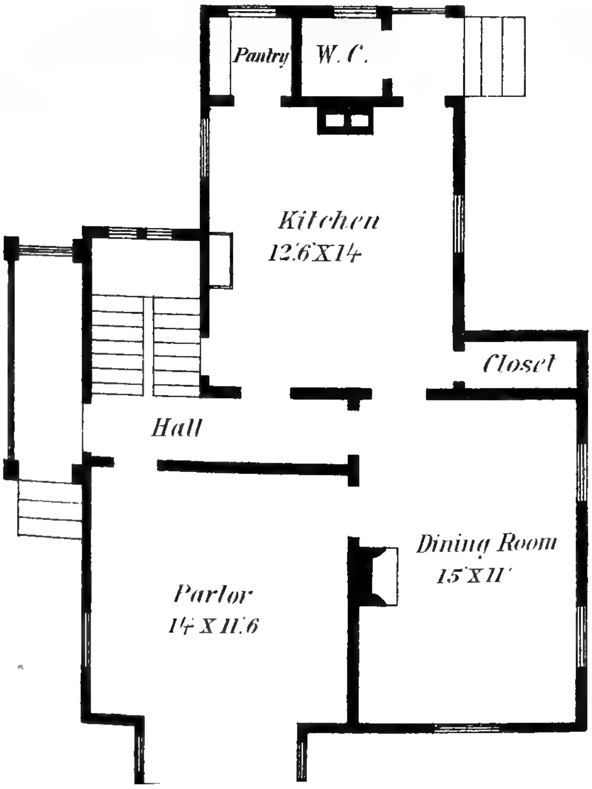
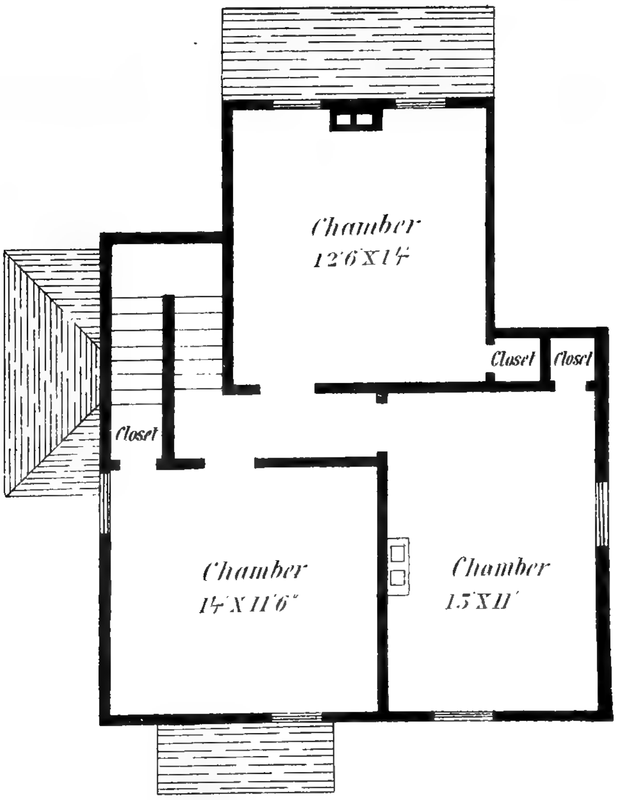
FIG 3 PERSPECTIVE VIEW





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ERECTED BY THE LUDLOW MANUFACTURING COMPANY

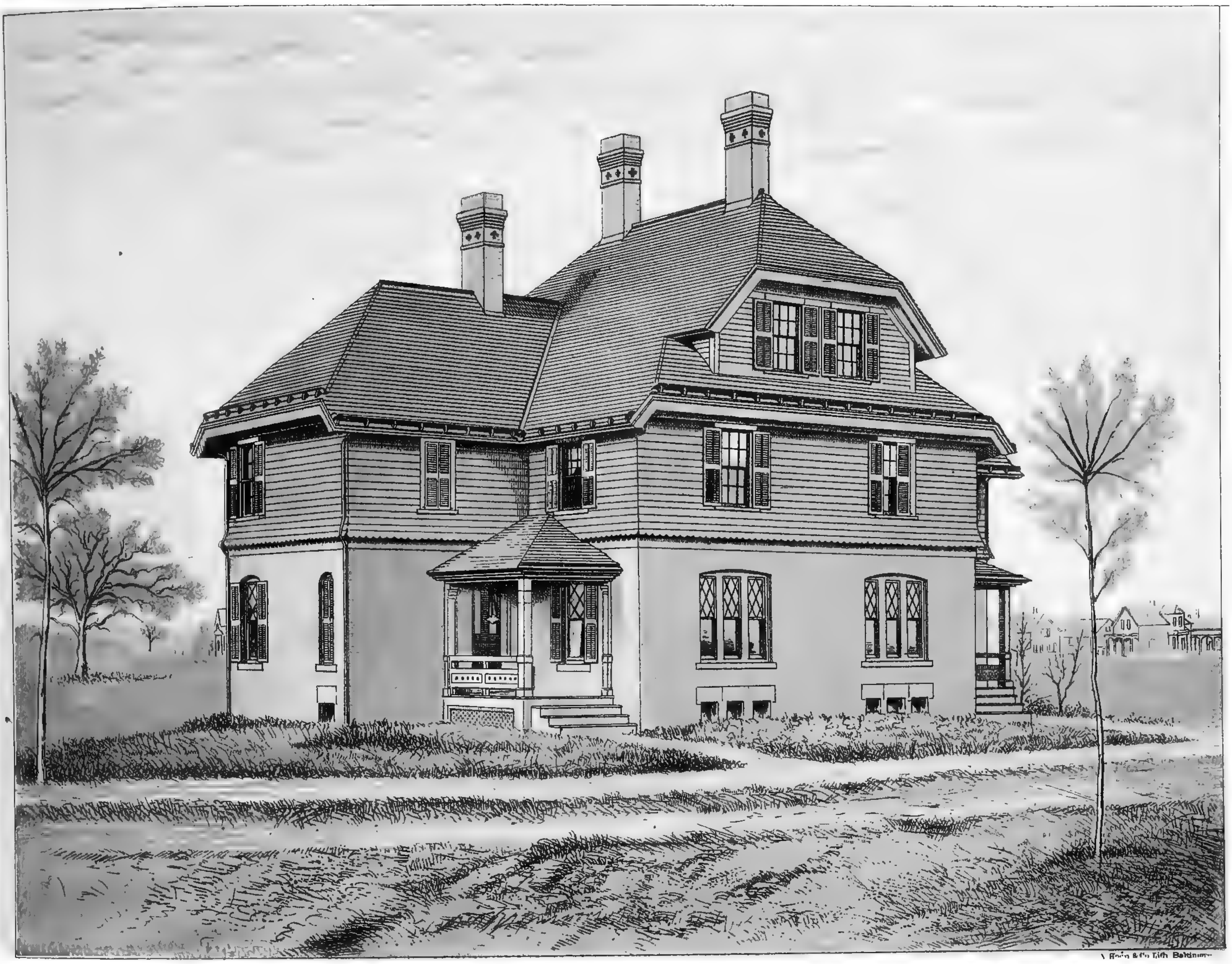
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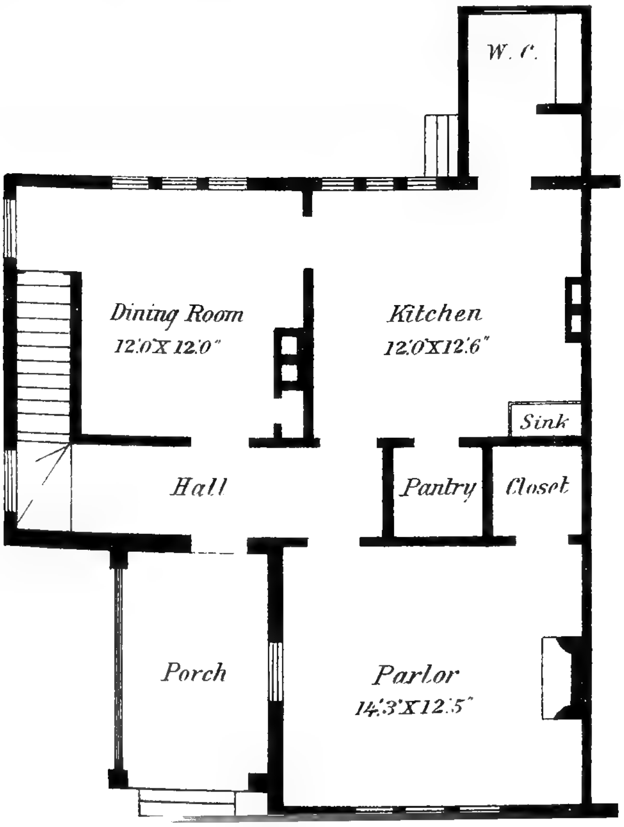
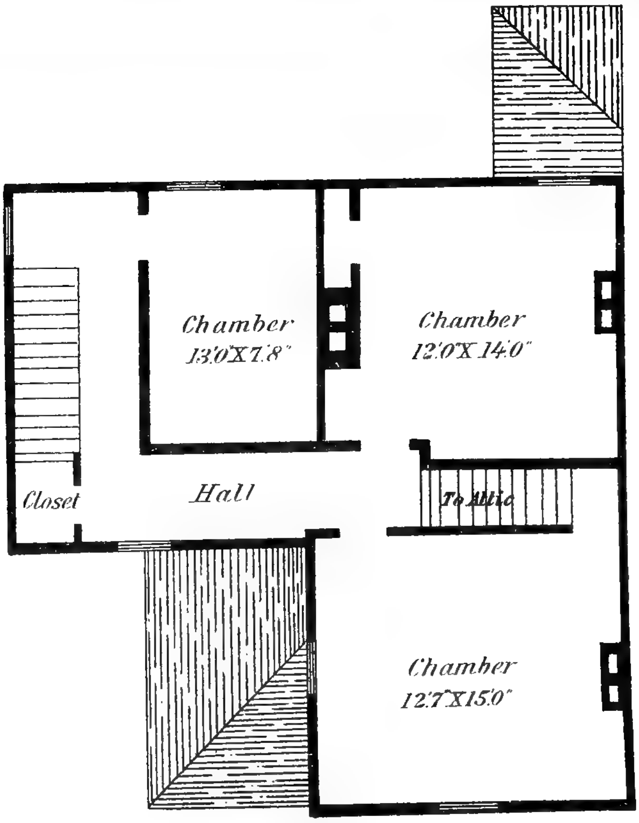
FIG 1 PERSPECTIVE VIEW





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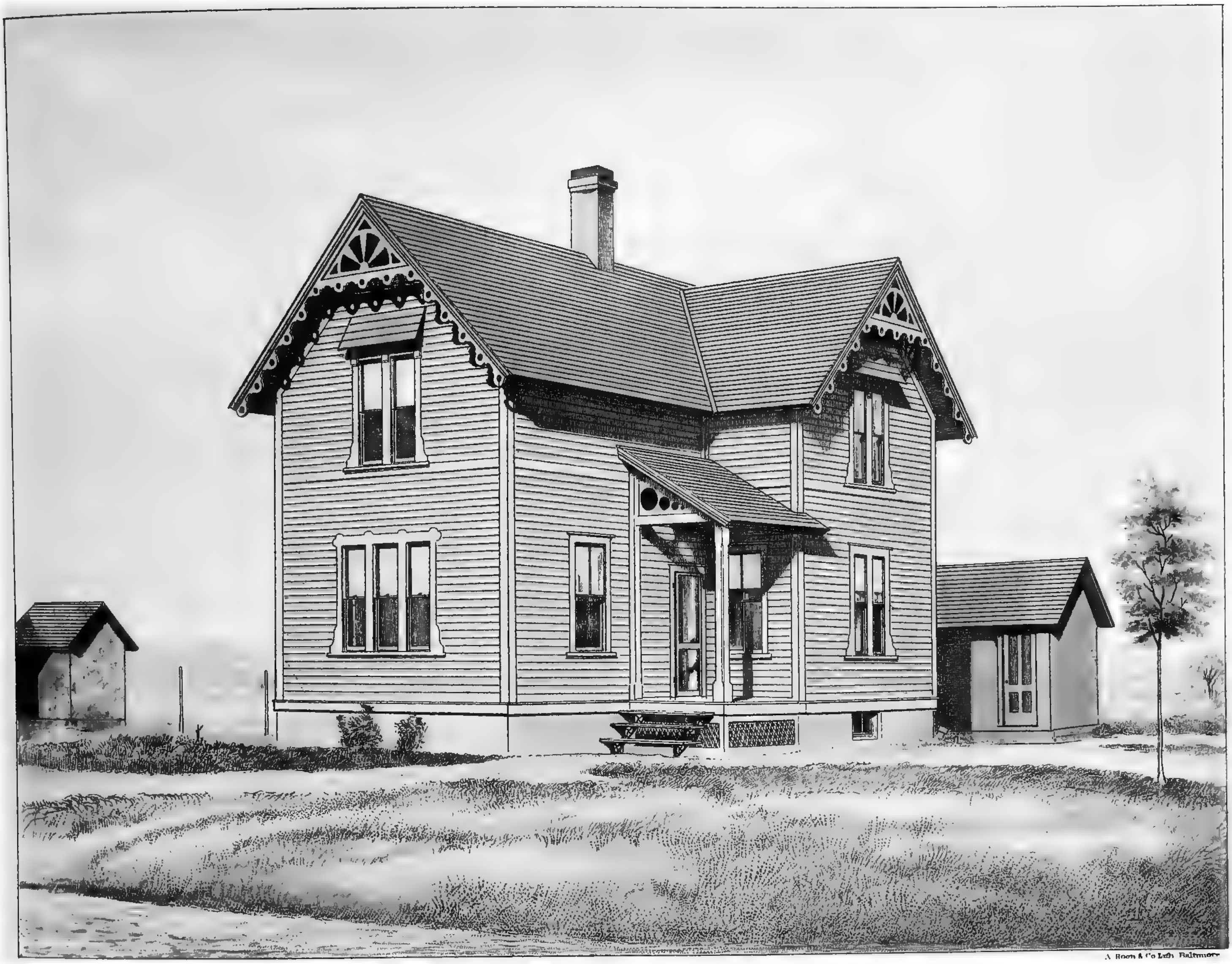
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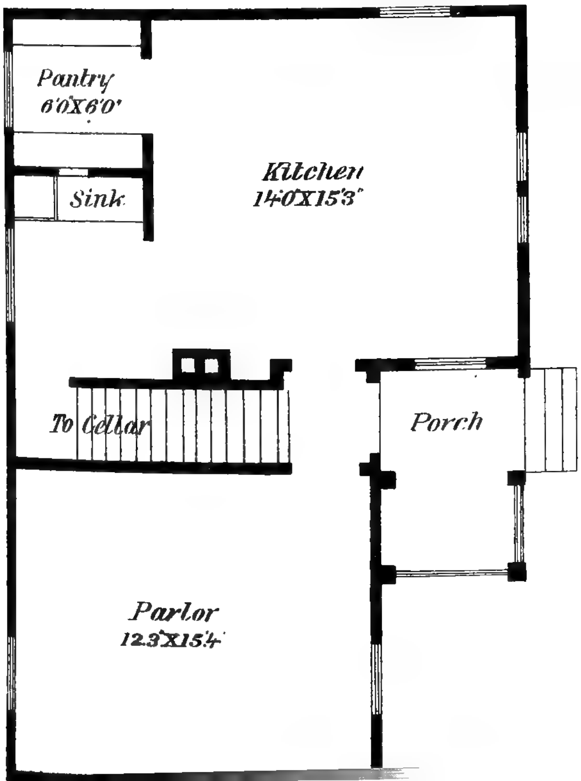
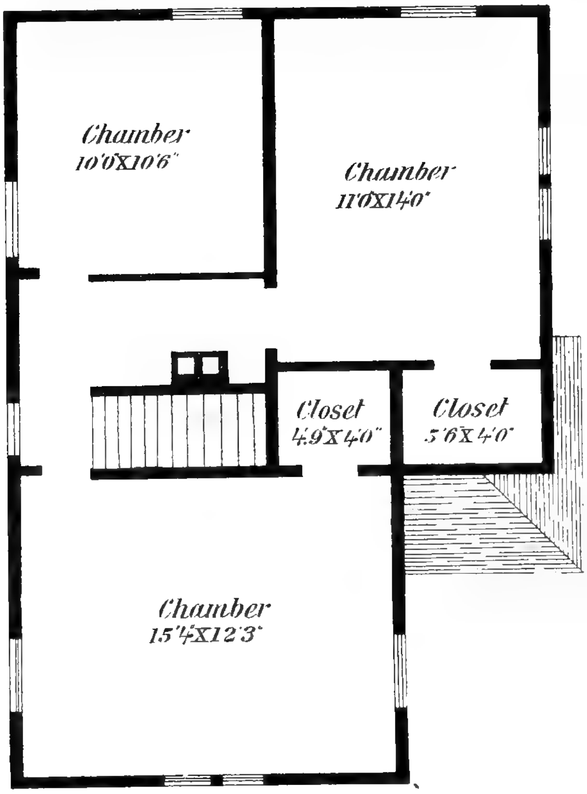
FIG 2 PERSPECTIVE VIEW





HOUSES AT LUDLOW, MASS.

ERECTED BY THE LUDLOW MANUFACTURING COMPANY.

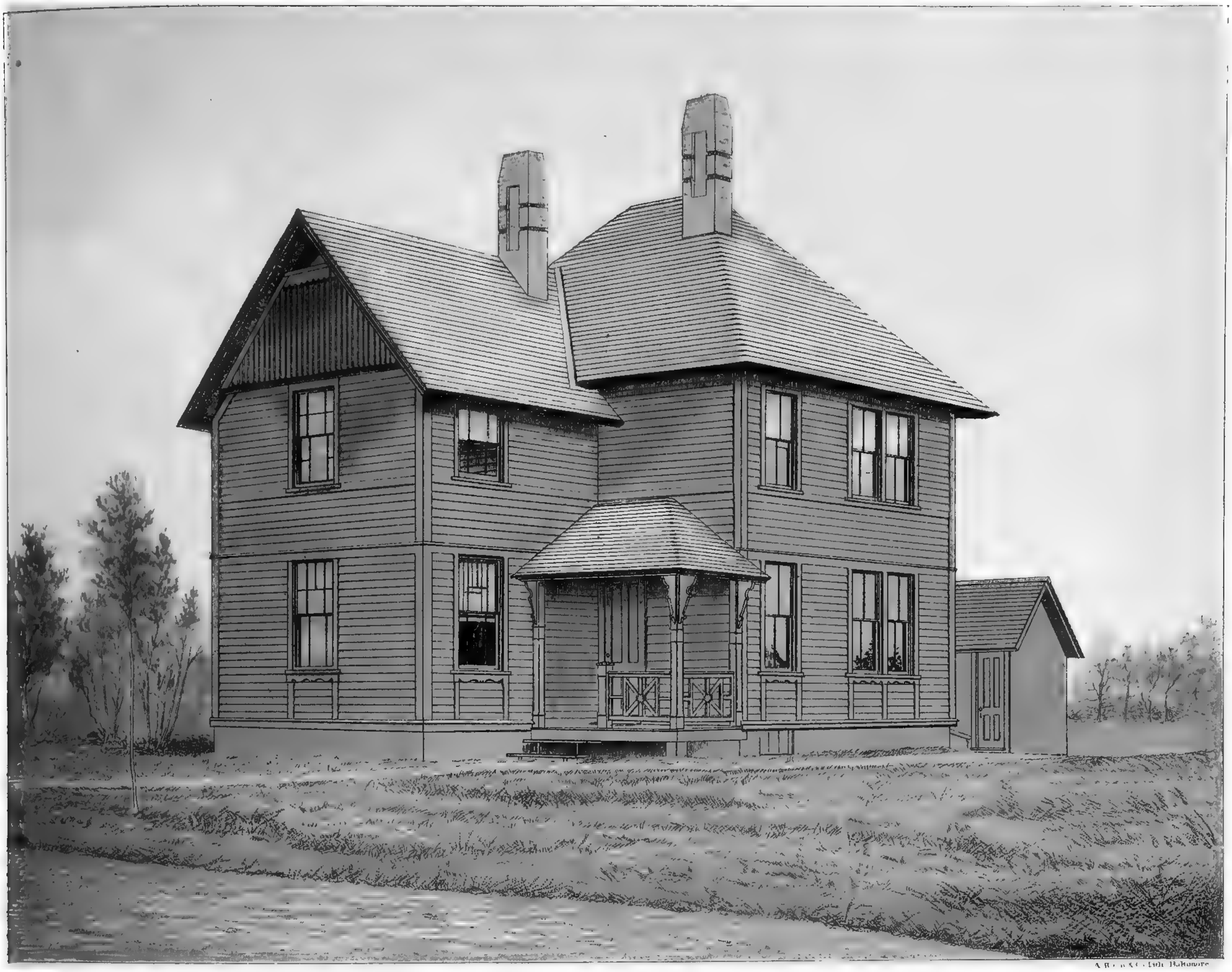

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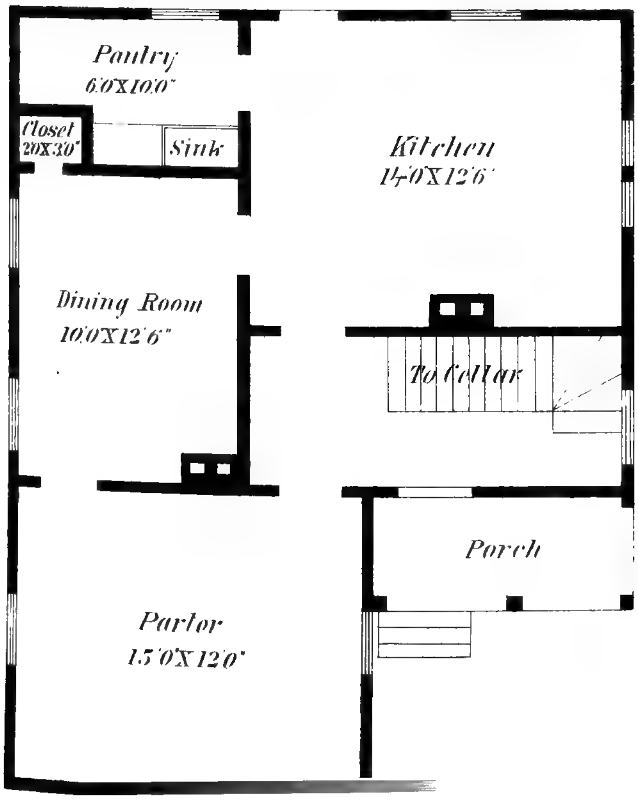
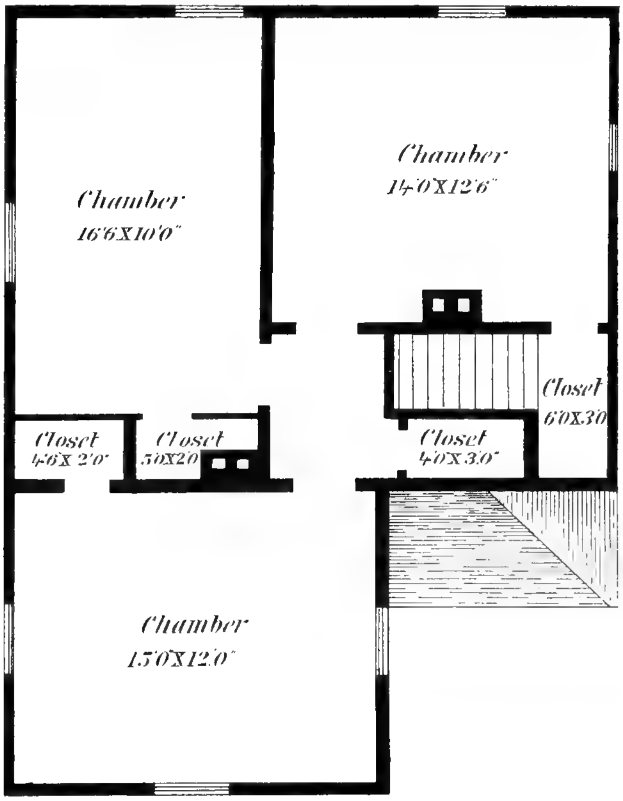
FIG 3. PERSPECTIVE VIEW





depends largely upon the temper in which employers carry the responsibility intrusted to them. I know of no trust more sacred than that given into the hands of the captains of industry, for they deal with human beings in close and vital relations; not through the media of speech or of exhortation, but of positive association, and by this they can make or mar. Granted that the material is often poor, very poor, the intellects dull, and that the apathy of the operatives often offers antagonism to efforts in their behalf, then all the more sacred the trust and all the greater the responsibility. The rich and powerful employer, with the adjuncts of education and business training, holds in his hand something more than the means of subsistence for those he employs; he holds their moral well-being in his keeping, in so far as it is in his power to mold their morals, and he thus becomes something greater than a producer. At all events, he has no right to return the apathy and indifference of his people with apathy and indifference. Nor is it sufficient for him to say that the operatives he congregates accept work with its consequences, as he is not justified in placing men and women in jeopardy, physically, without providing and insisting upon the adoption of sufficient precaution. Law and public sentiment, or both, in the future will insist upon the saving of the moral characters of operatives as well as their limbs and lives; and they will insist, too, upon means for protecting the child of a woman obliged to toil in the factories before as well as after its birth.

The facts from the industrial history of nations, not the gift of prophecy, enable us to foretell the future of a system which has in it more possibilities for good for the masses who must work for day wages than any scheme which has been devised by philanthropy alone. This may sound like sentiment; I am willing to call it sentiment; but I know it means the best material prosperity, and I know that every employer who has been guided by such sentiment has been rewarded twofold: first, in witnessing wonderful improvement in his people; and second, in counting an increase in his dividends and in the wages of his operatives.

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REPORT

ON THE

MANUFACTURES OF INTERCHANGEABLE MECHANISM.

COMPILED, UNDER THE DIRECTION OF

PROF. W. P. TROWBRIDGE,

CHIEF SPECIAL AGENT IN THE DEPARTMENT OF POWER AND MACHINERY EMPLOYED IN MANUFACTURES,

BY

CHARLES H. FITCH, D. E.,

SPECIAL AGENT.

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LETTER OF TRANSMITTAL.

NEW HAVEN, CONN., *October* 1, 1881.

Hon. FRANCIS A. WALKER,
Superintendent of Census.

DEAR SIR: I have the honor to transmit herewith the reports of Mr. Charles H. Fitch, of New Haven, Connecticut, special agent of the Tenth Census, on the interchangeable system of manufacturing in the United States.

Mr. Fitch, a graduate of the Sheffield Scientific School of Yale College, was selected for this duty from my personal knowledge of his acquirements and his unfailing industry and zeal in whatever work he is called upon to do.

The general growth of the "interchangeable system" in manufacturing, which it was your wish to include in the statistics of power and machinery, has had an influence in the development of manufacturing, agricultural, and other industries which but few have heretofore appreciated. It may not be too much to say that, in some respects, this system has been one of the chief influences in the rapid increase in the national wealth. Two of the great industries which constitute the basis of this wealth, agriculture and manufactures, depend now largely upon the existence of this remarkable feature in manufacturing, which has reached its highest development in this country. The growth of the system is due to the inventive characteristics of our people, and their peculiar habit of seeking the best and most simple mechanical methods of accomplishing results by machinery, untrammeled by traditions or hereditary habits and customs.

The practice of making single objects of general utility, such as steel-pens, pins, and needles, by machinery or by successive processes, in which different workmen have special operations to perform in succession on the same object before it is completed, is an old one. The art of making complete machines or implements, each part of which may be introduced into any machine of the same kind, and especially the adaptation of special tools, by which hand-work in fitting the parts is often entirely avoided, is, I believe, of American origin.

The gradual change which has taken place in methods of farming during the last twenty or thirty years has been chiefly due to the fact that the farmer can now supply himself, at reasonable cost, with machines or implements which reduce manual or muscular exertion to a minimum, and render almost a pastime work which formerly taxed his endurance to the utmost.

The introduction of these machines and implements has, moreover, reduced waste and effected economy in production. The manufacturer is now able to furnish the modern agricultural implements to the farmer at reasonable cost only through the peculiar system of manufacture which is now followed, it being possible to furnish such machines at low prices only by making the separate parts of each machine in large numbers or quantities, by means of special tools, and assembling the parts which are required for a complete machine at a single and separate operation.

This constitutes the fundamental idea of the interchangeable system. One of the direct results of the system has been, moreover, a great improvement in the strength, durability, and working performance of the machines thus made.

These two great interests, agriculture and manufacture, have thus reacted upon each other. While, on the one hand, there has been a great increase in the manufacture of such implements to supply the demand created, on the other hand agricultural processes have become to a large extent but the application of labor-saving or labor-multiplying machinery, requiring more exercise of the intellectual faculties and less of muscular force.

Perhaps the most conspicuous illustration of the capabilities of this system of manufacture is found in the sewing-machine; a machine so complicated in some respects in its mechanism, and requiring such a perfect adjustment of its parts, that it is doubtful whether it could be made *by hand* with its present qualities of durability and perfect action under long-continued use. Yet these machines find their way into the homes of the poor as well as of the rich, and through years of continual use are always ready and never-failing in their action.

To the special tools by which the parts are made, and the interchangeability of the parts, may be attributed the growth of a new manufacturing industry and the great benefits which have been derived from the invention of this useful machine.

I need but refer to other branches of manufacture, such as watches, fire-arms, railroad cars, and locomotives, of which great numbers, identical in parts and dimensions, are to be made; all such constructions are now produced to a greater or less extent under the application of this system. It may be said that a new business principle has been introduced into the art of machine manufacture, viz, that diminished cost and more perfect workmanship may be secured by interchangeability of parts, and for certain kinds of manufacture the carrying out of this principle is essential to financial success.

Very respectfully, your obedient servant,

W. P. TROWBRIDGE,
Special Agent.

INTERCHANGEABLE MECHANISM.

I.—FIRE-ARMS.
II.—AMMUNITION.
III.—SEWING-MACHINES.
IV.—LOCOMOTIVES.
V.—WATCHES.
VI.—CLOCKS.
VII.—AGRICULTURAL IMPLEMENTS.

I.—THE MANUFACTURE OF FIRE-ARMS.

NOTE.—For statistical information regarding the manufacture of fire-arms, see Table II, page 10, and Table III, page 38.

HISTORICAL AND DESCRIPTIVE SUMMARY.

THE MATERIALS USED.—In the manufacture of fire-arms the relative cost of constituent materials varies with the character and finish of the product. With a fine grade of sporting guns it is sometimes as small as 3 or 4 per cent. of the value of the product. In one instance, of all the constituent materials used, by weight, about 90 per cent. was domestic decarbonized steel at 6 cents, 5 per cent. foreign steel at 15 cents, 4 per cent. iron and steel wire at 8 to 40 cents, and 1 per cent. Norway and refined iron at 6 to 9 cents per pound.

Some parties import all their gun-iron and nearly half their steel; but the percentage of foreign iron and steel used is, on the whole, small, some concerns using American iron and steel only. The gross weight of the material used is sometimes double the net or finished weight. Refined iron was once the principal material in gun-making, but it is now almost displaced by decarbonized steel. In 1826 cast-steel was considered a curiosity; blacksmiths were unable to weld it, and it was not used for bayonets, ramrods, and springs until after 1842 in either national or private armories.

The cost of constituent material, relative to the product, is sometimes upward of 13 per cent., being usually greater for pistols than for guns, greater for cheaper than for more finished grades of arms, and greater for military rifles made in large quantities than for sporting guns manufactured with less wholesale facilities.

The principal mill supplies are fuel, tools, oil, files, emery, glue, and soda. An average equivalent of about 3 tons of coal per annum per operative is required in the latitudes of Connecticut and Massachusetts, about 20 per cent. being estimated for heating purposes in factories during the year. The fuel required for power is, as in other manufactures, usually in excess of the best economical results obtainable with good stoking and the most suitable boilers and engines.

In the returns for establishments classified as fire-arm factories the ratio of material to product will be found to have a wide range. This variation is due partly to the incessant fluctuations of the metal market, both local and general, and partly to the inclusion of manufactures of sewing-machines, ammunition, hardware, and machinery (having a higher relative cost of material); but there is sometimes a marked appearance of inconsistencies in making the returns, the cost of material being, as reported in some cases, barely sufficient to cover the purchase-price of of constituent materials, while in others it assumes a relative value, which would indicate that the cost of new machinery or other expenses were included.

THE GENERAL CHARACTER OF THE WORK.—The manufacture of fire-arms comprises the fabrication of a great number and variety of parts, and the assembling of these parts into arms. The making of gun-barrels and stocks may be conveniently considered as separate departments of the work; but the lock-systems and other small parts exhibit such variety, both among themselves and in the different arms manufactured, that their fabrication may be better classified in respect to the similar kinds of work done upon them, rather than in regard to the pieces themselves.

The detail of the methods of operation is a variable matter, exhibiting in different armories, and in different parts of the same armory, different methods of effecting similar results, with all the variation in productive efficiency thereby entailed. From month to month, and from week to week, the ingenuity of foremen and of contractors is applied to improve these details. Some classes of automatic machinery, involving a heavy outlay, obtain a high output, and are only profitable on heavy orders, and, when these fall away, the less efficient but less expensive usages are resumed. Some of the changes introduced by individual ingenuity are found to be experiments, rather than improvements.

While these transitions may prevent the utmost exactitude in general statements of the condition of the industry, its outline may still be fairly drawn. As a prelude to such presentation of the subject, an account is introduced of the growth of the interchangeable or uniform system, which has so notably modified the character of the manufacture, both in its mechanical and in its administrative features.

THE DEVELOPMENT OF THE AMERICAN SYSTEM.—The development of the interchangeable system has been a gradual process, extending over a considerable period of time. Sample guns, with parts to interchange, had been made in France as early as 1717, and again in 1785, at each of which dates the attempt to reduce this desirable feature to a practical manufacturing result failed, presumably through prejudice, improper system, and lack of machinery. Eli Whitney, the inventor of the cotton-gin, who took up the idea in this country about the beginning of the present century, systematized the work, and by making the parts in lots of large numbers, employing unskilled labor for filing them to hardened jigs, and by close personal supervision, succeeded in executing a contract under circumstances which caused the failure of other contractors, who employed skilled craftsmen, filers, and gunsmiths to do the work. While with him, as with the gunsmiths of that time, the stocks were made by hand shaving and boring, the barrels were forged by hammers upon anvils and finished by rude drills and by grindstones, and the lock parts were ground and drilled and filed approximately to patterns and fitted together; he also made the lock parts more uniform by the systematic use of hardened jigs, and classified the work on a more intelligent and economical basis. If gun parts were then called uniform, it must be recollected that the present generation stands upon a plane of mechanical intelligence so much higher, and with facilities for observation so much more extensive than existed in those times, that the very language of expression is changed. Uniformity in gun-work was then, as now, a comparative term; but then it meant within a thirty-second of an inch or more, where now it means within half a thousandth of an inch. Then interchangeability may have signified a great deal of filing and fitting, and an uneven joint when fitted, where now it signifies slipping in a piece, turning a screw-driver, and having a close, even fit. Gunsmithing was a great craft at that time. There were separate establishments for the manufacture of gun-barrels, and armorers were scattered through the country, as blacksmiths now are, and some of them had a local notoriety for the cunning work of their hands. But whatever of mechanical ingenuity may have been devised at this period, in default of more specific evidence, general accounts of machinery remarkable in design and precise in operation can be construed to signify little more than drills and boring and slabbing machines of a rude description.

The making of arms with interchangeable parts continued to be attempted, although generally held to be impracticable. In 1812 it is stated that alarm was taken at the rapid increase of damaged muskets on the hands of the government. Whitney, Hall, North, and other contractors exhibited samples of interchangeable work at early dates, and the desirability of interchangeable work seems to have been very generally expressed. In 1815 it was recommended by Colonel Wadsworth, after advising with Messrs. Stubblefield, of Harper's Ferry, Prescott & Lee, of Springfield, and Whitney, of New Haven, that pattern muskets and rifles be made and distributed to the various armories, public and private, for the purpose of insuring practical uniformity, no deviation from the patterns to be tolerated after the work in hand should have been finished off.

The assembling of the lock parts is considered a crucial test of interchangeability. After hardening, the parts cannot well be filed or milled. If, then, they are hardened before fitting, the parts must be made interchangeable; but if they have to be first assembled and fitted soft, and the same parts have to be marked or kept separate to avoid mixing after hardening, it is evidently on account of a lack of uniformity.

It is stated that in 1814 Colonel North, at Middletown, Connecticut, commenced the manufacture of pistols whose lock parts were made so uniform that they did not require to be assembled and fitted soft, as was then the usual practice. In 1819 Hall commenced practical operations at Harper's Ferry, and in 1827 had so far perfected his improvements that a report made by three gentlemen, Messrs. Carrington, Sage, and Bell, to Colonel Bomford, testifies that 100 Hall rifles, made in 1824, were stripped and the metal parts mixed and remounted on 100 new stocks, the parts all coming together well. This notable achievement, so well authenticated, is the more notable because it appears to have been due to the machine methods employed by Hall; to the die-forging, and to the system of making machine-cuts for all the essential fits, rather than to ordinary forging and hand-filing. The joints were not close, nor was the work fine, but the interchangeability was a practical fact, and uniformity was approached on a more sustained plan than that of merely filing to jigs or patterns. The joint of the breech-block was so fitted that a sheet of paper would slide loosely in the joint, but two sheets would stick.

From 1817 to 1822 the improvement in manufacture at the national armories was stated, considering the better workmanship and uniformity, to involve an advantage of 20 per cent. This was the period of the introduction of barrel-turning, forging under trip-hammers, and the Blanchard method of machining stocks. Yet even then the pattern rifles furnished to guide contractors and insure practical interchangeability do not appear to have attained a high degree of uniformity themselves, for it is stated that after Colonel North commenced the manufacture of Hall's rifles, in 1823, he was furnished with two pattern rifles, which were found to be so unlike that one had to be thrown aside, while the work was gauged to the other; and it is said that some of the contractors used to stipulate for a case of pattern muskets, resting assured that if, upon inspection, any fault were found with the guns manufactured something equally defective could be found in the case to match it, and thus to define the degree of practical "uniformity" desired.

The Hall rifles made at Middletown appear to have been uniform, although the machinery of Hall's design was not used in making them. It is stated of those made by North that the locks were first assembled after hardening, that the stocks were machined without fitting the lock parts (the machinery being designed by Selah Goodrich on the Blanchard principles), and that after the Florida war a lot of damaged carbines thrown into the Watervliet arsenal were repaired, and the parts, old and new, interchanged without difficulty. In 1829 the Hall rifles, made by R. & J. D. Johnson, of Middletown, were referred to in an ordnance report as being of superior make. Inspection was now more thorough, and receiver-gauges were used. But the muzzle-loading muskets were still made at the national armories with the lock parts so far from uniform that a device of Blanchard's for adapting his stock-bedding machinery to conform to their irregularities was still in use.

In 1840 Thomas Warner, master-armorer, introduced improved methods and machinery at the Springfield armory. He secured interchangeable work by the use of milling machinery, by jig-filing, and by careful inspection. Receiver-gauges were used, and it is stated that at this time the locks were not marked for hardening. This improved system was introduced by Warner at Whitneyville in 1842, where, prior to this time, the locks had been assembled and fitted soft and marked for hardening in sets of ten.

In 1842 Albert Eames introduced interchangeable work in the manufacture of Jenk's carbine and pistol for the Ames Manufacturing Company. He used a fine set of gauges and jigs, and, on inspection, the efficiency of the system was repeatedly tested by stripping ten guns, mixing the parts, and reassembling them at random. In 1842 the manufacture of the new model percussion musket was begun at Springfield, and model jigs, taps, and gauges were provided for the work. Although from this time there was gradual improvement in the machinery used, the books of account for piece-work show that the custom of assembling and marking locks "soft"—that is, before the hardening process—in sets of ten was practiced at least from 1844 to early in 1849. In 1853, as a test before the British commission, Major Ripley ordered ten guns of the manufacture of ten years, from 1843 to 1853, to be stripped, and the parts mixed and reassembled promiscuously, which was successfully done. The practice of assembling locks "soft" appears to have been discontinued in 1849. A system of interchangeability largely dependent upon hand-filing is difficult to sustain, even with the aid of jigs. In the earlier attempts filing was the principal means of making interchangeable work; but the inspections were not then severe, nor were the pieces required to be so well made as to fit fine gauges. Filing close to hardened jigs is also very destructive of files—an important element of cost. It is scarcely a matter of wonder that the systems of interchangeability so repeatedly introduced were not well sustained until after the introduction of the practices of close forging with steel dies and metal-working, with efficient machinery for making sensibly exact cuts, without dependence upon the craft of the operative. Drilling with jigs is still the common practice, but filing to jigs was superseded by milling and edging with cutters, which were themselves formers, whose exactness was tested and maintained, in case of wear, by the careful gauging of the work. The present excellence of fine machine work enables almost any desirable degree of accuracy to be obtained, both in cutters and gauges. For ordinary work receiver-gauges, into which the work must fit accurately, are sufficiently nice, although for the finest work upon the dimensions of chambers and other parts, verniers, micrometers, and multiplying arrangements are often used. Limit-gauges, or, as they are called, go-in and not-go-in gauges, are in common use; that is, a set of two close gauges, one of which will receive a piece which will not go into the other, thus establishing a limit of accuracy both for openings and for exterior outlines. One hundred and fifty-four fine gauges are used in testing the accuracy of the parts of the Springfield rifle; that is, 154 pieces, many of them being so contrived as to gauge a great variety of measurements with a single instrument.

Adoption of the American system in foreign countries.—At the world's fair of 1851, London, a number of Mississippi rifles, as made by Robbins & Lawrence, of Windsor, Vermont, for the United States government, were exhibited, and received the award of a medal. The locks of these were not marked for hardening, and their workmanship and uniformity attracted much attention. This exhibit, and the reports of the Blanchard stocking machinery, caused the British government to send a commission to this country to examine the methods of manufacture. The interchangeable system, with its astonishing results and its ingenious plants of machinery, was still distinctively American. The inspection of its workings at Colt's armory, the national armory at Springfield, the Robbins & Lawrence armory at Windsor, Vermont, and other works, led to immediate orders for American machinery. In 1855 an American firm supplied British agents with 20,000 interchangeable Enfield rifles and several sets of machinery, the first comprising 157 machines, valued at $44,360 (exclusive of boxing, transportation, and sundries), and including 8 universal milling, 57 milling, 3 double-milling, 4 screw-milling, 2 clamp-milling, 12 four-spindle drilling, 5 tapping, 7 edging, 8 drilling, 1 grooving, 2 squaring, 5 threading, 1 chucking, 1 broaching, 5 screw-slotting, 3 screw-pointing, 3 screw-clipping, 1 chasing, 3 six-spindle drilling, 2 screw-thread finishing, 1 punching, 1 hand-planing, 1 index-milling, 7 turning, and 2 rifling machines. These machines were extensively copied in England and in Germany. The universal milling-machine, which was designed by Frederick W. Howe in 1852, is found, in all essential features, illustrated in the London *Engineering*, nearly a quarter of a century later, as a machine of English design. The universal milling-machines were sold at $850 each; the plain milling-machines at $300 each. At the same time the stocking machinery at the Springfield armory had been found to handle with ease the tough stocks which were brought over to test its efficiency, and several English orders for stocking machinery were given to an American manufacturing company. Thus introduced, and manifesting its superiority beyond all question, large and numerous orders for American machinery followed, which were filled by various parties. Within the next fifteen or twenty years the governments of England, Russia, Prussia, Spain, Turkey, Sweden, Denmark, Egypt, and other countries were supplied with American machinery for the manufacture of arms, while its essential and labor-saving features have been introduced and copied throughout the civilized world. The civil war gave a tremendous impetus to arms manufacture in this country, and after its close the capital invested sought a foreign market, and millions of arms were exported. In 1867 the visit of agents of the Danish government to E. Remington & Sons resulted in a contract for between 35,000 and 40,000 arms, with machinery for their manufacture. In the same year the Swedish government contracted for 10,000 arms, 20,000 lock-systems, and machinery for their manufacture. In 1868 the Spanish government contracted for arms. In 1869 the Egyptian government ordered 60,000, and later 100,000 additional guns, and machinery for a gun-factory, to be built at Alexandria (an order never completely filled). Japan, the Argentine Republic, Chili, Peru, Mexico, and other countries have been largely supplied from the same source.

During the Turkish war both the Russian and the Turkish governments were very heavily supplied with arms and munitions of war from American armories, notably by the Winchester Repeating Arms Company, of New Haven, Connecticut; the Providence Tool Company, of Providence, Rhode Island, and the Union Metallic Cartridge Company, of Bridgeport, Connecticut. Perhaps no more creditable instance could be adduced of the superiority of the best American gun machinery than is furnished in the supply by the Pratt & Whitney Company, of Hartford, Connecticut, of gun-making plants for the Prussian government armories at Spandau, Erfurt, and Danzig. This machinery was designed to execute all the work upon parts of the Mauser rifle, except the stocking and part of the barrel-making. A testimonial was furnished by the Prussian government, expressing its satisfaction with the work, from which a few sentences (in translation) may be properly quoted. The paper was dated April 27, 1875, and stated that "the said machinery and tools were to furnish the parts of the guns automatically, and with such precision of finish as to render them fit for the polishing process without hand-work"; and also of the machines, "that the system upon which they are founded has rendered the government in no small degree independent of the skill and power of the workmen. In addition, a very material economy has been obtained, amounting already to one-half of the wages formerly paid."

Nor should it be considered that the methods displaced with such advantage were so very rude or primitive. Milling and profiling machinery was in general use, and the other machines were at least of a fair order, although susceptible of great improvement, as the above statements would plainly indicate. About the same time the Prussian government was furnished by the Billings & Spencer Company with 42 tons of finished dies for forging gun parts. But instances such as the foregoing only indicate a tithe of the world's indebtedness to American machinery and system in gun-making, methods and machines being introduced only to be followed and duplicated upon a more extensive scale.

THE CONDITIONS OF UNIFORM MANUFACTURE.—A large demand assured, and fine workmanship required, are the prime conditions of a uniform system. These conditions first existed in a pre-eminent degree only in gun manufacture under government contracts. The advantages of the system in making fine workmanship profitable in kindred manufactures secured extensive profitable markets for the manufacturers first availing themselves of it, while the advance in the conditions of comfort and convenience, due largely to this very agency, has continued by increased demands to advance the practice of the interchangeable system.

THE RETURNS OF CAPITAL.—Inadequate returns of capital employed in the manufacture of fire-arms are sometimes due to the fact that, while parties owning their real estate report its full value, parties renting it will report only such capital of current funds as may provide for the rental for a short period. In one case of a large factory, the main shaft and part of the machinery were found to be reckoned with land and buildings as real estate, all being leased from the heirs of the former proprietors—a capital as actively employed as ever, but practically withdrawn from the personal or corporate return of the parties manufacturing. Work-room and facilities can be provided at a lower rate per man for a large than for a small number of operatives, but the return of capital per operative is usually less for a small shop.

Overratings, on the other hand, may be considered to result from the inclusion of capital foreign to the purpose of the manufacture, as is notably the case in the return from Hampden county, Massachusetts, which exhibits a high rating of capital, due to the inclusion of the extensive arsenal property of the government. It is also obvious that returns may be properly augmented beyond the usual average per operative by the high valuation of real estate in cities, and by plants of machinery disused, but still potentially capital. The valuation of real estate, carrying of stocks, and funds for running expenses, present so many special conditions that these requirements cannot well be generalized. For gun-work, the cost of machinery alone (exclusive of engines and boilers, the cost of which, in proportion to the number of power-machines, is much greater in a small than in a large factory) will average from $300 to $350 per operative, tools and fixtures costing half as much more. In some cases noted, hangers and shafting cost $8 to $12 per power-machine, and belting about half as much; and in one large factory the investment for steam and water piping is as great as for pulleys, hangers, and shafting.

In this connection one matter ought to be distinctly emphasized. The capital return is no indication of the capability of this country to produce small-arms in case of an emergency. Large plants of gun-machinery exist which are but partially used, and which are returned at a greatly reduced valuation, and, in addition to this, the vast plants of machinery employed in the manufacture of sewing-machines and other light mechanism could be diverted to arms manufacture with a great degree of facility.

THE DIVISION AND EFFICIENCY OF LABOR.—In large gun factories, under the stimulus of heavy orders, the finest military rifles are sometimes produced at the rate of 200 per annum per operative employed, on the basis of 312 working days of ten hours each in the year, and the operative labor is divided among the several departments in proportions roundly expressed in the following percentages: Making stocks, 6⅔ per cent.; barrels, 15 per cent.; locks and other parts, 66⅔ per cent. (comprising forging, 11⅓ per cent.; filing, 9⅓ per cent.; machining, 36⅔ per cent.; polishing, 7⅔ per cent.; sundry processes, 1⅔ per cent.); and inspection, assembling, and proof, 11⅔ per cent. Different factories present different requirements and divisions of labor, filing, for example, often requiring a smaller proportion than stated of the whole number of operatives. In addition to this there is some clerical and common labor—packing, teaming, and the like—and a small but important factor of special tool-making. The variation in such estimates, due to difference in breech-loading systems, is considerable, but for purposes of general statement may be considered to fall within such limits of workmanship and productive facilities as cannot be satisfactorily defined.

The effect of wholesale manufacture may be expressed in the estimate that, in manufacturing at the rate of 1,000 rifles a day, 3 men will do as much work as 7 to 9 men in manufacturing at the rate of 50 a day. Some of the methods commonly in use in the two cases, as generally practiced in this country, might be contrasted as follows: In the former, the barrels would probably be rolled down from drilled molds upon mandrels; in the latter, they would probably be drilled full length (a method preferred by some manufacturers in any case). In the former, the stocking would be more thoroughly done by machinery, while in the latter the chisel and the file would do a larger proportion of the work. In the former there would usually be two-thirds as many men as machines, and in the latter two-thirds as many machines as men, while much time would be wasted in waiting for machines to finish their work, in changing the appliances of milling-machines, and in changing operatives from one kind of work to another.

But either extreme of present usage stands in sufficiently marked contrast with the practice in 1819, when it was stated (*Ordnance Reports*, vol. 1, p. 57), in evidence of the superiority of American methods, that 250 men would at the national armories fabricate 12,500 stand of arms a year, while as many men were required for the fabrication of 10,000 stand in French armories. Nor can these rates of 40 and 50 muskets per operative per annum be compared with the numerical output of fine breech-loading rifles of to-day, for if present facilities were applied to the wholesale manufacture of these old muzzle-loading muskets an output of over 300 per operative per annum could easily be attained. The division of labor at that time was also very different. So far as machinery had been introduced, its construction was rude, and its use exceptional. Hand-shaving and chiseling for the stocks, and hand-forging, grinding, and hand-filing for the metal parts, constituted nearly all of the work. The filers—skilled workmen—were then mostly foreigners, and the consumption of files was enormous.

Apart from all consideration of the earliest usage of specific machines, it must be said that their introduction did not make itself felt as a great industrial agency until within twenty-five years past, in instance of which it may be stated that in 1839 there were at the Springfield armory about six men to one machine, and the ratio at other works seems to have been equally large; for of the private armories most reputed for early improvements one is stated at this time to have had but a single milling-machine, and that a rude one; and at another armory a single gang-saw profiling-machine was the principal stocking machine in use. It was some fifteen years later before the manufacture of milling, edging, and other important gun machinery was conducted on a scale sufficiently extensive for the general outfitting of large armories.

In the present manufacture of the finest revolvers (of .44 or .45 caliber), under favorable conditions upward of 250 may be produced per annum per operative, the operative labor being divided among the several departments in proportions roundly expressed in the following percentages: Forging, 12 per cent.; machining, 50 per cent.; filing, 10 per cent.; polishing, 12 per cent.; assembling, inspection, and proof, 11 per cent.; sundry processes, 5 per cent. In the best practice the workmanship is much finer than that attained in 1870, but there is in the manufacture a considerable variation in the size and quality of the pistols produced; so that a large proportionate output may be indicative of less nicety in the inspection and finish, rather than of the most approved facilities. In the past, no basis of comparison is afforded prior to the advent of the inventor, Colt, who did not establish his pistol works at Hartford until 1848. In 1854 his factory at Vauxhall, London, with 200 hands, turned out 100 pistols a day, or 156 per operative per annum; and although, both in America and in England, he then used ingenious machinery in the whole manufacture, there is no doubt but that, taking quality into account, the introduction of improved designs, speeding, and system in the mechanical work has since more than doubled the productive efficiency.

It may be said that the manufacture of double-barreled shot-guns is usually conducted under less effective conditions, besides involving more labor per arm than that of military rifles; so that a numerical output of from one-half to one-fourth as great per operative is not unusual, while barrel-making, filing, and ornamental work employ larger relative proportions of the labor.

Relative to the skill required in the manufacture, it may be said that, since most of the work is special and done by the piece, few of the operatives may, in any case, be placed under the schedule caption of ordinary laborers. The foremen upon the several jobs or sub-contracts (who may be usually rated at 1 foreman to 30 or 40 operatives), the blacksmiths and the machinists proper, the tool-makers and the barrel-straighteners, are considered skilled workmen, but the machine-tenders and other operatives, however proficient in their special duties, are not so considered. The skilled men thus specified will generally constitute less than 20 per cent. of all. But in many factories much of the machinery is tended by experienced men, drawing the wages of skilled workmen, and the employment of unskilled labor, often adduced as an advantage due to improved machinery and the interchangeable system, seems largely available only on heavy contracts, when it may be utilized with a careful system of oversight. Machinery may contract the province of certain skilled trades whose identity is as firmly established as that of the three learned professions, but the fact remains that the increased fineness and accuracy required in the manufacture of fire-arms demands the most skillful and experienced oversight, and unskilled labor can only be employed with the best results upon limited portions of the work. Thus we will find that at most of the larger armories the greater proportion of the operatives draw the wages of skilled men.

Some details of the subject thus outlined may now be supplied by a consideration (with comparisons with past practice) of the methods employed, the power and the machinery required, and the productive efficiency obtainable in the various departments of the work.

THE MANUFACTURE OF GUN-BARRELS.

DRILLING.—Barrels for military guns are now commonly made from 2-inch round steel, which is cut off into lengths of about 9 inches, in which, after centering, a ¾-inch hole is drilled. The cutting off and centering are operations involving little time or labor, the latter being done by a tool in the head-stock of a lathe, while the mold-blank is rested in ways. The drill is sometimes pressed down by a weighted spindle in a machine similar to that shown in the illustration (Fig. 1), a four-spindle machine, designed by Frederick W. Howe for Robbins & Lawrence, at Windsor, Vermont, in 1852, and then applied to the full-length drilling of steel barrels, in which work one man could tend two or more machines, and each spindle would drill 5 barrels a day, the barrels being ½-inch bore and 23 inches long. Prior to this a similar four-spindle drill was made by Albert Eames for drilling the steel barrels made by Remington & Sons for Jenks' carbines (in 1846), and an illustration is given (Fig. 2) of a barrel-drill designed by E. K. Root for Colt's armory, in which the spindles were located about a center. These vertical barrel-drills superseded drilling by hand or by means of horizontal drills, which were less accurate and efficient, and in some cases quite rude, as, for example, the device (in use at Watertown,

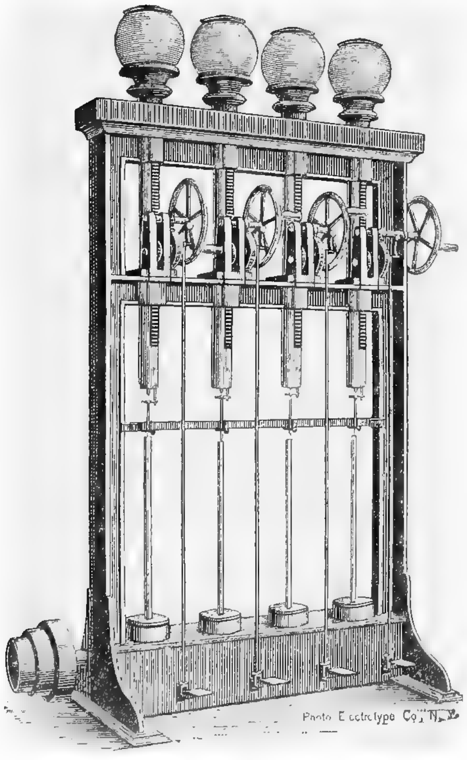

Fig. 1.

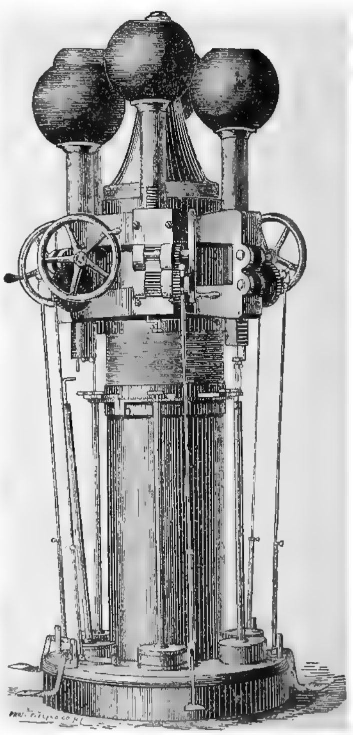

Fig. 2.

New York, in 1832) in which the barrel was rested in V-grooves in wooden blocks, and by means of hand levers was forced against drills of several successive lengths, placed in the head-stock of a lathe.

Weighted spindles may be arranged for drilling the short molds for barrel-rolling with considerable rapidity, one man tending 6 spindles, and each spindle drilling ¾-inch holes in about 50 nine-inch mold-blanks in ten hours, a weight of 450 pounds resting upon each spindle; but these vertical weighted drills, which were in the first instance designed for drilling full-length barrels, are in turn becoming superseded for drilling both molds and barrels by compact geared drilling-machines, in which greater steadiness and rapidity of drilling may be secured. Such a 5-spindle multiple drill, self-feeding, with a quick return feed, and with a drill speed of an inch a minute, will drill ¾-inch holes in about 300 nine-inch wrought-iron blanks in a day; and an illustration is shown (Fig. 3) of a special gun-blank drill (Thorne, DeHaven & Co.), with self-feeding tool, drilling at the rate of three-quarters of an inch per minute for a ¾-inch hole in steel, one boy being able to attend a battery of four or five machines.

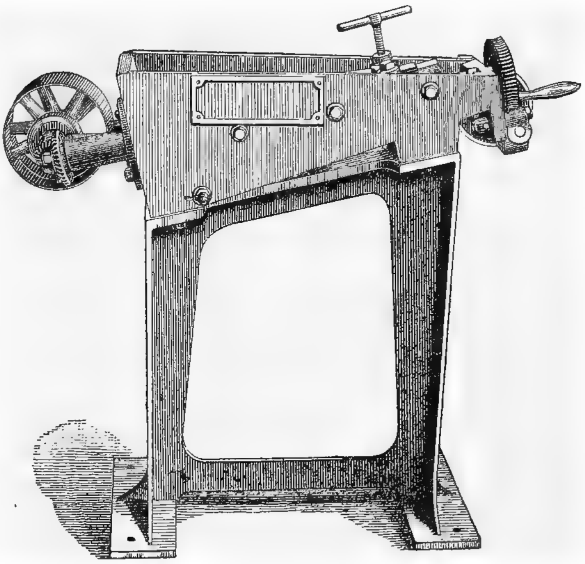
Fig. 3.

Forging and rolling.—The rolling out of decarbonized steel-molds upon mandrels occupies three men (1 foreman roller and 2 helpers) to a set of rolls, such as shown in the illustration (Fig. 4). There is more or less variation in the practice of rolling barrels, which may be generally described as follows: The first heating of the barrels requires about 8 minutes, and after each time that they are passed through the rolls over mandrels they are replaced in the furnace to maintain the heat. Sometimes two, but more generally four barrels are manipulated in one lot, passing successively through the rolls six or eight times, the first two grooves being cylindrical, and the remainder having the taper of the barrel. The alteration of form attending this operation is approximately exhibited by the sections shown in the cut (Fig. 5). Six or eight mandrels are used, reducing the bore (¾ inch) about one-half. The ends of the mandrels have knobs or enlarged, hardened bearings, upon which the barrel is pressed by the rolls. It is important to have the rods extend just to the center of the rolls, for if they go too far the hardened bearing of the mandrel will be torn off, and if not far enough the barrel will be crushed together, and the next size of mandrel cannot be introduced. The proper length of mandrel is determined by a stop, with washers upon the rod, bringing up against a bar in the frame.

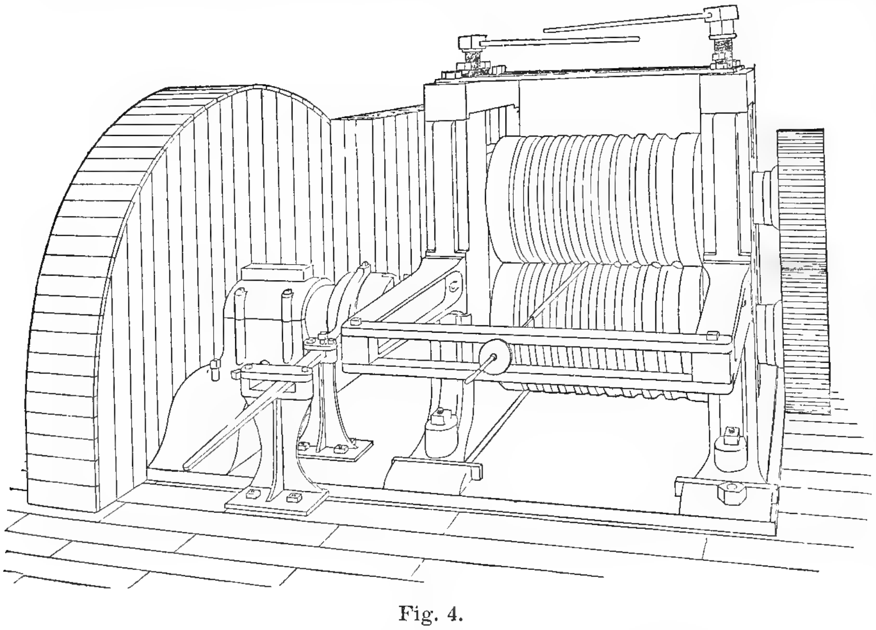
Fig. 4.

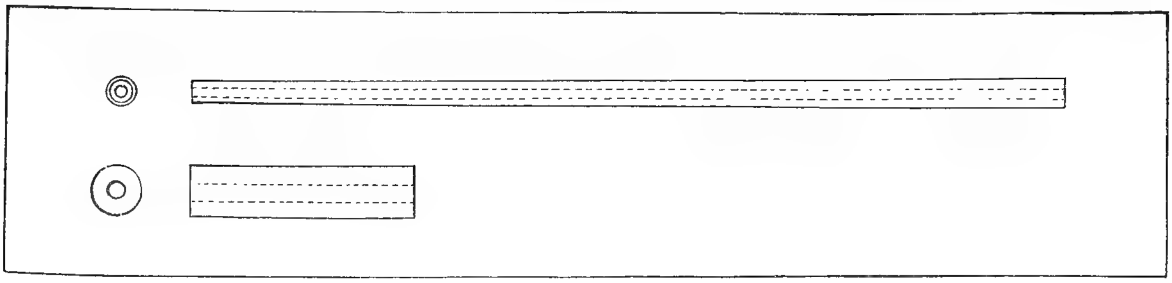
Fig. 5.

The foreman takes the mold from the furnace, slipping the mandrel into it, and thus passes it through the rolls. The first helper, standing upon the other side, receives it upon a rod and passes it to the second helper, who straightens it by slapping it upon a flat table, and then replaces it in the fire. After the reduction of the bore, the barrels are finally passed from three to six times through a groove of the rolls, and back over the top, without mandrels or reheating. The daily product of a set of rolls is about 200 for 10 hours, or at the rate of 1 barrel in 3 minutes.

Barrel-rolling was introduced at the Springfield armory in 1860 by James T. Ames, who had been sent to England, as agent of the United States government, to examine machinery for making gun-barrels and to make purchases. The method then employed in England was to roll out tubes, which were first made of skelp, bent together and welded. James H. Burton, who had been master-armorer at the Harper's Ferry armory, and who had charge of the improved machinery made by the Ames Company for the English armory at Enfield, patented a method of rolling barrels from the solid drilled tubes, the present prevailing method for military guns, which was first extensively adopted by the Remington works at Ilion, New York. Their rolls are still in charge of William Onyans, who came from England to operate the barrel machinery purchased by Mr. Ames for the Springfield armory. Prior to the use of drilled molds attempts had been made to use short, punched molds, and also steel molds cast with a core. The first barrel-rolls built in this country were made by Wood, Light & Co. for Nathan Washburn, Worcester, Massachusetts, and soon after rolls were built for the Providence Tool Company and other armories. These rolls were turned by means of a special tool, designed by Mr. Aurin Wood, for turning them with the requisite taper and jog, by means of a cam-ring, which, in revolving, forced back the tool-holder, allowing it to spring forward at the conclusion of the turn.

The fuel required in barrel-rolling depends largely upon the economical arrangement of the furnaces. As much as a net ton of coal per 100 barrels is sometimes used. At the Springfield armory, by an improved construction of the furnaces, with a method of blowing in slack, the coal per 100 barrels is reduced to as low as 500 pounds. A set of rolls, with the auxiliary mechanism, cutting-off machines, and appurtenances, appears to require about 15 horse-power. The engine is sometimes driven by waste heat from the barrel furnaces.

It ought, however, to be stated that while military barrels are, in this country, generally rolled down upon mandrels, the barrels for sporting guns are drilled full length, as is the practice at the Winchester armory and at Colt's armory. It is also significant that at Enfield the English method of barrel-rolling, so generally introduced into this country, and the present practice at the United States armory and other large works, has been abandoned for the former and more expensive method of drilling the barrels full length. This is also the method approved in the Prussian armories, where the barrels are drilled at high speed in double horizontal drilling-machines, using a straight, half-round bit, cut across diagonally at the lip, so as to bring one outer edge forward, and thus cut out the circumferential in advance of the central portion of the bore. In general, it may be said that barrel-rolls are more especially adapted for turning out great numbers of barrels of uniform size and taper. Apart from all considerations of quality, in sporting work it is unprofitable to have a set of rolls for every size and taper required. In some armories the two methods will be found to be practiced side by side—barrel-rolling for military, and full-length drilling for sporting rifles.

Barrels were first forged by hand, but in 1817 the method of welding them under a trip-hammer was patented by Asa Waters, of Millbury, Massachusetts. The trips were geared to make 400 strokes a minute, running by water-power. When barrels were welded by hand two strikers were employed—a lap of about 6 inches was welded at one heat, and 6 barrels a day was a fair day's work. When the trip-hammers were introduced, but one striker was required; from 14 to 16 barrels a day were welded, and the work was more nearly perfect. The practice of welding barrels under trip-hammers, instead of by hand, was not introduced at Harper's Ferry until 1836.

The earliest use of decarbonized steel for gun-barrels is generally credited to the Remingtons, who made steel barrels for North & Savage, of Middletown, Connecticut, and for the Ames Manufacturing Company, of Chicopee, Massachusetts, as early as 1846. It is also stated that some time about 1848 Thomas Warner, at the Whitneyville works, incurred so much loss in the skelp-welding of iron barrels that he voluntarily substituted steel-drilled barrels in his contract, making them of decarbonized steel, which was believed by him to be a novel expedient. The use of a soft cast-steel was begun at Harper's Ferry about 1849. After 1873 all small-arm barrels turned out at the national armory at Springfield were made of decarbonized steel (a barrel of which will endure twice as heavy a charge as a wrought-iron barrel), Bessemer steel being used until 1878, and afterward the Siemens-Martin steel.

The loss on barrels welded from the skelp sometimes ranged as high as from 10 per cent. to upward of 20 per cent. on account of imperfections in the wrought iron and in welding. The loss on drilled and rolled-steel barrels is only a fraction of 1 per cent., and in some large contracts has been within one-tenth of 1 per cent.

Damascus barrels are made from gun-rods, assorted, packed in bundles, rolled or forged small, and then wound, ribbon-like, upon mandrels and forged into barrels, the colors being brought out in the browning, in a twist dependent upon the arrangement of the different kinds of gun-rods.

Pistol barrels were at one time forged at the Colt works by the use of the Ryder forging engine. It comprised four dies and one shear, all operated by eccentric presses from a single shaft above the dies. The lower dies were adjustable, and a handle, with a lever, served to bring up the lower member of the cutting-off press. The dies used were 1 flat, 1 point-grooved, 1 curved, and 1 round-grooved, the barrel blank being then cut from the bar by the shears. The tending of this machine is said to have required more skillful handicraft than any other operation at the Vauxhall works. Pistol-barrel blanks are now generally drop-forged in dies with great rapidity, the appearance of the forged blank being here illustrated (Fig. 6), and the operation being similar to the other operations of drop-forging, which will be elsewhere considered.

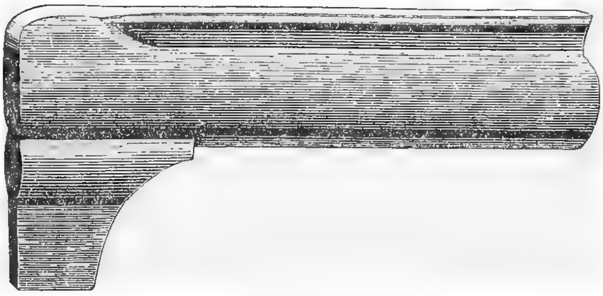

Fig. 6.

After the rolling of the gun-barrels, they are placed, while yet red-hot, in a press, whose jaws (with formers) gently reciprocate as the barrels are turned by a workman with tongs, or revolved by other appliances. This occupies two or three minutes, when they are laid out upon grooved plates, and, after a partial cooling, are cut to length with a cutting-off saw. The cutting off sometimes precedes the machine straightening, and, after annealing, another straightening is necessary, which is done under hammers.

Boring.—The first boring, commonly called nut-boring, or slow-boring, is done with a twisted bit, with a rod in tension, which tends to keep it straight. There is some variation in practice, drilled requiring less boring than skelp-welded barrels, clear water having been formerly employed where soda water is now used, and the number, time, and depth of the cuts being more or less varied. Sometimes three cuts are taken on rolled barrels, occupying 20 to 25 minutes each—about 8 barrels per day to a spindle, one boy tending a number of machines. Sometimes only two cuts are made, enlarging the bore about one-twentieth of an inch each. In past practice in nut-boring skelp-welded barrels a single cut was made with a twisted bit having a square lip, taking out about one-sixteenth of an inch. The four-spindle machine commonly in use is similar to that designed by F. W. Howe, at Windsor, Vermont, about 1850; but horizontal automatic-feed barrel-boring machines were in use at Whitneyville prior to 1840, and hand-traverse machines were generally used at an early date. It is stated that an improved nut-boring machine and auger was introduced at Harper's Ferry by James Green in 1817.

The general features of the present machines are exhibited in the illustration (Fig. 7) of a machine used at the Springfield armory, the cutter-rods being slid through the barrels before the rods are fastened in the revolving heads, and the barrels being copiously supplied with soda water as they are drawn over the cutters by the carriage, which has a rack and pinion movement.

Turning.—Gun-barrels, not being cylindrical, are turned to formers in special lathes. In turning the barrel it has in recent years been customary to support it at the middle as well as at the ends, in order to get the turning more perfectly concentric with the bore. The use of lead center-bearings was introduced at the works of the Providence Tool Company in 1861, and a few years later Babbitt metal center-bearings were used at the Springfield armory. The barrels are placed vertically in racks, and the Babbitt rings are cast about them midway between the two ends. The barrel is then placed in a lathe, while the ring is turned smooth by two tools, successively operating, but held by a single holder—a principle of following tools which, it may be remarked in general, seems destined to be an important future factor in securing increased rapidity of machine-work. The bearing for the Babbitt ring is taken by a center rest, a circular-sector slide-ring moving in ways about the center, so that three pins, moving in curved slots and inclining toward the center, serve to push in three radial jaws, that take the bearing. The barrel is turned up to the Babbitt ring, and the jaws take a new bearing on the turned part, and (the ring being knocked off) serve to true the turning on the remaining portion of the barrel. The English practice is to use sulphur rings. In less accurate work the precaution and the expense of a center-bearing would be omitted.

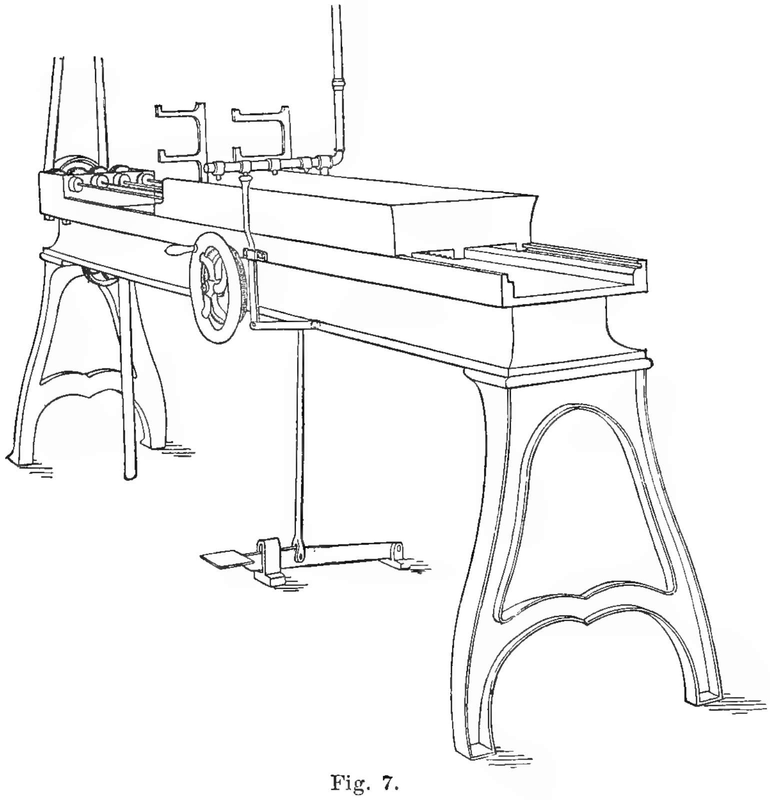

Fig. 7.

At an early date turning superseded the grinding of barrels—an operation liable to leave them with weak places where the bore was eccentric with the exterior. As compared with turning, grinding was also vastly more slow and inefficient in a ratio dependent upon the closeness of the forging. In 1818 Asa Waters took out a patent for turning barrels in a lathe, but the progress of improvement was slow, even slide and back rests not being in general machine-shop use as late as 1832. Turning superseded the grinding of barrels at Harper's Ferry about 1825. The operation of grinding is now reduced from a principal to an auxiliary one, the barrels being surfaced, after turning, upon large grindstones. To guide the grinder more accurately in his work, a portion at the muzzle of the barrel is sometimes milled or turned to the taper.

PROVING.—In proving the barrels they are set in a frame, so that a large number are discharged at a time by the action of one hammer outside the proof-house. They are loaded with heavy charges of powder and solid slugs of lead, which are fired into a sand-bank, which may be conveniently formed within an old boiler. Although only a small percentage (for decarbonized steel barrels about one-sixth of 1 per cent.) is burst in the proving, in the long run the heavy timbers of the proof-house become well scarred with the marks of these violent explosions.

TRUING OR STRAIGHTENING.—The straightening of gun-barrels remains a skilled craft, in which mechanical contrivances have not yet superseded hand labor. The straightening is done by shade, the workman looking through the barrel at a horizontal line in a framed glass or upon a window-pane, and the lines of reflection in the bore showing any deviation from straightness. This method superseded straightening by the string or silk cord, which was in use long after the introduction of truing by shade, and sometimes at the same time and place, since truing by shade requires a knack which some find it difficult to acquire. Truing by shade is said to have been practiced by Eli Whitney at an early date; to have been introduced at North's factory, Middletown, Connecticut, by an English workman named Peter Ashton in 1830, and at the Springfield armory and at Waters' factory, at Millbury, Massachusetts, by an English workman named Thomas Smith, and to have been introduced at Harper's Ferry about 1822. It is also stated to have been introduced at Harper's Ferry by Smith after he had left Millbury. These statements seem conflicting, but the earliest practical introduction of the method as a skilled craft was probably in 1830, by Smith, whose skill was so great that at a time when journeymen's wages were commonly $1 a day he was paid by the gun-barrel, and received $21 a day for himself and boy. His blows upon a twisted barrel (to quote Mr. A. H. Waters) followed each other like the taps of a woodpecker, leaving scarcely a square without the marks of his copper hammer. He was not long left to enjoy this profitable monopoly, as his method was watched and copied, first by Thomas Warner, who afterward became master-armorer at Springfield. In 1832, at Watertown, New York, barrels were still straightened by the use of the bow and the silk cord.

In straightening, the place of the deviation must not only be seen, but the barrel must be properly laid upon the anvil and struck at exactly the right place, or else the blow causes a new bend, instead of rectifying the former one. Straightening usually accompanies smooth-boring, and is done by the same man while the boring is in progress. At this work 40 or 50 barrels a day are considered a fair day's work. On large orders men are sometimes employed to devote themselves entirely to straightening. A specially skillful operative has been known to straighten 124 barrels in a day, keeping two men busy smooth-boring; but this was an unusual rate, some men not being able to straighten more than 30 or 40 in a day. Straightening becomes more difficult with the small-bore barrels of the present day than with the larger bores formerly used.

REAMING AND POLISHING.—The quick-reaming and the smooth-boring of barrels are done with squared cutting rods or bits—augers of rectangular section, one or two of the corners being sharpened, and these reamers being backed by strips of wood and oiled paper. In this work the barrels are passed to and fro over the rods several times, and the depth of the cut is extended from time to time. As an example of former practice, smooth-boring was done in two successive operations, taking off about one-hundredth of an inch at each. It is now done in from three to five operations, taking out from two to five thousandths of an inch at an operation. The machinery used is simple, consisting of power-turning heads for carrying the rods, and carriages, with a rapid traverse, for moving the barrels back and forth. The chip cut is exceedingly fine, like powdered plumbago; and if a gauge-plug be slipped into a smooth-bore thus finished, the joint, although free, is air-tight, so that if the other end of the barrel be closed the plug rests mobile upon a spring or cushion of air, and upon the inversion of the barrel will not fall, being sustained by the atmospheric pressure.

The draw-polishing of barrels is usually performed on a 5-fold barrel-polishing machine. In this machine wooden jaws, fed with a paste of emery and oil, are pressed against the barrels, which are held vertically, and are revolved by a square spindle, passing through one of a set of geared pinions carried with the barrels by a reciprocating frame, the bearing of the spindle (which, through the pinions, gives a rotary motion to the barrels) being in the fixed frame. The operation being a brief one, a man tending two 5-fold machines can perform this work on a great number of barrels in a day. A ring at the breech end of the barrel is first polished on a buff wheel, the barrel being held by this end in the draw-polishing machine.

RIFLING.—Two methods of rifling gun-barrels are now employed—floating-out or file-tool rifling and hook rifling. An illustration is given (Fig. 8) of a rifling-machine for short barrels operated by the former method, made by the Pratt & Whitney Company, which will serve to illustrate the general character of rifling-machines. The cross-head of the connecting rod carries a rack with a pin, which, moving in a vertical adjustable slide, serves to actuate a small gear and turn the barrel. A rod attached to the cross-head at the back of the machine actuates the mechanism for setting forward the cutters, so that they will act in new grooves, and also serves to expand them in the following manner: The cutters are in the faces of small oblong plates, so set with flat springs in a tubular rod that, an inner rod being gradually shoved forward, pushes them out and deepens the cut. At each stroke the end of the inner rod touches a plate, which is very slowly fed forward by click and ratchet work, and thus the cutters are expanded.

The machines in use at the Springfield armory are of different design, and a chain-feed has been substituted for the crank-feed, which change in these machines, by avoiding the inertia due to a crank movement, is stated to have effected a large saving in the wear and tear of rifling rods and tools. In other factories, however, the traverse by the crank movement is preferred to that by the chain (the machinery for which was first designed by H. B. Bigelow, and introduced at Whitneyville, where it has now been discarded), and the movement is most commonly effected by the use of horizontal screws, or by ropes or bands, whose continuity of movement prevents shocks in the transmission of the power.

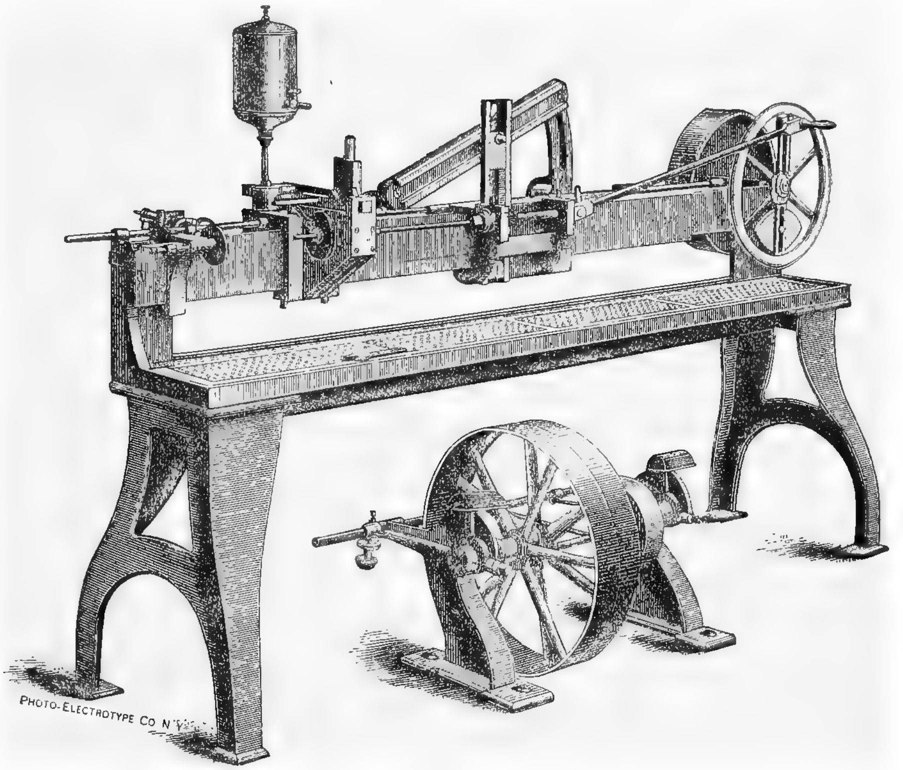
PHOTO-ELECTROTYPE CO N.Y.

Fig. 8.

In file-tool rifling one man can tend eight to twelve machines, and from twenty to thirty minutes are required for rifling a gun-barrel. The cutter-rod is turned after each cut, so as to secure uniformity by bringing every cutter successively in every groove. The expanding cutters, as now used at the United States armory, are not applied to effect a gradual deepening of the groove from muzzle to breech, but simply to feed out the cutters gradually in making grooves of uniform depth. The chip is a very fine one, and, by a device employed at the United States armory, at the conclusion of the cut the cutters are allowed to traverse the grooves a number of times without advancing in depth, which serves to polish out the grooves, which would otherwise have to be polished in a separate machine. In file-tool rifling it is claimed that there is less liability to variation than in hook rifling, the tool being stiffly supported, and the gradually increased deepening of the cut being so much smaller that any possible variation in the hardness of the barrels is not likely to deviate or dull the tool. This method is considered the better of the two at the United States armory at Springfield. It is also the method employed in the Prussian armories.

Hook rifling was the English method, and was introduced, with some improvements, by E. Remington & Sons, at Ilion, about 1861. In this there is a regular planing cut, and barrels can be rifled in five or ten minutes, one man tending two or three machines. Perhaps it is sufficient commendation of this method to say that the Remington Creedmoor rifles are machined in this way, and that it is the method in most general use in this country, although some armories employ the other method, and some use both methods. It has also been applied in cutting expanding grooves. The hook lies back against a wedge, and the deepening is effected by a rod striking against a pin, which is slowly fed forward by a screw and wheel with a click. The hook is thus pushed out, and at each return a finger, actuated by a spring, shoves it back, so that it will not scratch the barrel in returning. The barrel is turned by a gear moved by a rack with a pin in a straight horizontal slide, and is fed forward and back by a large screw. The setting forward to a new groove is a dependent movement, effected by a weighted vertical rack, notched wheel, and click.

The earliest rifling-machines had wood frames, and the twist was obtained by the passage of a twisted rod of square section through a square hole. Such machines were used by Hall at Harper's Ferry, and in 1832 or 1833 he introduced power rifling-machines. Tryon, of Philadelphia, had power rifling-machines built prior to 1840. William Ball, of Chicopee, designed improved rifling-machines for the Whitneyville armory about 1842. These were run with oval pulleys, to equalize the crank motion. Ball's machines used only one cutter. Rifling-machines, cutting three grooves simultaneously, with expanding cutters, operated by a central cone in a tubular rod, are stated to have been first used in 1853 at Frankford arsenal, Philadelphia, Pennsylvania. In 1854 a rifling-machine was designed by H. D. Stone, at Windsor, Vermont, for the English government, which cut three grooves at a time, the twist being given by a vertical rack, actuated by a roller moving in guides. This was afterward used for the Springfield model of 1861, with expanding cutters for cutting grooves deep near the breech and shallow at the muzzle, which was done by a telescopic rod, the cutters being carried by a tubular rod and bearing against the inside rod, and being pushed out by it as the barrels were drawn over them, the cut starting from the muzzle of the barrel. Robbins & Lawrence made 2,300 stand of muskets in 1855, for the use of the English government in the Crimean war, with rifled barrels 42 inches long, rifling having been previously attempted only on barrels 33 inches long. In 1861 machines for rifling two barrels at a time were built by Bement & Dougherty for the Providence Tool Company. In these the output per operative was increased by greater facility in handling and placing the barrels, the rifling being with the hook tool.

In leading or polishing-out rifle grooves a fourfold vertical machine is commonly used, the tools, which are set in rods, having a vertical reciprocating movement from a crank above, while they are free to turn, simply following the groove.

TERMINAL CUTS.—Of the remaining cuts upon the barrel there is more or less variation, according to the lock-system employed. The most general of these operations are squaring, breech-turning and filing, muzzle-turning and filing, chambering, counterboring for cartridge head, milling and slotting for cartridge extractor, threading breech-screw, and milling, drilling, and tapping for front and rear sights. All such operations, which might be classed together as terminal cuts, probably require from one-third to one-fourth of the labor upon the barrel. The breech-screw is considered to be the last gun part made uniform and interchangeable. This was accomplished in 1853 at Frankford arsenal, where, according to Colonel P. V. Hagner, a method of threading breech-screws and tapping barrels by machinery was introduced, which produced identical screws. It was also done independently at the Springfield armory, where Cyrus Buckland devised a machine for starting the thread at the same point in screw and nut, breech-screws having before this been fitted by hand to each barrel.

REVIEW OF PROCESSES.—In the operation of browning, power-brush and carding wheels are used in cleaning and surfacing the barrel. At the United States armory the barrel is inspected after the rolling, nut-boring, slow-boring, finish-turning, finish-reaming, milling to taper, grinding, and proving after the rifling, lathe-filing of muzzle and rounding of muzzle-end, after the emery-finishing, and after the browning. The operations are, besides browning (which, with the repetitions, constitutes about 30 processes), cutting off, centering, drilling, rolling, sawing, straightening in press, annealing, straightening on anvil, nut-boring twice, slow-boring (with squared bit), milling ends, turning for dog or holder, casting center-bearing, turning center-bearing, turning former half, turning latter half, straightening by shade, finish-turning, reboring (with squared bit), milling to taper, grinding, proving twice and stamping, rough-filing muzzle, smooth-milling breech end, seating front sight, brazing sight, milling front end of sight, filing about sight, smooth-milling muzzle end, reaming, finish-reaming, polishing breech end, draw-polishing, rifling, lathe-filing muzzle, hand-filing muzzle, jig-filing front sight, rounding muzzle end, milling to length, turning screw blank, turning blank tenon, squaring shoulder, stamping center-mark, threading breech-screw, drilling holes for sight-base screws, counter-sinking for cartridge head, hand-reaming chamber, profiling for breech-block hinge, slotting for extractor, tapping holes for sight-base screws, draw filing, and finishing with emery cloth.

MACHINES REQUIRED.—The kinds of machines used are, in general, cutting-off lathes, centering machines, barrel-drilling machines, barrel rolls, iron-sawing machines, straightening presses, drop-hammers, nut-boring and reaming machines, barrel lathes, grindstones, buff wheels, draw-polishing, rifling, and breech-threading machines, drill presses, tapping lathes, profiling- and milling-machines, and common turning lathes. In a set for barrels drilled full length the cutting-off, rolling, and iron-sawing machines and straightening presses would be omitted. In the usual practice, leading or groove-polishing machines would be required. The number of machines required would be dependent not only upon the output, but upon the manner of handling. Probably an output of 50 barrels (drilled full length) per day would require 30 to 35 machines, exclusive of power motors, and requiring about 20 horse-power and 25 to 30 operatives. Probably an output of 200 barrels (rolled from the drilled molds) a day could be obtained with 80 to 90 machines, exclusive of motors, requiring about 75 horse-power and 50 to 60 operatives.

MAKING PISTOL BARRELS.—The work on pistol barrels involves only such special features in machinery as result from the short length and easy handling of the barrels. Improvements in detail have been made upon some of the machines used by Colonel Colt twenty or thirty years ago, although these were very ingenious and effective. In the Colt barrel-drilling machine the barrel is clamped by screws in a hollow-turning arbor. The drill-carriage is held in position by an eccentric clamp below the bed of the machine. The drill is fed forward by a hand-wheel, with a screw working in a half-nut, which, supported by a hinged leg with a roller and handle, may be tripped up and dropped out of bearing with the screw, so as to allow the tool a quick, sliding return. Probably other forms of drilling machines now in use do more effective work. In the Colt barrel-boring machine the barrels are clamped in notched bars on a traversing carriage, and are thus drawn over helical cutters upon revolving rods in tension; the reaming-machines being similar, except that the bit is a square section reamer, with two cutting edges. Pistol-barrel rifling-machines exhibit the same essential features as those for gun-barrels. In the Colt machine the barrels are held in hollow axles, with notched disks, operated by puppet bolts and shifting rods for moving them and holding them in position for the cutting of the several grooves. The rifling stems move horizontally in a carriage sliding in ways, and moved by a crank and connecting rod from the main shaft, and are carried by spindles with spur wheels, which are turned to make the spiral groove by a rack actuated by a link or connecting rod, one end of which is pivoted to a projecting arm of the frame, while the other, moving with the carriage, actuates the rack. Floating-out cutters are used, which are expanded in the usual manner, a disengaging gear operating to stop the machine when the full depth is cut.

Of the pistol-barrel rifling-machines designed by Howe, at Windsor, in 1853, one machine would rifle 100 pistol barrels in a day.

THE MANUFACTURE OF GUN-STOCKS.

Operations in stocking.—The stock of a gun is sometimes in a single piece, and sometimes (depending upon the breech mechanism and design) in two parts, the tip-stock and the butt-stock. Beneath the latter there is sometimes added a projecting piece, called the pistol-grip. If the stock is in a single piece, the upper angle of the junction of butt and tip is called the head. The operations upon a plain gun-stock for the Springfield rifle may be enumerated as follows: rough sawing; cutting off butt and tip ends; marking four points in butt end and one in tip end for fastening in turning lathe; turning tip and butt; spotting (or by means of a circular-saw gang marking places on each side of butt and tip, and several on one side of the stock between the head and tip, as a guide for additional operations); cutting barrel-groove; cutting for receiver and tang and tenon of breech-screw; finish-cutting barrel-groove; squaring tenon mortise; planing sides and edges of stock to a former; sawing off butt and tip to gauge length; cutting butt-plate curve; bedding butt-plate tang; boring and tapping for butt-plate screws; bedding for lock-plate; boring for tang of sear and for bridle and sear screws; cutting recesses for main-spring bridle, tumbler, and sear spring; countersinking for head of bridle screw; bedding for guard plate; boring for guard-bow nuts and trigger-stud; cutting mortise for blade of trigger; boring holes for guard, tang, and side screws, and counterboring for side-screw washers; finish-cutting top, upper, and lower bands, and between bands, and forming shoulders for bands, and shoulders and tenon for tip; finish-turning from heel of butt to head and from head to lower band; bedding for ramrod-groove and stop and forming holes for studs; cutting recesses for the band-springs and boring holes for their tangs; boring ramrod-groove; cutting barrel-groove for receiver; cutting groove for arm of hinge-pin; boring hole for tip-screw; finishing with hand shaves, scrapers, and sand-paper, and oiling with linseed oil. These last few hand operations require about five-eighths of the labor upon the stock, all the varied and curious cuts made by machinery requiring only three-eighths, which is a very forcible exhibit of the value of labor-saving machinery. The enumeration of the foregoing operations outlines a complete system of manufacture which has, since 1820, been gradually evolved from the whittling, boring, and chiseling by hand, which then constituted the single craft of stocking.

The Blanchard machinery.—In 1818 the first gun-stocking machine was made by Thomas Blanchard at Millbury, Massachusetts. One of his earliest machines, built about 1822, is still at the Springfield armory, and is here illustrated (Fig. 9). It has a large wood frame of 6 to 7½ inch timbers, the pattern and the stock-holder far apart, and carried by a swinging frame, hung upon pivots nearly 8 feet above the floor. The cutter-wheel and the guide are each 18 inches in diameter, and are carried by a very heavy iron frame, which was fed forward by a small screw spindle (with a weak V-thread) at the back of the machine, the spindle pulley being driven by a small pulley, shown at the top and extreme left in the cut. This heavy frame moved on one V and one flat guide, and the reverse movement was given by a strap or a rope, wound upon a roller turned by a handle, upon the automatic disconnection of the feed screw, which was effected by the throwing out of a half nut. The cutter-wheel was turned by a belt from a large drum, and the stock and the pattern were turned by a belt from a pulley on the same shaft, the stock and pattern being geared together by a train of four spur-wheels. This machine did excellent work in rough-turning stocks,

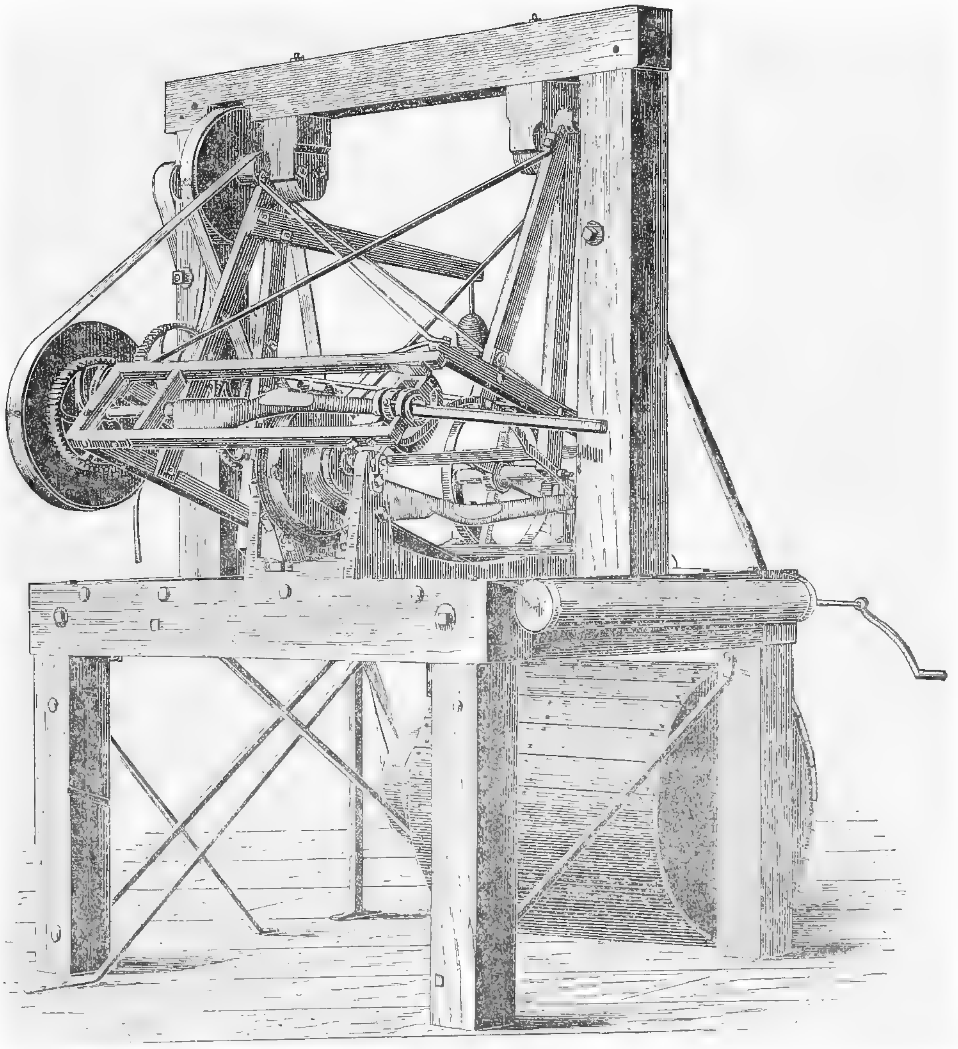

Fig. 9.

as is exemplified by samples still extant. By 1827 Blanchard's stocking and turning machinery had been developed into 16 machines, in use at both national armories, and for the following purposes: sawing off stock, facing stock and sawing lengthwise, turning stock, boring for barrel, turning barrel, milling bed for barrel-breech and pin, cutting bed for tang of breech-plate, boring holes for breech-plate screws, gauging for barrel, cutting for tang of breech-pin, forming concave for upper band, dressing stock for and between bands, forming bed for lock-plate, forming bed for interior of lock, boring side and tang-pin holes, and turning fluted oval on breech. Of most of these machines little more than the names remain. The machine for forming the bed for the lock-plate deserves especial mention, as it indicates how far Blanchard's ingenuity in making stocking machinery had outrun the facilities for making the metal parts with which the stocks were required to fit. After the stocks were made uniform by machinery, the lock-plates and other gun parts were for some time not made uniform nor interchangeable. It was not, therefore, sufficient to cut out the stock uniformly, for the lock-plates, being of variable shapes and sizes, would not fit the cut; so Blanchard devised a combination of dies sprung inward toward a center, so that they would conform inside to any shape of lock-plate set in the interior, while the outer ends formed a surface which was used as a former, and thus every cut in wood was made by machinery to conform to the irregularities of the metal work. The use of this device, as attested by Messrs. Lord, Stillman, and others, was continued at the Springfield armory until 1840, but the machinery was destroyed, and no official record remains of this curious invention, which was not in use at the private armories, where the lock-plates were at this time usually fitted in by hand.

Before the introduction of Blanchard's machinery one skilled man was capable of making 1 or 2 stocks in a day, much of the work being in the fitting of the metal parts. With his earlier and ruder machines an output of 5 or 6 stocks per operative per day seems to have been attained at an early date. The uniformity and quality of workmanship and the number and nicety of cuts have since been gradually increased; but the machining of stocks can now be done on a large scale at the rate of 28 per operative per day, and all the work, including shaving and sand-papering, which constitute the major part of it, at 10 per operative per day. For an output of 50 stocks a day, 8 per operative per day for the hand-work and machining together might be stated as a practical rate. A revision of these estimates, assisted by data furnished by Mr. A. H. Waters, is expressed in the following table:

Men per hundred stocks per day.

	Before Blanchard's improvement.	Blanchard's early results.	Present results.	Best present results.
Machine-work		10	5	3¾
Hand-work	75	7	7	6
Total	75	17	12	9¾

STOCKING MACHINERY AT HARPER'S FERRY.—The precursor of the mill-cutter was the gang of circular saws, set together on a spindle. These were arranged so that the teeth broke joint irregularly, which prevented the splitting up of the grain of the wood. This saw-gang was used in mill-planing or profiling, the gang being placed between the two sides of the slide bearings of a jig-frame, in which the rough stock was clamped, the spindle of the gang being underneath and in direction perpendicular to the slide bearings, and the jig-frame having the outline of the profile of a gun-stock, and being moved over the slide bearings, which were on a level with the cutting edges of the gang. The saw-gangs used were from a quarter to half an inch thick and 3 to 7 inches in diameter. This was the principal stocking-machine used at Hall's works, at Harper's Ferry, prior to the introduction of Blanchard's machinery, and as late as 1844. By its use the stock was brought to a square-edged profile, top, bottom, and sides, but much of the work remained to be done by shaving and cutting with hand tools.

Of the other stocking machinery in use at Hall's rifle works at that time, to quote the statement of Mr. James H. Burton, "a circular saw 'slabbed' the face of the stock, or the surface in which the barrel was subsequently bedded, and the surface, so faced and straightened, became the base or bearing for the subsequent operations of gigging or profiling. Another circular saw—'cross-cut'—was employed to saw the ends off to the proper length. Another machine, carrying a revolving cutter on a horizontal axis, was employed in connection with another 'gig' for roughing out the groove for the barrel. Then still another machine was employed to 'spot-groove' the bed for the barrel. This machine carried a spindle (horizontal), say about the length of a barrel, the surface of which was turned off so as to leave standing at intervals in its length of, say 3 to 4 inches, narrow belts about three-sixteenths of an inch wide, which were cut with diagonal teeth of shallow depth, the spindle being in the first place turned and finished to the exact longitudinal profile and diameter of the barrel. This spindle was, of necessity, provided with intermediate supports, to prevent it from springing when in use. The gun-stock, previously rough-grooved out for the barrel, being secured in proper position in a sliding frame, was lowered to the slowly-revolving cutter spindle until arrested by a properly-adjusted 'stop'. The result was that the roughly-grooved bed for the barrel was 'scored' at intervals of 3 or 4 inches of the exact diameter of the barrel at corresponding points in its length. These 'scores' became the guide for the hand-workman in planing out the bed for the barrel, and were the means of saving much time in fitting by hand. The gun-stock was finally rounded and shaped by hand, the draw-knife, the spoke-shave, and files being the tools employed, in connection with suitable gauges for determining the cross-sections at various points."

In 1844 J. H. King devised a bedding-machine, which was used at Harper's Ferry. In this there was a vertical drum, 2 feet in diameter, inclosed in a cylindrical frame on the same axis, the frame bearing six vertical spindles in its circumference. This frame could be moved about the central shaft and held by a spring-catch striking into notches. The drum was on the driving shaft, and belts from it ran to pulleys on the six tool-spindles. The copying pin was set in the frame carrying these spindles. Its height was adjustable by set nuts. During action the pin remained and the tool revolved in one position. All the feed motions were obtained in the bed, which was mounted on a vertical slide, balanced on a hinge by a weight, as is a drill-press table. The bed had two horizontal slides at right angles, the slides movable by levers, and one slide being mounted upon the other. The work and the pattern, or former, were thus actuated, but the motion lacked sensitiveness on account of the weight of the bed. It was, however, an ingenious machine, and was universal so far as it served for the letting in of all the component fittings for a gun-stock; that is, the lock, guard, side-plates, band-springs, and butt-plates. Stock-turning machines were not used at Hall's works until several years later.

STOCKING MACHINERY AT MIDDLETOWN.—Stocking machinery, designed by Selah Goodrich, was in early use at Colonel North's factory at Middletown. This was used in making interchangeable stocking work for Hall's rifles, on a government order given in 1823. The stocks were made and boxed up apart from the trimmings, and required no fitting for the lock-frame parts. Of the details of this machinery little is now known, except that a machine for mill-planing to a former, now in use at the Springfield armory, is stated to be of a design derived from one of Goodrich's machines.

THE AMES MACHINERY.—The principle of cutting to pattern in irregular turning, bedding, and profiling was thus gradually put into application at all of the armories, but in many of them only to a limited extent, and with very rude and imperfect mechanism, by which the full benefits of the method were by no means obtained. Of the stocking machinery of this period few relics remain. In 1853 the Ames Manufacturing Company, of Chicopee, Massachusetts, commenced the manufacture of Blanchard stocking machinery from improved designs by Cyrus Buckland, which may be considered to mark a new epoch, not only in the improvement of the machinery, but of its more extended application throughout the world. The Ames machines are in use to-day both in American and in foreign armories, the earliest foreign orders coming from the British government, the British board of ordnance, the London Armory Company, the royal artillery department of Spain, the Birmingham Small-Arms Company, and the Russian government.

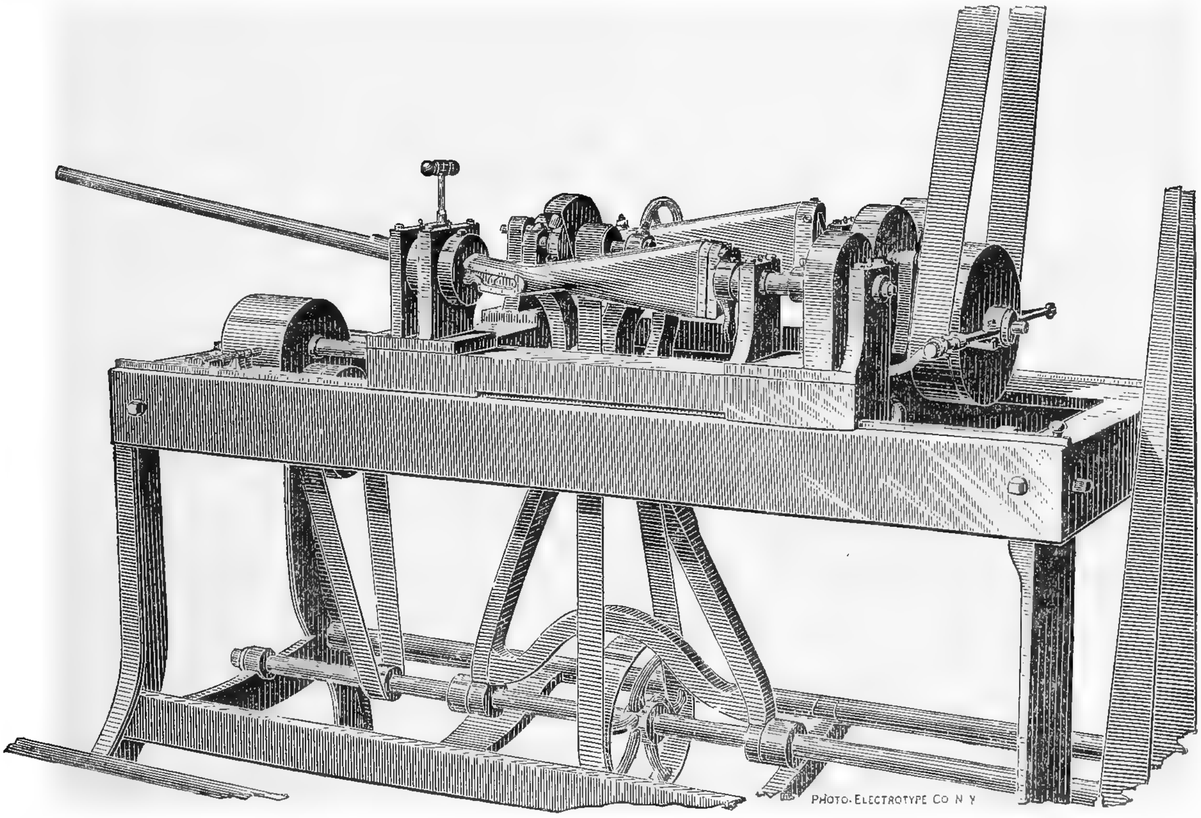

Fig. 10.

These early orders were for between 400 and 500 machines, beside fittings. The machines were for the most part modified designs of the Blanchard stocking machinery, but also included machinery for milling, edging, and barrel-boring, and other metal-working, and forging and proving machinery for gun parts; in fact, almost every machine then employed, from a drop-hammer to a milling or a barrel-polishing machine; dynamometers and experimental machinery for proving and testing; edging, drilling, tapping, reaming, grooving, barrel-squaring, chucking, broaching, stamping, spring-setting, and other machines, beside more or less complete sets of stocking machinery. It is to be remembered that stocking machinery is so prolific in output that a comparatively small number of machines will do the world's work.

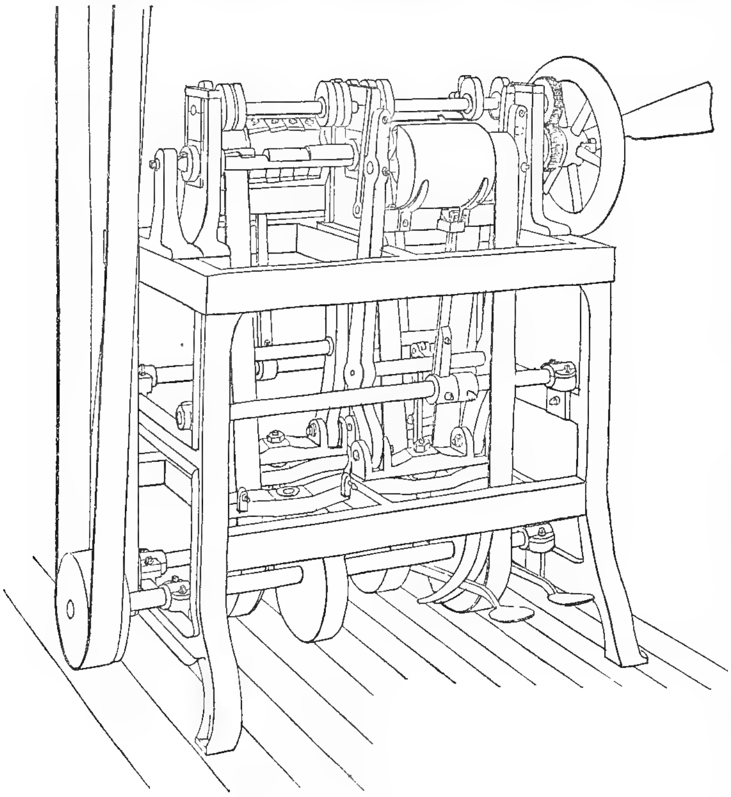
Fig. 11.

Turning to patterns.—The illustration of the Ames butt-stock turning-machine, here introduced (Fig. 10), is naturally compared with that of the primitive Blanchard stock-turning machine. The more compact arrangement of the later machine will at once be noted. The frame is of metal. The swinging arm, carrying the guide and cutter-wheels, is pivoted below the bed on a shaft, from which the cutter-wheel is driven by a belt, the wheel being held to its work by a spring pressing against the arm. The carriage containing the pattern and stock-holder has a longitudinal movement, the gearing for turning the stock and pattern being driven by a belt from a countershaft above the machine.

In the stock-turning machine in use at the Springfield armory the stock-holder is placed above instead of by the side of the pattern, the cutter-wheel being above the guide-wheel. The traversing belt for the carriage is dispensed with, and all the motions are obtained in train from the shaft beneath the bed, the traverse of the carriage being obtained through a screw and worm-wheel feed motion. Other forms of machine have the stock-holder and former driven by a long, spurred shaft admitting of longitudinal traverse, and some of the most recent designs have the stock-holder and the former side by side, and the carriage driven direct from a countershaft, but the guide and cutter-wheels, instead of being mounted on a swinging arm and held to the work by springs or weights, are mounted on a transverse slide carriage, moving in ways and actuated by a weight.

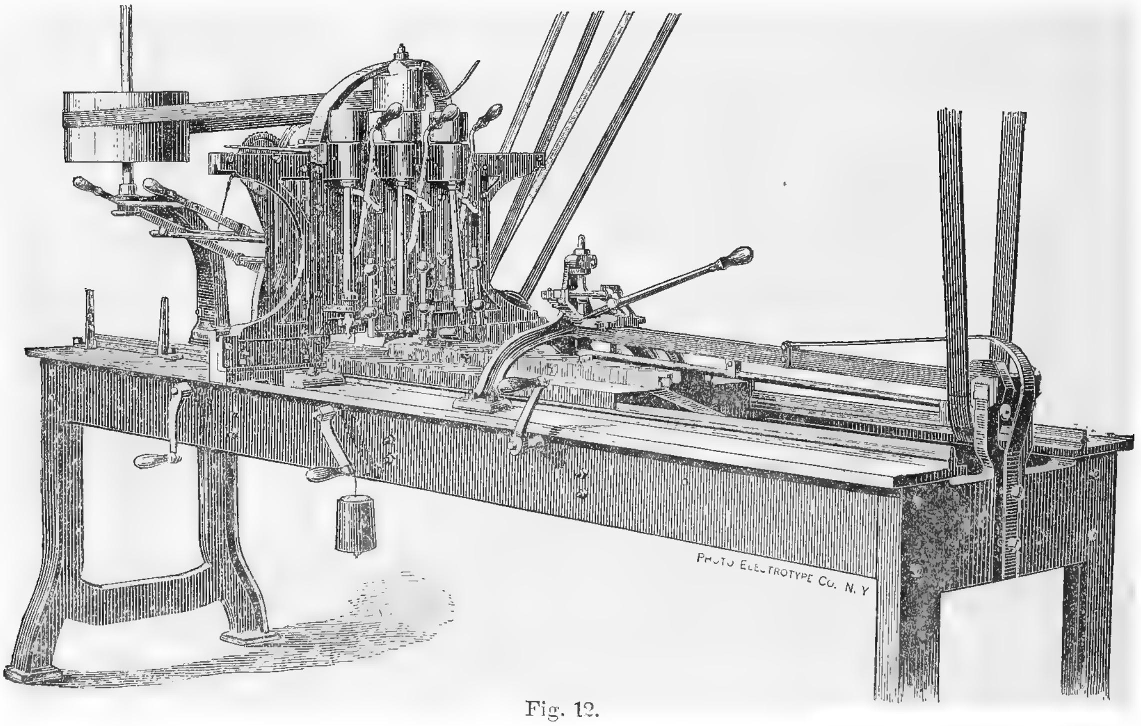

Fig. 12.

The machine for turning between bands, as used at the Springfield armory, is shown in the illustration (Fig. 11). The cutter-wheels are carried by swinging frames, and the form is given by guide-plates striking against former-cams upon a spindle. This machine has a hand-feed and motion for the stock and the cam-shaft.

MILLING TO PATTERNS.—For mill-planing to a former the machine used has a milling-cutter and a guide-wheel on one vertical spindle actuated by power, the jig-frame former and the stock-clamp being upon a long arm or lever resting upon a plate. This arm is pivoted in a horizontal slide and operated by hand, so as to bring the former against the guide-wheel, while the cutter mills the stock to the same form.

BEDDING AND DRILLING MACHINERY.—An illustration is here given (Fig. 12) of the Ames barrel-bedding machine. The machine now used at the Springfield armory differs from it only in having one additional vertical spindle. It may best be described in a review of the operations of barrel-bedding. The first operation is the cutting of the barrel-groove. The stock is fixed upon the carriage beside the former-plate containing the slots and shapes, which, by regulating the movements of guide-pins, determine the cuts upon the stock. The row of vertical cutter-spindles, each with a pulley at the top and a guide-pin beside the cutter, is carried by a slide-frame with a transverse movement, so that the pulleys may be successively driven from one standing belt, and the cutters may be successively brought into position for the work. The spindle of the barrel-grooving cutter is lowered by its handle; its guide-pin enters a slot in the former-plate, and as the carriage is moved along the bed (by a crank and gearing) the cutter, by two cuts, forms in the stock a double groove. Two cuts are necessitated by the taper of the barrel, and a ridge is left between them at the center base of the bed. This ridge, prior to 1849, was planed out by a properly-rounded hand-shave or planer. Cutting the sides of the groove for the receiver, and cutting the mortise for the tenon of the breech-screw, comprise the second and the third operations on the Springfield rifle-stock, each requiring a separate spindle and cutter. The fourth operation, cutting the groove for the tang of the breech-screw, is a sloping cut, which is executed by means of a tilted spindle. This tilted spindle is run by a ball-pulley, a ball, by friction against the interior of the pulley, transmitting the motion to the spindle. The fifth operation—smoothing the barrel-groove to shape and removing the ridge at the center base of the groove—formerly done by hand-planers, is now done by means of a horizontal cutter, driven by a separate belt. This cutter is carried by a long rod, and with its frame and guide-pin may, by means of a four-motion cross-head and handle, be given a motion which enables it to form the groove truly to the taper of the barrel. This labor-saving device was invented in 1849 by Mr. Stillman, of the Springfield armory. The seventh operation—squaring the end of the barrel-groove for the receiver—is also done by a horizontal cutter, which is brought down to the work by the handles of the hinged frame shown back of the vertical spindles in the illustration. This cutter is driven by a separate belt, and after the cut is made, it is allowed to be drawn up out of the cut by a weight with a chain passing over a pulley and attached to the hinged frame.

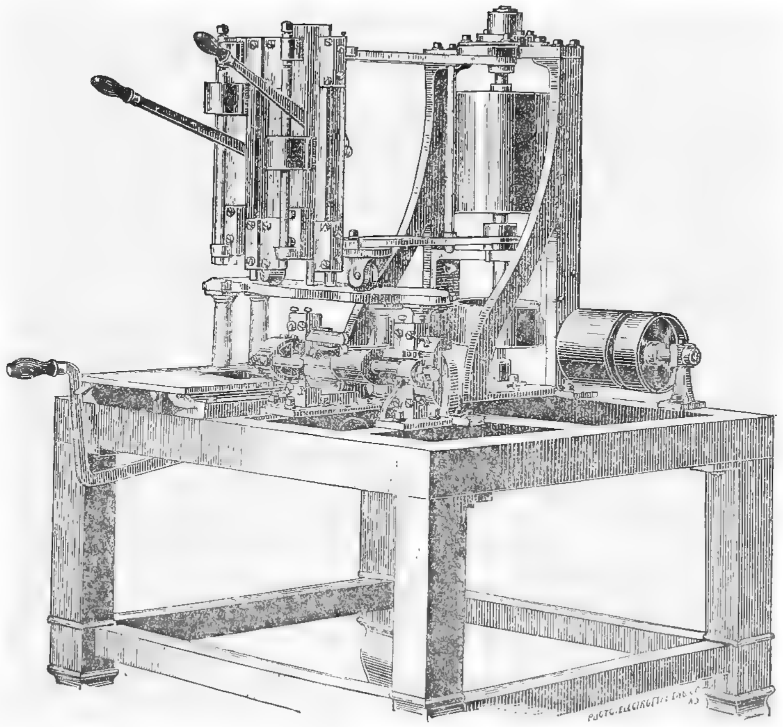
Fig. 13.

The earlier barrel-bedding machines had double rows of vertical spindles before and behind the transverse slide, and so required two standing belts. About 1842 one was built at Whitneyville having all the spindles in front of the slide and one standing belt.

Other stock-bedding and letting-in machines are similar to the barrel-bedding machine in principle, but a few additional examples may be noted. In the Ames butt-plate machine the frame bearing the vertical spindles, instead of moving on a transverse slide, is pivoted on vertical bearings and supported by rollers moving upon a plate back of the spindles. This is shown in the illustration (Fig. 13). A horizontal cutter-spindle, driven by a separate belt, is mounted upon the same frame.

The guard-bedding machine, as used at the Springfield armory, exhibits the feature of an oscillating fixture, which has the effect of enabling the operative to tilt the barrel with precision, so that cuts perpendicular to the stock may be made in several positions. This machine, as illustrated (Fig. 14), is fitted with a fan-blower and air-pipes for the removal of sawdust. An illustration is also given (Fig. 15) of the Ames lock-plate bedding-machine, which is a machine of Buckland's design, and, with some minor exceptions, the same as used at the Springfield armory. In this machine the vertical spindles rotate about a center, stopping over the work, which is passed through the bow or yoke above the bed. The looped springs serving to lift the cutters back from the work, and the coiled springs and catches to regulate the chucking movement about the center and the successive engagement of the spindles, give an appearance of complexity to the machine. In more recent designs these ends are attained by devices less conspicuous and probably equally effective. Other bedding-machines have tables that can be lifted and lowered, giving scope for a greater variety of work. Of the more recent improvements, the pivoted holder is perhaps the most important. Prior to the use of the tilted spindle on the barrel-bedding machine the stock was tilted to accomplish the bedding of the tang, but with present devices a great number of operations can be performed in one machine upon the butt-stock, once clamped in a pivoted holder; operations such as bedding for the barrel, receiver, tang, ramrod, and butt-plate, formerly requiring several machines. A similar machine is used for the tip-stock, each machine having five vertical spindles. These pivoted holders or jig-frames, containing in themselves the gauges and formers for the various cuts and borings, as well as the stop attachments for determining the movement of the work, present examples of complex and ingenious design.

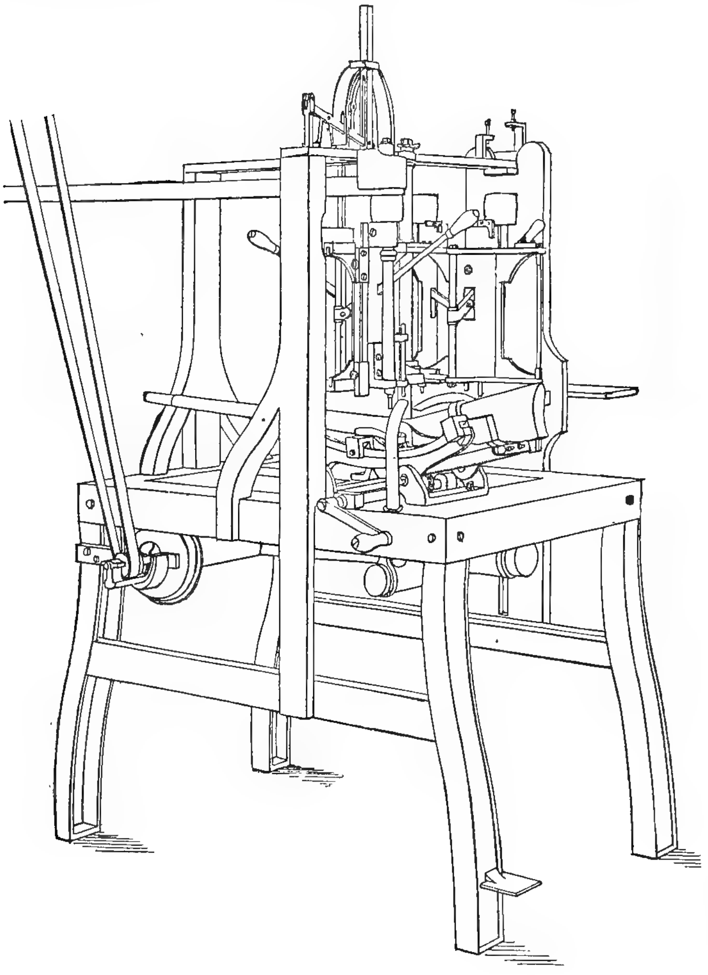

Fig. 14.

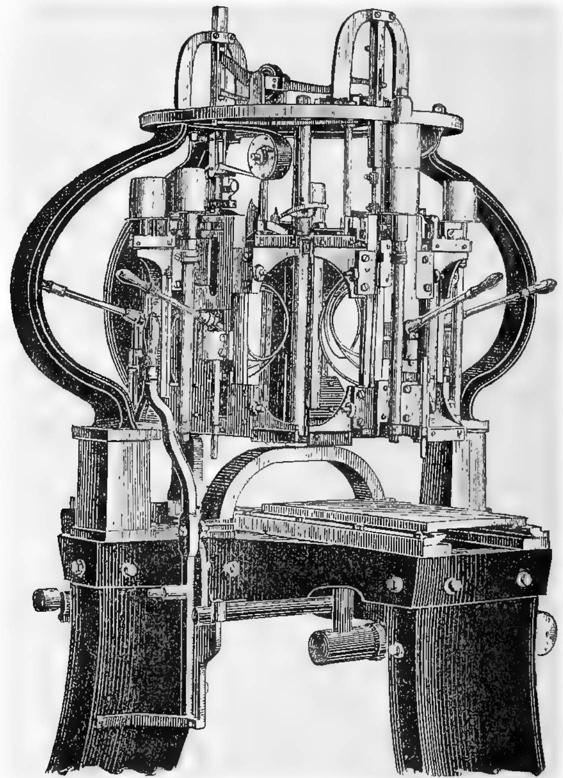

PHOTO-ELECTROTYPE CO. N. Y.

Fig. 15.

The drilling of the stock for the ramrod is sometimes a delicate operation, on account of the length of bit and the necessity for great accuracy; the hole being liable to break into other cuts if not exactly placed. The open part of the cut is bedded by a mill, and the hole was formerly drilled by hand. In 1840, under Thomas Warner, at the Springfield armory, the attempt was made to drill the hole by machinery, using a ship-auger bit, which has a single groove without core. This failed, and hand-drilling was resumed until 1860, when the precise machine method which had failed twenty years before was made a success by a knack of manipulation in starting the bit at the right depth. The labor upon the cut was thus reduced to one-fifth of the former labor, and the cost of the cut from $2\frac{3}{4}$ cents to $5\frac{1}{2}$ mills. In some armories the cut is made in a similar manner, but with a double-grooved bit.

Bedding-mills (of $\frac{1}{8}$ inch to $\frac{1}{4}$ inch diameter) have a velocity of 5,000 to 6,000 revolutions. The power required by stocking machinery is light. A set of stocking machinery for 250 stocks a day can be built for about $10,000, but the earlier sets, which were more complicated and experimental, cost two or three times as much.

ESTIMATE OF LABOR.—We are indebted to Mr. J. M. Clough, superintendent of the Florence Machine Company, for the following estimate of the labor required for the turning out (machining) of 250 musket-stocks per day of 10 hours, the daily attendance per machine being given in fractions of a man's time:

1 cutting-off saw bench	$0\frac{1}{2}$
1 profiling saw bench	$0\frac{1}{2}$
1 rough-profiling machine	$0\frac{1}{2}$
1 finish-profiling machine	$0\frac{1}{2}$

1 barrel-bedding machine	1
1 band-turning machine	0½
1 between-band and nose-cap turning machine	0½
1 butt-plate cutting machine	0⅓
2 butt-stock turners	1
1 machine for cutting butt-plate tang and boring and tapping for screws	0½
1 machine for letting in lock and guard plate	1
1 ramrod-grooving machine	0½
1 band-spring seating and boring machine	0½
1 ramrod-spring and boring machine	0⅓
1 ramrod-boring machine	0½
1 nose-cap boring machine	0¼

This was for Springfield musket-stocks. Such an estimate would, of course, vary with the form of stock, with the hardness of the wood, with the speeding and the feed of the cutters and work, with the condition and designs of the machinery, and with the rapidity of the operatives in handling the work.

PISTOL-STOCKS.—The work upon a pistol-stock can hardly be compared with that upon a gun-stock. The pistol-stock is usually composed of two small sides of wood, hard rubber, horn, ivory, or other material, fastened upon a drop-forged iron frame. The bedding, pressing, or milling of these pieces involves no heavy item of labor, and the whole work is similar to that upon cutlery handles.

FORGING GUN COMPONENTS.

DROP-FORGING.—The forged lock parts and trimmings of a gun (pieces which are technically known as gun components), being of various shapes and sizes, are subjected to different methods of treatment in the forging. Some parts, such as the larger screws (the smaller being machined direct from the rod without forging) and flat springs, are die-forged under pony hammers, and are afterward annealed and pickled. Flat springs are also drop-forged, the forging before the fin is trimmed off appearing very much as shown in the cut (Fig. 16). Of the larger and less regularly formed parts some are dropped in dies in several operations without reheating, the first blow blocking out the material, and one or two additional blows sufficing to bring it to shape. Parts of considerable complexity of form can thus be gradually swaged out, which, by a single blow, or by the use of an unsuitable succession of dies, would only be cracked and spoiled.(*a*)

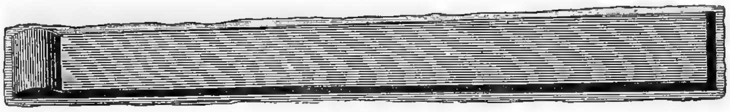

Fig. 16.

The rough or blocking-out dies are of cast iron, the finishing dies of steel. The accuracy of the form is proved by making a lead casting between the dies. The forgings are sometimes brought closer to form by dropping in dies and trimming and reheating before the second dropping. Parts like the bands of a barrel, having an open central space, are sometimes second-dropped upon a mandrel. The butt-plate, a curved piece requiring a weight of iron of about 12 ounces, is blocked from the rod by twice dropping in dies, is then trimmed, reheated, and redropped, annealed, pickled, and dropped cold, and the body and tang are trimmed in two operations. The pickling to remove scale is done in vitriol; the annealing in charcoal, brought to a proper heat in furnace boxes, ovens, or retorts. For softening, the smaller pieces are sometimes placed in a charcoal box in an annealing oven, the flame being carried under the box, on both sides of it and above it, and a tube passing through it revealing by its color the proper temperature for dampening the fire.

All the smaller parts are forged from rods or bars of merchant iron or steel, the butt-plate, for example, from ¾-inch by ⅜-inch iron, the large pins and screws from round, and the springs, hammers, and other parts from square or flat steel or iron. The end of the rod or bar is heated in the fire, and the piece is blocked out in the dies upon the rod; the rod being used as a handle for the insertion of this end-piece under the several drops, and the piece not being cut from the rod until the final blow, leaving the piece, as shown in several illustrations (Figs. 17 and 18), with a fin to be sheared off in the trimming-press.

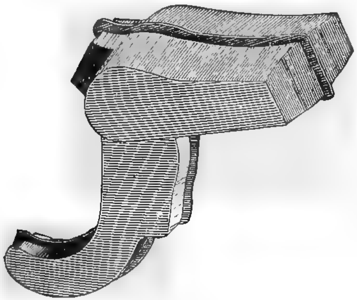

Fig. 17.

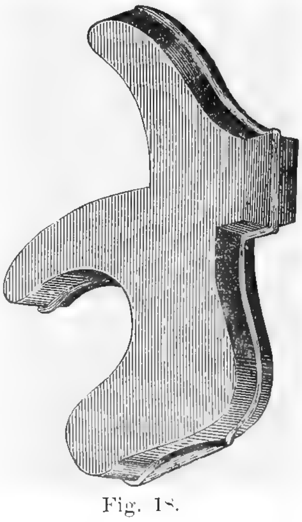

Fig. 18.

An illustration is shown (Fig. 19) of a pistol frame as made by the Billings & Spencer Company, of Hartford, Connecticut—a company which has applied die-forging to a vast variety of complicated forms in small mechanism, being pioneers in this class of work. Such a pistol frame can be drop-forged in dies at the rate of 60 an hour,

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a In the unsuccessful effort to make interchangeable work in France in 1785, die-forging was tried as an important means accessory to this end, and was abandoned on account of the pieces being spoiled and cracked by improper swaging.

involving the use of 3 pairs of dies and 3 different forging operations, beside the trimming, annealing, and pickling. A pistol-hammer is drop-forged in three operations, a man and boy in attendance, in half a minute or less.

For the heaviest pieces the stock has to be worked under a trip-hammer very much as the stock for axes and hammers is worked. The frame of the Remington shot-gun is made from 2-inch square Norway iron, cut to lengths. The pieces are heated and drawn out under a hammer to form the tang, and are then forged in a steel die under a 900-pound drop.

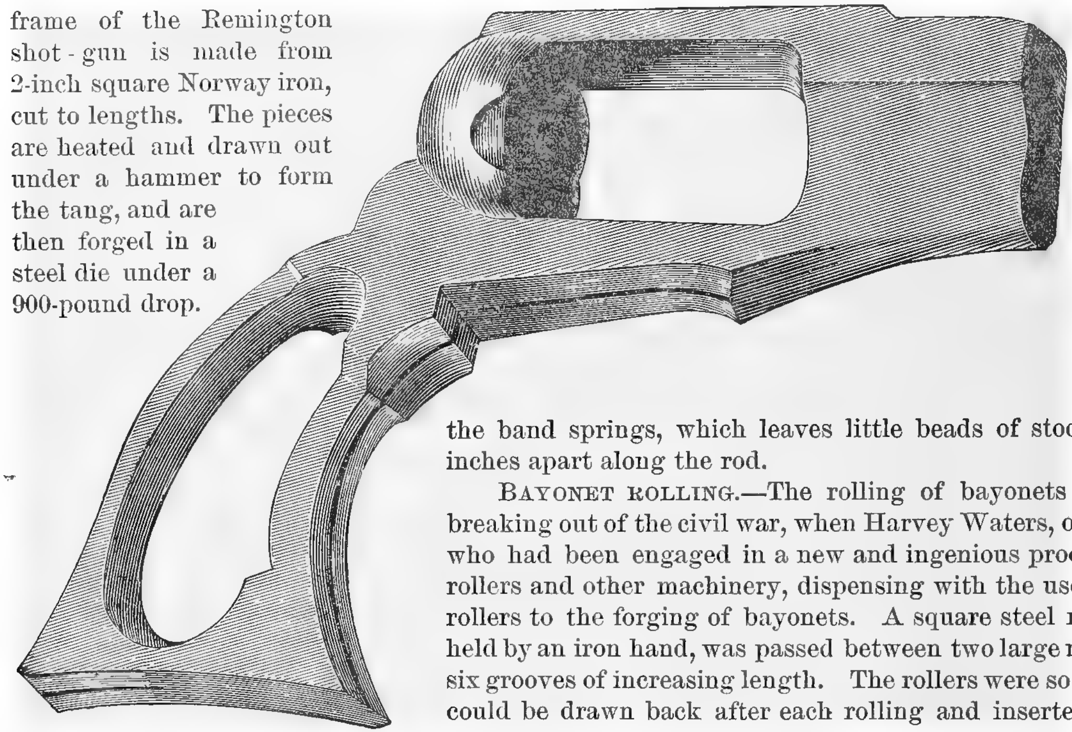


Fig. 19.

ROLLING.—The forging of stock by rolling is applied with advantage in some cases. Simple examples of this are furnished in the rolling of the metal for front sights, the rod being rolled to the cross-section, and having only to be cut off in lengths to form the rough sight (though the sight base is formed in a die), and in the rolling of the steel for the band springs, which leaves little beads of stock at intervals of about 2 inches apart along the rod.

BAYONET ROLLING.—The rolling of bayonets was commenced after the breaking out of the civil war, when Harvey Waters, of Millbury, Massachusetts, who had been engaged in a new and ingenious process of making scythes by rollers and other machinery, dispensing with the use of trip-hammers, applied rollers to the forging of bayonets. A square steel rod was heated, and, being held by an iron hand, was passed between two large rollers successively through six grooves of increasing length. The rollers were so arranged that the bayonet could be drawn back after each rolling and inserted in the next groove, the rollers revolving continuously in one direction. This machine was not only much more efficient than the old process of forging under trip-hammers, but saved 2 ounces of steel on each blade—not only a saving of that weight of steel, but of the greater expense of milling, filing, and grinding that weight of steel from the forged bayonet. To quote Mr. A. H. Waters:

> The bayonet machine was capable of turning out at the rate of 4 a minute, but 1,500 a day was the average day's work. The price charged for rolling was 10 cents each. The rollers were 3 feet long, chilled in casting; had 6 grooves (cut in after being chilled, a difficult operation, the rollers being harder than cast steel), increasing in length, the last one making the flute. The rollers were scarfed off or flattened on one side, so that the blade was released on coming to the vacancy, and could be drawn back and carried to the next groove, all the motions being automatic and timed exactly so that the iron hand did not release its hold until the whole shape was perfected.

At the Springfield armory the practice is to pass the bayonet through nine grooves, four for drawing out the stock and five for fluting the bayonet, which is passed three times through the last drawing-out groove. For each bayonet the requisite weight of stock is measured with precision upon the rod, for cutting off, by the displacement of water. The neck part is then heated and bent at right angles to the blade for the upsetting of the head, after which the socket plate is welded on under a trip-hammer, and with two heats is turned over and welded into shape upon a mandrel. The neck is finally, after heating, brought into its proper position under a die, and the annealing of the socket and the pickling complete this portion of the work upon the bayonet. Bayonets were forged by hand at the Springfield armory until about 1840, when the practice of forging them under trip-hammers was introduced.

JUMPER-DIES.—Some rough forms of dies for swaging appear to have been in use in hammer and anvil work from the earliest times; but when as late as 1842, upon pistol work at Chicopee, Albert Eames introduced die-forging with two dies and a heavy sledge—a method before commonly used in striking up lead and copper ware—its application to iron work was there regarded as novel. Such dies were called jumpers or jumper-dies.

DROP-HAMMERS.—The die-forging machines used by J. H. Hall at Harper's Ferry as early as 1827, and mentioned in *Ordnance Reports*, vol. 1, p. 155, were chain-drops. An endless chain, passing over toothed pulleys above and below, was actuated by a crank on the lower pulley. A hook upon the drop (the drop moving in ways) engaged with the chain, and the weight was thus lifted to the desired height, when it was disengaged by the action of a lever and cord. It will thus be seen that in the practice of drop-forging with dies Hall was greatly in advance of his contemporaries of the north, in which section one of the earliest instances of the use of drops for die-forging is furnished in the strap-drop, devised by Albert Eames for the Remingtons about 1846. This drop was raised by a leather strap wound upon a cylinder. The Peck drops, in which a strap was used in connection with a crank and pin, were also introduced at an early date. The compound crank-drop, designed by E. K. Root about 1850, has a high frame of four pillars, at the top of which is the driving shaft, and a crank, which actuates a vertical column, moving at top and bottom in slide-bearings. Between the four pillars of the frame are four drops, the machine being thus four-fold. On each drop are two puppet bolts actuated by flat springs. These bolts strike into notches in two sets of rods, one set moving with the reciprocating column, and the other being fixed to the pillars of the frame. By the successive operation of these bolts and the movement of the lifting column the drops climb to a height determined by a dog, which covers one of the notches, preventing the first puppet bolt from striking into it. Disengagement is effected by a sliding section of the notched rod in the frame, which, actuated by a treadle, pushes out the second puppet bolt, letting the weight fall. An illustration is given (Fig. 20) of part of the interior of the Colt drop-shop, showing a number of these machines. The compound four-fold screw-drop was also of Root's design, and was superseded at Colt's armory by the crank-drop, which was built upon a similar principle, but with more rapid action. In this screw-drop four hammers climb by means of a large vertical screw, and are stopped and detached at desired heights by the action of dogs and springs. This would forge a pistol-lock frame in two minutes. In 1861 ten drops were built by Lamson, Goodnow & Yale, of Windsor, Vermont, for die-forging at the Springfield armory, the drops previously in use there having been of a rough character. The present form of drop most generally approved for die-forging is the plank-drop, in which the weight is held by a plank of tough wood, which may be instantaneously grasped at any point by a pair of cast-iron rolls, one of which has its bearings in a movable yoke. With this arrangement the force of the blow can be instantly varied at the will of the forger. An illustration (Fig. 21) is given of such a hammer (Pratt & Whitney Co.). This machine weighs 11 net tons, the hammer weighing 1,200 pounds, and having a fall of 6½ feet.

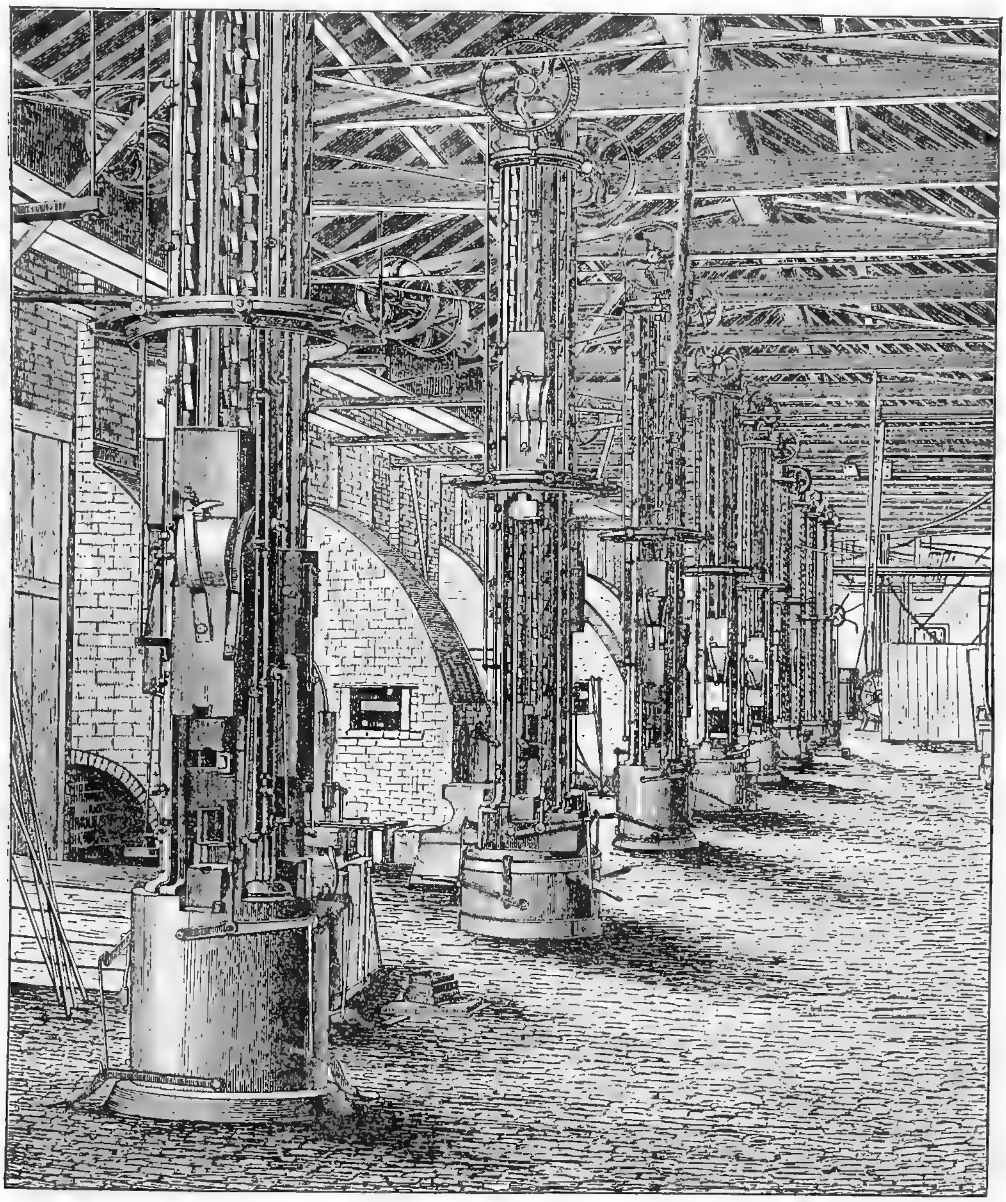


Fig. 20.

Cold-pressing.—In 1875, at the Springfield armory, the process of cold-pressing began to be used, effecting a considerable saving in milling cuts. As an illustration of the novelty and capability of this process, the adaptatio of a large number of old bayonets to guns of smaller bore than those for which they were made may be described as accomplished at the Springfield armory. It was necessary to reduce the size of the shank nearly one-sixteenth of an inch in the diameter. This was done by pressing it, cold, upon a mandrel between two dies. The fin at the joint of the dies was very slight, the metal being simply condensed by the powerful pressure. In a gun-lock hammer of fine finish four or five milling operations are saved by cold-pressing. By cold-pressing alone, without milling, a good gun-lock hammer may be produced by the use of proper dies. The parts so produced are of superior toughness and hardness. By the use of fine steel dies they can be made much more exact than the so-called interchangeable work of early days. Other lock parts and trimmings may be similarly treated. The band is cold-pressed upon a mandrel, and would not require to be edged were it not for the slight burr left after facing. The power press used at the Springfield armory has a capacity of upward of 800 tons, having two 8 by 12 inch risers, but it is none too heavy for work which requires such a degree of condensation of cold steel. It is believed that parts thus pressed acquire properties approaching those which have been proved to exist in cold-rolled iron. Hydraulic pressure is also used in cold-pressing. Cold-pressing of elaborate forms requires expensive machinery and considerable power, and the process is as yet applied only to a limited extent. Flat pieces are often cold-dropped, which is a very rapid and simple operation.

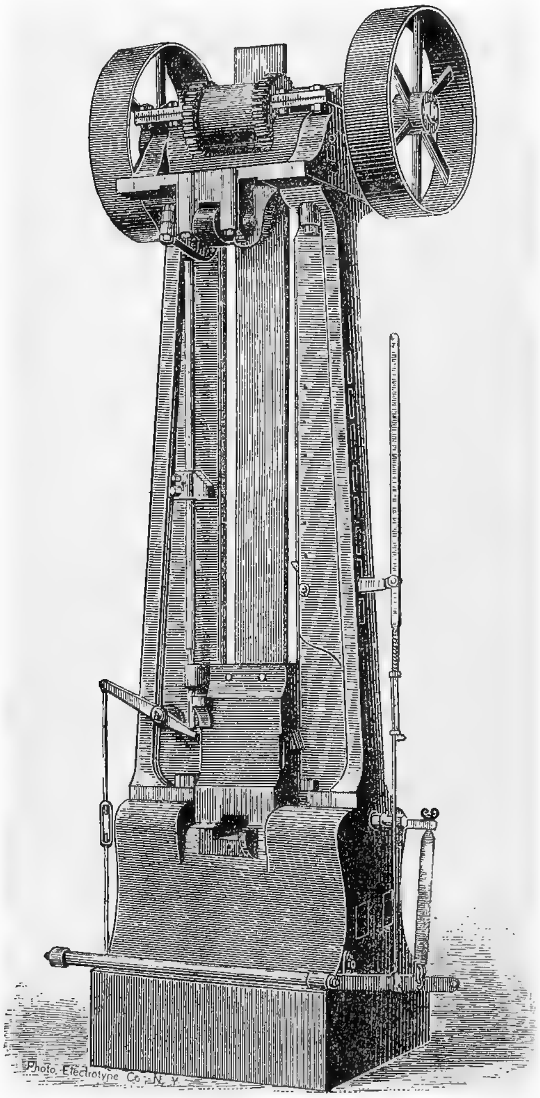


Photo Electrotype Co. N.Y.

Fig. 21.

IMPROVED METHODS AT THE SPRINGFIELD ARMORY.—In reviewing the progress of gun manufacture we have seen a number of skilled crafts practically obliterated by the advent of improved machinery. But, with the growth of the processes of die-forging and pressing, the craft of die-sinking becomes of greater service and consequence. Even here, however, we find that the labor may be greatly lessened by typing—that is, by making steel types or models of the form—which is then dropped in hot steel, giving the reverse impression desired. These forms may in almost every case be more easily made than the corresponding recesses in the die-plates. A little finishing by the die-sinker will then complete the die in good shape, and it may be hardened and employed as usual. This method of economizing in a highly skilled branch of labor is in use at the Springfield armory.

In the illustration given of the plank-drop there is shown a wrought-iron die-bed secured by a key. This saves the trouble and expense of redressing the main bed in case of damage. At the Springfield armory there is employed a method of keying the die-plates themselves into a solid die-block, so that the die-plate proper may be made small and light, and the trouble and expense of using a heavy block for every die may be avoided.

MACHINE PLANT.—Exclusive of barrel-forging, the machinery required for forging the parts of between 50 and 100 guns a day might be enumerated as 5 or 6 drop and 3 or 4 pony hammers of graded sizes, 2 or 3 shear and trimming presses, a blower, a die-sinking machine, and 12 to 20 firing stands, beside tools; and a considerably larger output could be obtained without any proportionate increase in the machine plant.

MACHINING GUN COMPONENTS.

MILLING.—Of all the machines used in the manufacture of gun parts none are so numerous or so characteristic of the manufacture as milling-machines. They are applied to an infinite variety of work under a great variety of conditions, and the development of their efficiency has been due more to higher speeding, closer workmanship, and better adjustment of the weight and strength of parts than to inventions of mechanical design. Their important place may be illustrated by a few examples. Of a plant of 205 machines for turning out 50 breech-loading rifles a day, with an attendance of 175 men, over one-fourth of the machines were milling-machines. Of a plant of over 600 pieces of power machinery for turning out 400 fine revolvers a day, 28 per cent. of the machines were milling-machines. Of a gun-making plant of 850 machines, 216 were milling-machines. Of a pistol-making plant of 225 machines, hand and power, 30 per cent. were milling-machines. These figures are exclusive of edging, profiling, and other machines, on which mill-cutters are used, but refer only to milling-machines proper. Another large plant has about 30 per cent. of its total number in milling- and edging-machines. When any machine may be used in such numbers and for such a variety of work, it may be said, within limits, that the larger the outfit the better equipped is the establishment. In considering the efficiency of output we find that men and machines, if we may so speak, can rarely be rated as commensurate quantities. Economy in attendance is procured at the expense of economy in machinery, and, with an assured demand for the product, an idle milling-machine does not cost as much as a man, who, however industrious, is obliged to pursue his work under conditions which render him as inefficient as though he were idle a good part of the time. Every important part of a gun requires more or less milling, and upon some single pieces as many as 12 or 15 machines may be used to advantage for a large output. Although by change and arrangement of fixtures the number of milling-machines may usually be greatly reduced, yet from the fact that the machines are built by manufacturers in large numbers for the trade, while the fixtures are usually made by job work, after special designs, the cost of the fixtures not infrequently exceeds the cost of the machines.

An illustration is here introduced (Fig. 22) of an interior view in one of the Colt's armory shops, showing how the machinery is massed together in such works. In this cut several horizontal slotting-machines occupy the foreground, with small lathes back of them in the front row, and behind these a row of the Root jigging or profiling machines, with vertical shafts. But to get an adequate idea of the machine-shops of any one of our large fire-arms factories we must expand the small area which may be shown in such a view into acres of floor-space thickly set with similar machinery.

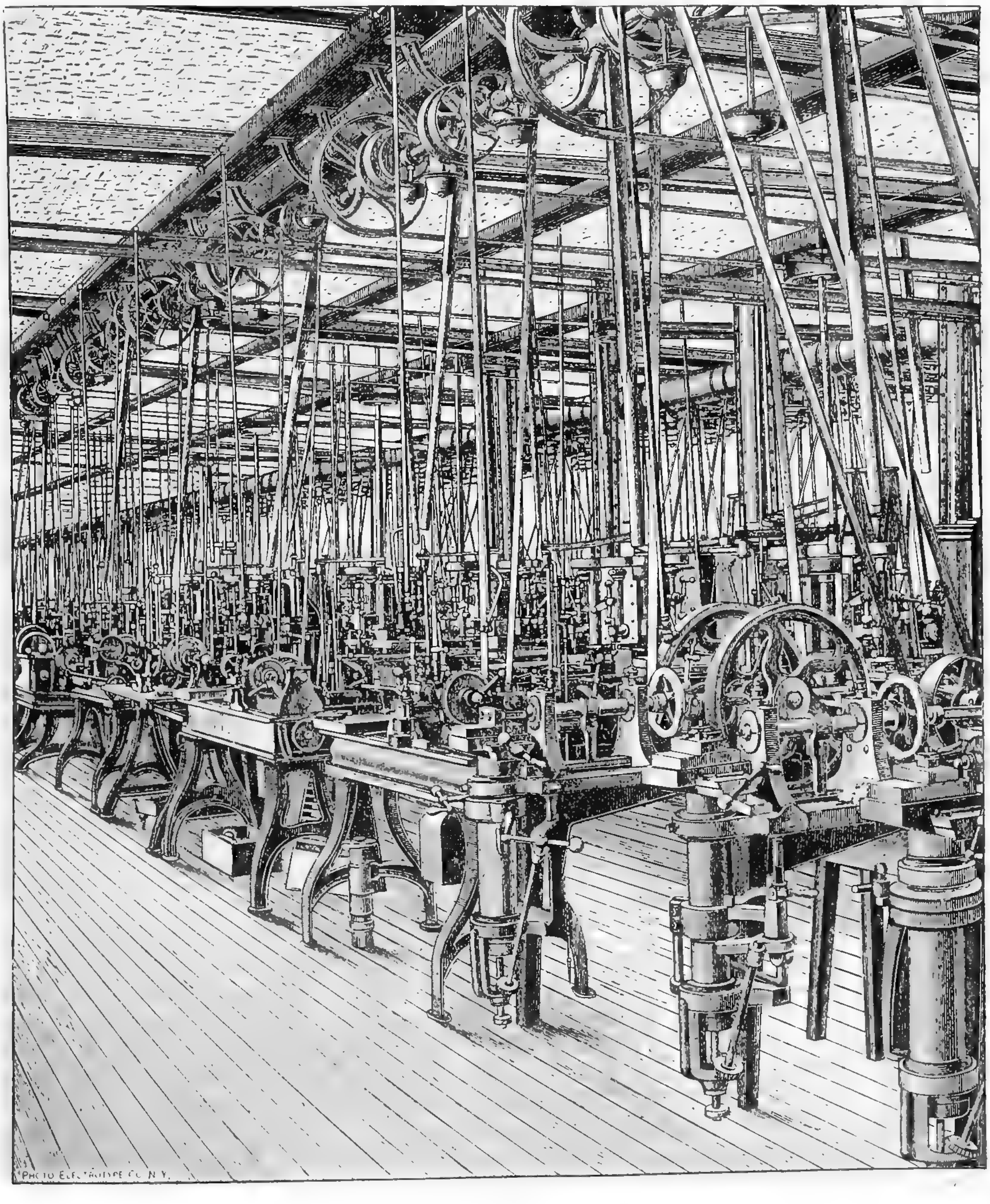


PHOTO ELECTROTYPE CO N.Y.

Fig. 22.

In an example of practice, nine machines (including milling, profiling, broaching, and drilling machines) were used in shaping a common pistol hammer. The milling operations upon the flat hammer, shown as a drop-forging in a previous illustration, might, after trimming, be as follows: Designating the main part of the forging as the body, and the three upper projections as the head and upper and lower combs, there would be two side cuts, an edge cut at some convenient spot (according to the arrangements of the holders and fixtures) to furnish a bearing or basis for subsequent cuts, an edge cut on the front of head and body, an edge cut under head, an edge cut on top of upper comb, and an edge cut between the combs. The lower part of the body and the under side of the lower comb, and perhaps the top of the upper comb, might be finished by edging cuts upon a profiling-machine. In milling, a single cut usually finishes the surface ready for grinding or buffing, but roughing and finishing cuts are sometimes made, especially where much metal has to be removed, and in bearing parts, where great nicety is to be obtained. In profiling, two cuts—roughing and finishing—are more usual, as the milling-cutter is then subject to greater variations of work, and does not usually make as smooth a cut. Profiling cuts save a greater number of milling cuts, and the expense of many irregular milling-cutters; but they are not generally available for such cuts as that between the combs, or under the head, where there are re-entering angles, nor are they desirable for flat and nearly flat cuts, such as those upon the sides and front edge of the hammer, which may be better and more steadily executed in a milling-machine. Cuts may often be saved in number, if desirable, by the use of mills of more irregular forms, but the expense of making these and keeping them true to gauge may render it undesirable. This expense is, however, reduced by the use of the milling-cutters for irregular forms made by the Brown & Sharp Manufacturing Company, of which an example is shown in the illustration (Fig. 23). These are made on a system which admits of exact duplication in the cutters (important for interchangeable work), and they may be sharpened by grinding without changing the form. Ordinary cutters, after becoming drilled, require to be annealed, recut, and rehardened at considerable cost.

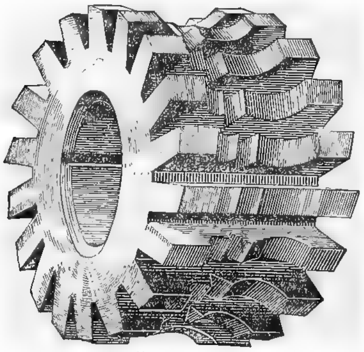


Fig. 23.

Where two opposite faces of a piece are to be milled, whether they be parallel or at a slight angle, the two operations may be performed at once by a double-head face-milling machine. Such a machine for milling the lock-frame of the Colt revolver is shown in the illustration (Fig. 24). In this there are two face mills, which may be adjusted (with their spindles) so as to make a slight angle with each other. The spindles and the sliding tables, with the screw-feed for moving the cutters forward and back, are adjustable at an angle on vertical pivots. A side fixture holds the lock-frame, by means of a clamp, during the performance of work upon it. The machine is shown rigged with oil-tank, drip-pan, and oil-pump, with driving gear. A double-face milling-machine of a different description is sometimes used on the light work of facing triggers. In this there are two face mills, one on a fixed and one on a sliding head, and neither of them revolves. A pin set in the center of the fixed mill holds the trigger, in which the hole has been previously drilled, and a revolving arm, with a projecting pin or finger coming against the trigger, forces it around in rapid revolution.

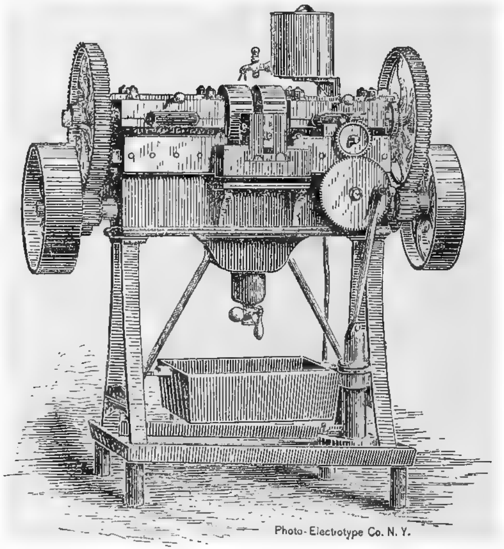


Photo-Electrotype Co. N. Y.

Fig. 24.

The milling-machine was of earlier introduction than the planer. Milling, or, as they were called, slabbing machines, were used for making narrow plane surfaces, while broader ones were made by chipping and filing. But while the principle may be considered indefinitely old, its introduction as a great industrial factor in gun-making was approached by slow and awkward steps.

Colonel North, at Middletown, Connecticut, is stated to have used milling-machines, with cutters of irregular form for milling the pan and between the bolsters in the flint-lock musket, prior to 1817, and they are stated to have been used at Harper's Ferry and at Whitneyville at early dates. The iron-cutting machines used by Hall at Harper's Ferry prior to 1827 did with cutters and saws work usually done elsewhere with grindstones, chisels, and files. A milling and drilling machine was used for milling screw-pins, as well as for drilling, reaming, and countersinking holes. This had a screw adjustment and conical sockets. A straight cutting machine was used, which appears to have been a milling-machine, for the production of flat and fluted surfaces, and which, as was then suggested, might have been applied to the milling of irregular forms. A lever cutting machine was used for mortising through the receiver for the cock and for boring the pan, and appears to have been similar in operation to some forms of hand-milling machine now in use. A curve cutting machine was used, which was probably a bridge-milling machine, or a lathe with a former. There was thus at Hall's works a small plant of milling machinery by which the system and economy of the manufacture was somewhat altered. By these machines, however, it is stated that there was obtained in 1827 an efficiency of only one-third greater than by filing—an improvement which does not appear large from the present standpoint. The machinery was, however, excessively solid and heavy, and was run by hand. In 1836 we find that Middletown contractors, who had commenced the manufacture of Hall's rifles, and had made milling, drilling, and edging machines of some sort, were making the rifles at a contract price of about $4 per stand less than the cost to the government with Hall's machinery.

At the Springfield armory milling and edging machinery was not introduced until a more recent date. The first milling-machine used in Springfield is said to have been a fixed-spindle machine used for rough flat-milling monkey-wrenches in 1834. About this time Thomas Warner, at the United States armory, devised a plain milling-machine to make lock-plates of uniform thickness. This class of machinery was then known to have been in use at Middletown, for the master-armorer at the Springfield armory sent there in 1835 to get a Mr. Barker to build a milling-machine. In this machine the cutter-spindle was adjusted at a distance above the work by being carried by a lever movable (with a screw adjustment) about the spindle.from which the power was obtained. About 1830 Ethan Allen is stated to have devised the method of using cutters of irregular outline for milling the forms of pistol-locks. A small fixed-spindle milling-machine is still to be seen at the Whitneyville armory, and, although of uncertain date, is said to have been built by Eli Whitney, sr. This has a work-plate with a power-screw feed actuated by a worm gear, so as to disengage at the end of the cut by the dropping of a screw-spindle—a method still applied in machines of the present day. Soon after the introduction of plain milling machinery at Springfield Messrs. Robbins & Flagg, contractors at the Waters' armory at Millbury, built a machine for milling the irregular edges of lock-plates. This worked well, and was introduced at the Springfield armory. Other devices for milling were also introduced, and in 1840, under Thomas Warner, milling-machines were built with spindles adjustable in vertical slides, as at present. Five machines were at first built, comprising, with their fixtures, a complete set for finishing the bayonet in all its parts, dispensing with grinding and greatly reducing the labor required. These machines had power-screw feed and disengaging gear, and their predecessors at the Springfield armory are described as temporary fixtures, rigged upon lathes and generally of rude construction. The first milling-machine used in Hartford, Connecticut, is said to have been brought there by Mr. R. S. Lawrence, who took an important part in the development of improved gun machinery, both by his own designs and by his efforts to combine the best appliances then known; a policy finding expression in many features of the improved machinery built at Windsor, Vermont, about 1850. The general manufacture of milling-machines dates back only twenty-five or thirty

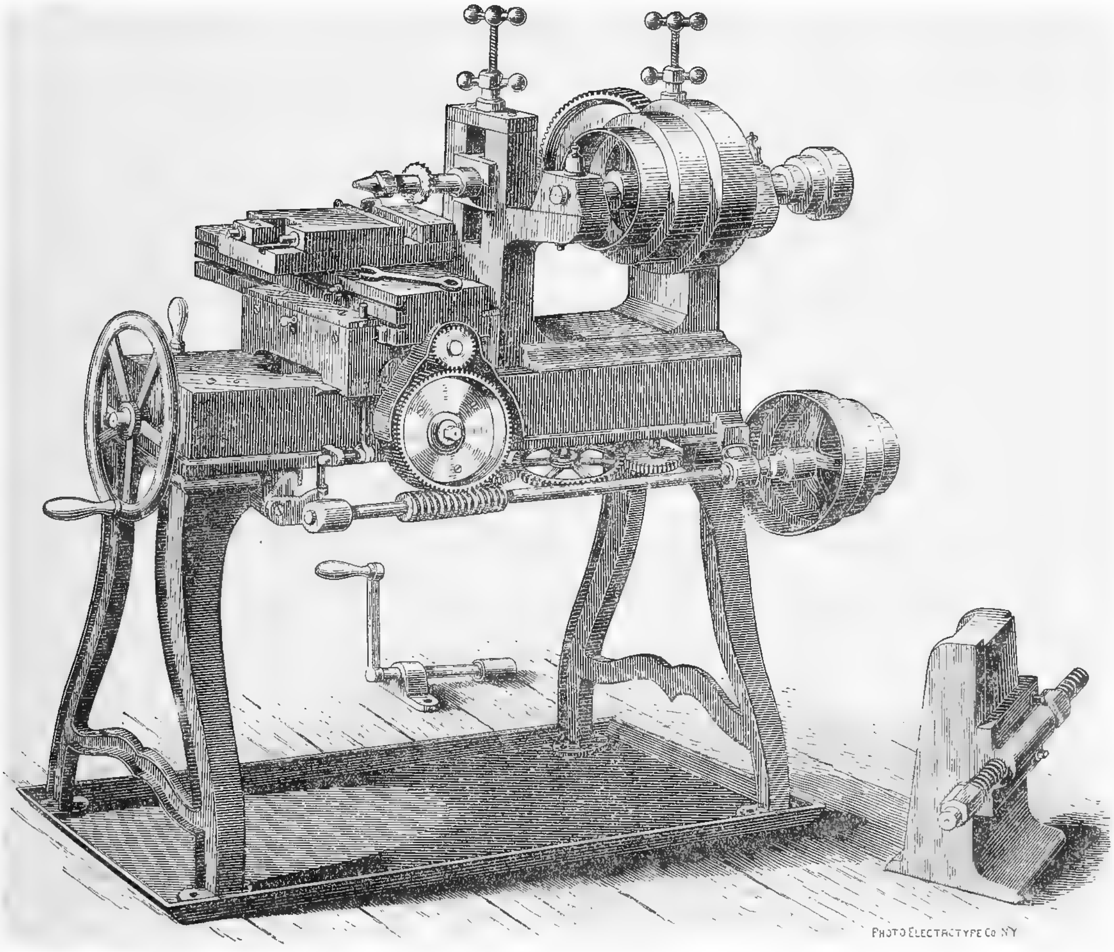


Fig. 25.

years, and twenty years ago there were but three extensive manufacturers of milling-machines. The demand for them in the rapid growth of gun and sewing-machine manufacture after 1855 was very largely supplied by George S. Lincoln & Co., of Hartford, the Lincoln pattern being a well-known and standard machine, of which an illustration is here given (Fig. 25). This machine is provided with back gear. It was designed by F. A. Pratt, who afterward improved it by substituting a screw-feed in place of the rack-feed in the original design. It is considered that since 1855 nearly 100,000 of these machines, or practical copies of them, have been built for gun, sewing-machine, and similar work. When we attempt to consider the labor that would be required to be done by filing and chiseling the work that has been done by these machines, we see the utter futility of attempting comparison between hand and machine work for certain classes of labor-saving machinery. The Lincoln machines were from the outset, in 1854–'55, made in large lots, with interchangeable parts, and some of them have been in active use for nearly a quarter of a century.

Where the heaviness of the work requires greater provision for steadiness, the cutter-spindle is provided with a bearing at the outer end, which would otherwise overhang. This bearing is supported by a tail-stock on one side or at the end of the bed, or by a heavy arm of the frame extending over the spindle, which arrangement may admit of greater convenience in handling the work.

As an illustration of the care that is exercised in the production of a fine quality of interchangeable work, it may be stated that at the Smith & Wesson pistol factory it is the custom to run the milling-machines before working until the spindles become heated, and the same conditions of bearing are thus established at the outset as would result in the later process of the work.

PROFILING.—The distinction between milling and edging or profiling machines is not clearly drawn, bridge-milling being, in effect, simply a method of edging by means of a fixture upon a milling-machine, the operation being as follows: The cutting-mill revolves upon a spindle fixed in position, and the work is clamped to a long holder, pivoted as far from the cutter as convenient, but upon a movable carriage. The bridge is a fixed fulcrum directly under the cutter, and the pattern to be cut forms the under side of the holder, which, with the work, passing between the cutter and the bridge, and resting upon the bridge, is lifted and lowered conformably to the pattern, while the cutter mills a corresponding outline in the work above. This, the earliest form of profiling, does not admit of convenient application to many forms which may be cut in the machine more distinctively known as the profiling-machine, but it is still much used in edging butt-plates and other pieces whose surfaces have large radii of curvature.

Profiling-machines are specially used in making rounding cuts of surfaces curved in every plane section, as only surfaces curved in one plane can be cut by irregular-formed milling-cutters, acting in connection with plane slides, without formers. They are also used in cutting around closed curves, whether plane or not, which, if interior, could not be cut in a milling-machine, and if exterior, could only be so cut by a series of cutters and by a succession of operations. Profiling machines are used to advantage, not only in cutting the curves of bands, guards, straps, and other parts having long, closed, or re-entering curves, but they are also useful in making many small chamfering cuts upon the edges of rounded surfaces. The cutter upon the profiling-machine is usually of necessity upon a light spindle in a movable frame, while the cutter of the milling-machine is mounted on a very heavy spindle, in very heavy and rigid bearings. The profiling cutter may also be at one moment edging a sharp convex curve and at the next may be nearly sunk in the work. The cut is therefore less steady and smooth than the milling-machine cut.

In the ordinary profiling-machine the table has a horizontal rack and pinion traverse. The gearing is made double to take up back-lash. There are two upright cutter-spindles, with guide-pins, in a frame which may be made to slide vertically and horizontally, the vertical movement being used in adjusting the height of the cutters and the guide-pins and in bringing them down to the work upon the table. The vertical spindles are belted to a long horizontal drum at the back of the machine, and by the simultaneous action of the table and cross-slide movements the guide-pins may be held to a former, while the cutters describe and edge a similar form, the cutters being used respectively for roughing and finishing cuts, the piece to be operated upon remaining clamped while the cutter-spindles are shifted by the cross-slide traverse from roughing to finishing. As an example of the work upon such a machine, it may be said that 150 trigger-guards a day may be edged upon it—outside and in—rough and finish cuts.

These machines are simply bedding machines applied to metal work. At some of the armories, in 1845, prior to their introduction, it was customary to put side-plates, guard-plates, and the like upon a stocking-machine for edging. The machine not being sufficiently firm for this work, made a rough, uneven cut, which had to be filed down. The straight-slide edging or profiling machine, with two spindles, and substantially as shown in the illustration (Fig. 26), was designed in 1848 by F. W. Howe for Robbins & Lawrence, of Windsor, Vermont. This machine had double gearing for the feed motions, one set of gears being half a tooth forward, so as to take up back-lash and insure greater continuity of motion. The former was of the same outline as the piece shaped, and two successive cuts, roughing and finishing, could be given the piece without moving it from its position, the cutter-spindles being shifted.

An edging-machine, in which four spindles were grouped about a center, was designed by E. K. Root for the work on Colt's revolvers. This is commonly called a jigging-machine. The power is derived from a vertical spindle, around which the cutter-spindles may be shifted in rotation. They are lowered to the work by handles with gears, which actuate vertical racks, and one or both of the feed motions is furnished by slides in the bed. The formers used cannot be of the same pattern as the piece cut unless double slides are rigged upon the bed and all the motions obtained from them. It may be used for making four successive profiling cuts upon a single piece, or in making single independent cuts upon four different pieces.

Tip-turning or oval-cutting machines, sometimes used, are in principle profiling-machines. Two steel tips are turned at once, being clamped together on the power-spindle and forming an oval. A carriage, bearing a guide-disk and a milling-cutter, either rests entirely on springs, and has a universal movement, or moves in a slide, and is pressed by springs in only one direction. The carriage-plate bears the cutter and the guide-disk upon horizontal spindles, placed at an angle with the power-spindle, upon which the work and the pattern are set. The movement and tendency of the carriage at once presses the guide-disk against the pattern form, and the cutter against the work.

On the account-books for piece-work at the Springfield armory the first entry for work on a metal-profiling machine appears in 1849, and for work on an edging-machine in 1853. The drawings of the edging-machine in use at Sharp's rifle works, Hartford, were taken to Cyrus Buckland, at the Springfield armory, by a United States government inspector in 1852. This machine was of the same pattern as those supplied by Robbins & Lawrence to the British government.

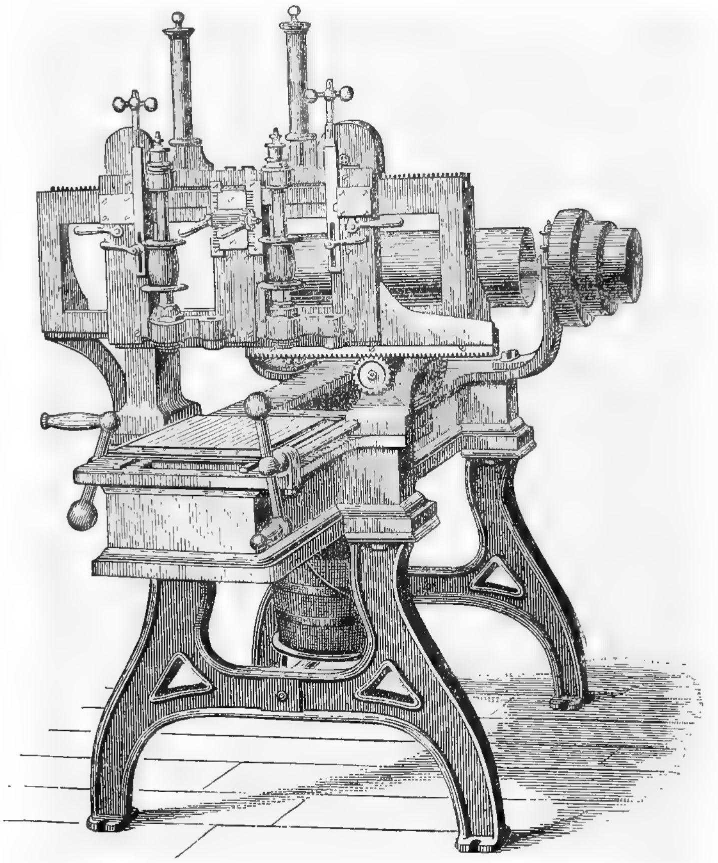


Fig. 26.

Automatic gearing, to displace the hand-feed in holding the cutter to its work, was designed by Cyrus Buckland, and was used at the Springfield armory to a limited extent. Similar mechanism, designed by Frederick W. Howe, was used with advantage in edging lock-plates by the Providence Tool Company in 1861.

Drilling and chucking.—In drilling, pieces requiring a number of holes to be drilled, countersunk, or the like are placed in a jig, commonly a hinged clamp of two plates, in which the position of the work is determined by pins in the lower plate, the upper plate containing hardened drill bearings; and the work is done in multi-spindle drill presses.

A machine for performing a series of drilling, boring, or kindred operations, by having the tools or the pieces of work, or both, brought into position and stopped at proper intervals by rotation in holders, is commonly called a chucking-machine. For small barrels, tubes, bolts, bayonet-sockets, base-pins, and chambers these machines greatly facilitate the work to be done by obviating the necessity for frequent removal and resetting of the pieces. For example, a large bolt for a magazine gun is operated upon by 14 tools in a horizontal chucking lathe, 25 to 30 bolts being thus finished by a man in 10 hours—an average of about 1¼ minutes per operation. But chucking-machines are almost indispensable in operations upon the cylinders of revolvers. In one form of "Colt" chucking-machines for drilling, reaming, and boring revolver cylinders the work is held in a chuck on the power-spindle, while the tools, set in rods with bits, are chucked into position before the work, a hook, with rack and pinion feed, serving to push them up to, and remove them from, the work. The cone-seating machine differs from the foregoing in that the drills and tools both chuck into position and have an independent rotation, engaging with a power-spindle, while the work (a revolver cylinder) is simply chucked, not moving during the cut.

A form of horizontal chucking lathe is here illustrated (Fig. 27). In this the work revolves upon a spindle. A cluster of tools is turned by means of a small handle with a spring and ratchet movement, and a hook rests in a groove at the back end of the uppermost tool-holder, making connection with a rack in the same line, and the tool is operated by being thus advanced or withdrawn by a gear on a spindle, which, as shown, is turned by three handles, or otherwise by a hand wheel. If the movement of the tools is about a vertical spindle, the machine is called a turret lathe. In 1852 E. K. Root, at Colt's armory, devised a double-turret machine for centering, center-drilling, and squaring up base-pins, in which the work revolved horizontally between two turrets or tool-stocks, which chucked about vertical centers, and operations were thus performed upon both ends of the work. It is noteworthy that the same arrangement of parts characteristic of the Colt revolver seems to have been carried through the principal machines for its manufacture, the horizontal chucking lathes, cone-seating and screw machines, barrel-boring, profiling, and mortising machines, and even the compound crank-drops, exhibiting the same general arrangement of working parts about a center.

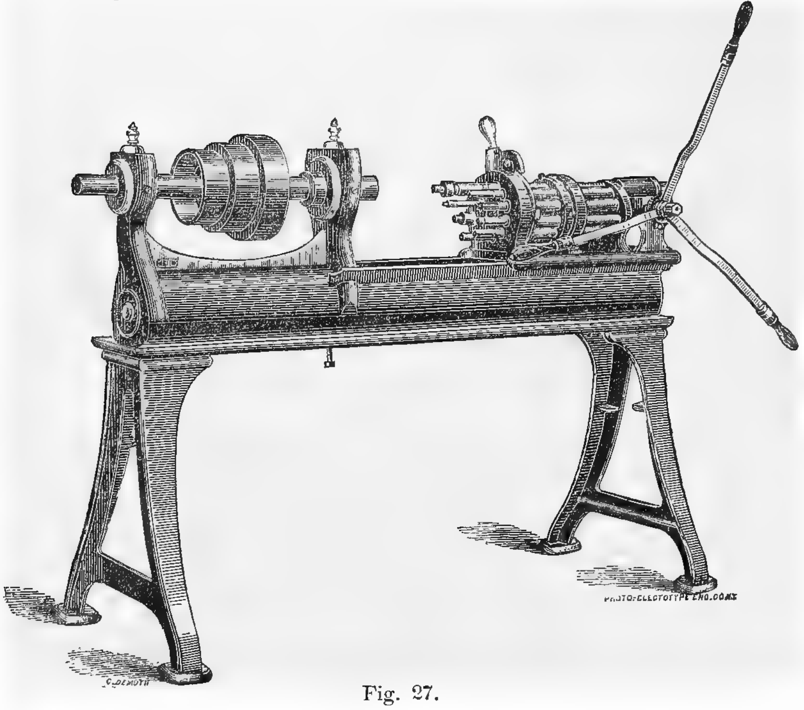


Fig. 27.

Screw Making.—Screw-making machines, of which many desirable forms are manufactured, are generally turret lathes. Of most systems of guns or pistols the screws number over one-fourth of the whole number of parts, and screws and pins about a third. The making of these is facilitated by the revolving tool-stock. Even with a hand-fed turret lathe working on large screws one man can make as many screws as four or five men with engine lathes and chasers. With the most rapid-acting power-fed machines, cutting small screws from the wire, the production is very great, one machine turning out from 250 (in case of a complicated shape with a milled head) to 4,200 screws a day without slotting, and one boy being capable of tending from 8 to 18 machines; an improvement in productive efficiency per operative of from ten to twenty fold as compared with methods commonly in use for this class of work in 1870. The turret lathe is simply an efficient combination of gauging, turning, threading, stamping, pointing, and cutting-off machinery, saving the time of setting and handling the pieces between these operations. A machine so prolific as the automatic-feed machine, if employed continuously upon screws of a single size, would soon outrun the requirements, not only of a small, but of a large establishment, and the necessity for cutting many sizes of screws, for the use of several sizes of machines and for close gauging (requiring the dies and tools to be carefully watched and changed when worn), is such that the simpler and less automatic machines may often be most suitable for ordinary use in a gun-shop.

The simple form of turret lathe, the tool-stock chucking by hand, shown in the illustration (Fig. 28), is stated to be the earliest turret screw machine made for general sale. It was designed in 1858 by H. D. Stone, of the Jones & Lamson Company, of Windsor, Vermont. This is of interest, since it is more especially within the last twenty years that labor-saving machinery, which may have long existed in devices of special and limited application, has been manufactured in large quantities for general sale.

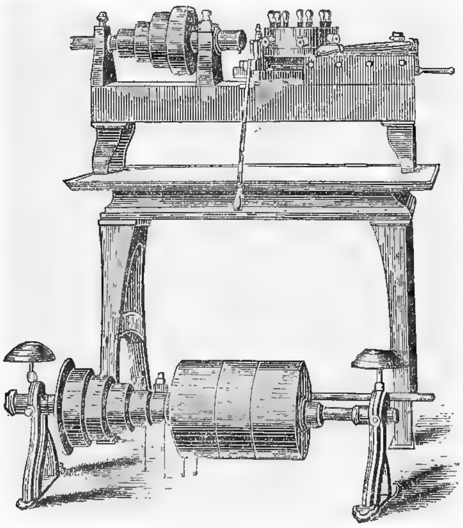


Fig. 28.

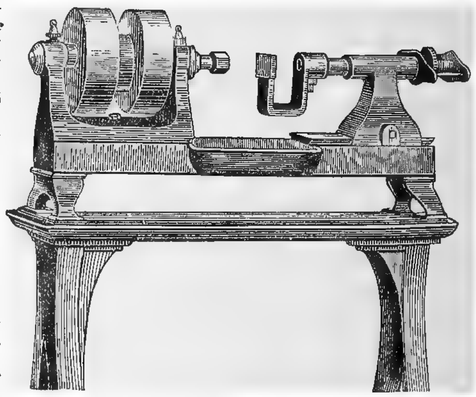


Fig. 29.

The slotting of screws is a brief operation, usually performed by a slotting mill, the screw being set in a socket and passed along the mill by the action of a hand lever.

The tapping of small nuts may be done in a turret lathe, but a tapping machine or lathe is more generally used. The principal feature of these machines is the reversing gear, which, in the lathe shown in the illustration (Fig. 29), is a covered clutch between the spindles, operated by drawing back the piece. In upright machines the reversal is sometimes effected by a foot-lever. In the machinery used for tapping receivers and threading breech-screws for interchangeable work at the Springfield armory the threading is done with a leader screw and a chaser or follower-die, regulating the feed of the cutting tool, and the tapping machine is a form of horizontal chucking lathe with reversing gears.

Of the whole number of machines constituting a gun- or pistol-making plant, 4 or 5 per cent. will usually be for screw-making, comprising, beside three or four sizes of screw machines, slotting-machines, drill-presses, and machinery for special cuts required by the system. If too powerful a machine be used in cutting small screws, there is a liability to strip the thread.

TURNING.—As an example of a labor-saving contrivance in special turning may be cited the arrangement used at the Springfield armory for facing off bands, in which a lever serves to move up two cutting-off tools upon a carriage, separated at a distance determined by a stop, facing off both sides of the band at one operation. It is very common to see butt-plates turned, instead of being profiled or bridge-milled. In this case, the plates are clamped upon a center-piece, and the turning tool thus machines a number of them at a time, as though it were turning a single piece.

SLOTTING AND DRIFTING.—Slotting and broaching cuts are used in making holes and openings, which, on account of their depth or angular shape, cannot be milled or edged. The opening in the frame of the Colt revolver, through which plays a pawl called the hand, is an example of a cut requiring to be slotted. The body of the metal is first taken out by drilling a series of holes, and the opening is then slotted; the depth is then extended by deeper drilling, followed again by slotting, the tool in the machine used having a horizontal movement. The vertical revolving-head mortising machine is a form of slotting-machine here illustrated (Fig. 30), the machine being designed to obtain for slotting cuts the same economy and facility as is obtained in the turret and the horizontal chucking-machines for turning and threading cuts. The bed of the machine is mounted upon a balanced slide, having an up and down movement, and the tool is stationary during the operation, being held in a chucking tool-stock, so that four tools may be successively applied to the work upon the bed. A double slide upon the bed secures, with proper stops and jig frames, the position and extent of movement required for the work.

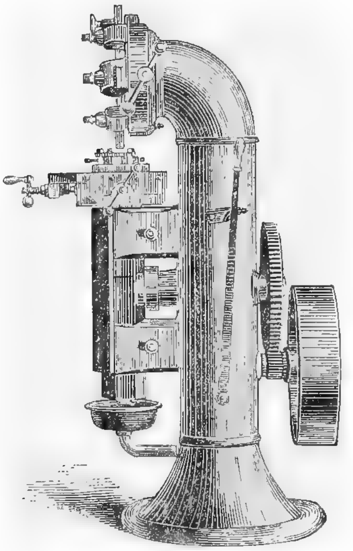


Fig. 30.

Through-mortises and openings of an angular form are usually broached, the broach being very slightly taper, or (depending upon the elasticity of the metal) without any appreciable taper, of the form of the opening, and banded about with a series of strong square-cutting edges. Broaches are sometimes as much as 8 inches deep, with 16 or 18 cutting edges. They are forced through the openings by heavy power-presses, smoothing and enlarging them as they pass through. By broaching or drifting, cuts are executed which could not be economically done in any other way. For example, in 1852, a mortise being required to be cut for the Sharp's rifle, it was estimated at the high cost of $1 50 each; but a broaching machine was built by Mr. R. S. Lawrence which "did the work" for 4 cents each.

FINISHING PROCESSES.—The small parts are polished upon emery wheels or upon leather-covered wheels spread with glue and surfaced with emery. These wheels sometimes have edges of special conformation for polishing peculiar forms, but are more usually flat wheels. The face-polishing machine is a flat, revolving plate covered with emery, upon which the pieces are pressed. We may estimate that 25 or 30 frames or lathes for polishing will be required for 100 rifles a day, and nearly in that ratio for a larger output.

Resort is had to brazing in a few cases where permanent fixtures, such as barrel lugs or sights, are placed upon a piece which may be better finished before they are made part of it. Some very interesting work in the reduction of bores by the insertion of tubes brazed-in has been done at the Springfield armory, and a considerable number of large-bore barrels from muzzle-loaders of 1842 were thus converted to the present size of bore. The practice was discontinued on economical grounds, and, though the barrels thus made were strong, from their lack of homogeneity they were considered inferior to solid steel barrels.

Acknowledgments.—In the preparation of the foregoing account acknowledgment is due the officers of the ordnance department for courtesies kindly extended, and more especially to Colonel J. G. Benton, commanding the national armory at Springfield, the detailed and thorough ordnance memoranda prepared by him leaving scarcely anything more to be said regarding the practice at the national armory. Acknowledgment for courtesies and assistance ought also to be made to Messrs. J. T. Ames, A. H. Waters, Thomas Warner, James H. Burton, Selah Goodrich, the late W. W. Winchester, General W. B. Franklin, R. S. Lawrence, Horace Lord, Philos Remington, and Eli Whitney.

II.—THE MANUFACTURE OF AMMUNITION.

NOTE.—For statistical information regarding the manufacture of ammunition, see Table IV (B), page 96 for Connecticut, page 131 for Massachusetts.

MACHINE PROCESSES AND THE DEVELOPMENT OF THE MANUFACTURE.

To the report on the manufacture of fire-arms is herewith appended a brief statement of that of ammunition—a manufacture naturally associated with the other, and the methods of which are distinctively American in their origin, and marked by great ingenuity, a wonderfully prolific output, and a quality surpassing anything approached by methods employed in foreign countries, or in any country prior to the past decade.

The nature of the manufacture is consistent with great productiveness, the parts to be made being few, and the processes being uninvolved with each other and establishing a natural system of procedure. The work is mostly press work, which is usually rapid, and permits the employment of unskilled or slightly skilled labor to a large extent, and without detriment to the accuracy of the work. Women are largely employed upon it, sometimes constituting over one-half of the whole number of operatives.

The ordinary copper percussion-cap was patented in 1822 by Joshua Shaw, who was in 1845 compensated by Congress in the sum of $20,000 for this valuable invention. But brass and copper shell cartridges did not come into use until some thirty years ago, when their importance in making gas-tight joints in breech-loading systems began to be recognized. The prominence which their manufacture has now attained in this country in supplying foreign nations with ammunition is due not only to the ingenuity which has developed the mechanical methods employed, but also to the purity and ductility of the American copper used in the manufacture.

From a statistical standpoint, the most noticeable difference between the manufacture of fire-arms and that of metallic ammunition is that, from the greater efficiency of the machinery, the latter product involves less labor than the former, the value of the material being relatively greater. This difference is most strongly marked in the manufacture of lead shot and slugs, in which, speaking roundly, an added value of from one-tenth to one-fifth is given the material, while in the manufacture of fire-arms the value of the material is sometimes increased more than five-fold.

In the manufacture of ammunition on a large scale a considerable amount of capital is required in order to carry and to properly store and handle the costly and dangerous materials employed, but the value of capital required for the machine plant is relatively less for the manufacture of cartridges than for the manufacture of fire-arms.

A center-fire cartridge is composed of shell, anvil, inside cup, reinforcing, primer, and bullet, beside the powder and fulminate. The great majority of the mechanical operations are performed upon the shell, and power-presses for this work constitute the great majority of the machines. The shells are first cut and cupped from brass and copper sheets, one attendant to a press, one press having a daily capacity of from 40,000 to 120,000 shells, according to size. This operation is followed by annealing, pickling, and washing, repeated annealing being necessary to preserve the ductility of the metal.

Then follows the drawing, an operation which, from its repetitions and less rapidity, requires five times as many presses as the cutting and cupping. Cartridge shells are drawn from two to five times—generally three or four—according to size and material, the drawing being more rapid and less often repeated for the smaller shells, and less rapid for the later than for the earlier drawings. The large presses have an attendant each, but the smaller presses are often rigged with automatic feeders, so that one person can attend several. The shells are either set by the operative in a rotating plate, which passes under a punch, or else the automatic feed is effected by dropping them into the plate from a duct leading from a hopper or other receptacle. Annealing, with the subsequent pickling in a solution of sulphuric acid, and washing in a potash solution, usually intervene between the operations of drawing, the shell being annealed in perforated cylinders, subjected, while in rotation, to a furnace heat, and the washing-machines being inclined cylindrical vessels, in which the shells are tumbled and rinsed, after which they are dried at a moderate heat (125°).

The trimming and heading are executed upon the same machine for most sizes of cartridges, although separate trimming and heading presses are employed for heavier work, such as the cartridge shells for machine guns. The smaller presses are automatic, with one attendant for several machines, the larger are hand-fed with one attendant each. The heading is usually done in presses acting horizontally. This method of heading is said to have been devised by Ethan Allen, of Allen & Wheelock, Worcester, Massachusetts, in 1859. His first machine was built upon a lathe-bed, and headed 60 to 80 cartridge shells a minute. The cartridge was dropped from above and taken upon a horizontal rod, operated by an eccentric upon a horizontal shaft. The rod carried the shell forward through an opening, when it was headed by a single blow, the rim being formed in a countersink about the opening, and the header being removed for the thrusting out of the headed shell, which was ejected by the next shell brought forward by the rod. At this time other parties headed cartridges by spinning up the cup—a slower process, and one liable to cause the shell to be thin at the center. The circle feed for trimming or cutting off was also used at this time.

Anviling is the insertion of the anvils, which are pressed into the shells by power-presses, the anvils being first cut and shaped in a quadruple press, making 4 anvils at a stroke, having one attendant, and turning out 150,000 anvils a day. The reinforcing rings of the head are inserted by power-presses in a similar manner, these being first cut, drawn, and trimmed.

In the nozzle-annealing, or annealing for the tapering, only a portion of the shell is annealed. The shells are set in plates, and by their movement are passed in procession between rows of gas-jets.

The next operation is the pricking or venting and priming, by which the primer is inserted, the daily capacity of a press for this work being upward of 40,000. Impressions in cups to receive fulminate are made at the rate of 80 a minute.

The first operation in the manufacture of primers is comprised in the cutting, cupping, and drawing in automatic-feed presses, one attendant to several presses, and each press having a capacity of upward of 40,000 a day. The next operation is varnishing. The apparatus for this work operates by dipping and dropping shellac from a great number of points, which is done automatically, an attendant being occupied in sifting the primers into feed-plates ready for the operation. The next operation is the priming proper, or charging the primer with fulminate, the placing of the primer in the shell being also called priming. The fulminate is in some cases spread upon feed-plates by hand, and dropped through holes in the feed-plates into the primers, set in corresponding plates, upon the withdrawal of an intervening plate. The attendant is occupied in spreading the fulminate. Then follows the operation of foil-pressing. The foil is pressed upon a row of primers at one operation, and the capacity per machine is upward of 150,000 per day, one attendant to three or four machines. An ingenious form of automatic machine is made to perform the work of charging the primer and priming the shell at the rate of 35 a minute. This is in principle like a vertical chucking-machine, the parts between which action ensues passing over and under each other and pausing during reciprocating movements, by which the fulminate is transported from a magazine and pressed down into the shells.

The shell thus charged and furnished is next generally tapered, one tapering press, with one attendant, having a capacity of 20,000 a day. Burring and trimming in presses and polishing in lathes are additional operations performed upon certain classes of fine and large shells.

After inspection and gauging, the shells are loaded with powder and bullet. The loading machinery is especially ingenious, the powder being held in a funnel-shaped receiver and dropped by charges into the shell; and, being pressed down by a rod or piston, it is so contrived that if, from any cause, the charge is too great, one bell rings, and if the charge is too small, another bell rings, thus warning the attendants and insuring the uniformity of the charge. One loading machine, with two attendants, has a capacity of 25,000 a day.

The slug or bullet then inserted is sometimes formed from cylindrical bars at the rate of 50 per minute, or else is cast, slug furnaces and apparatus being used, two attendants each, and the capacity per furnace being upward of 50,000 a day. The slugs are cast in hand-molds of 18 to 25 slugs at a time. They are then passed through swaging or bullet-forming presses, which are or may be automatic, in which case one man can attend as many as nine machines, the slugs being fed to them out of hoppers or receivers. They are then jigged—a term used to designate the placing of the bullets in feed-plates—which is done partly by hand, but assisted by machinery, which imparts a vibratory motion to the plates. This is preparatory to what is called channel-rolling, the jigging being for the purpose of placing the bullets all upright and in position, so that they may be placed upon a revolving plate, which carries them through a channel between cutters, which groove the bullet. One such machine has a daily capacity of upward of 100,000 bullets, and one man attends three machines. Certain grades of bullets are now passed through an extra close-gauge trimming press, and the bullets are gauged and inspected.

The next operation is bullet-patching, or covering the rifle bullets with paper, to prevent the clogging of the grooves of the barrel with lead. This is sometimes done by hand, sometimes by machinery. In the bullet-patching machine the bullets are fed to the machine by hand, and the patch is presented to the bullet and secured by a minute drop of mucilage, fed automatically, and is rolled closely around the bullet, and the end is folded up by the friction of flexible rolls, 45 or 50 bullets being patched in a minute, and, including stoppages, full 20,000 in ten hours. Two attendants are required.

After the loading of the shell, it is crimped into the grooves of the bullet, and the cartridges are tumbled in sawdust and lubricated by sifting upon feed-plates and dipping, or otherwise the lubrication is performed by machinery, which forces the lubricant into the bullet grooves through the perforations of cylinders through which the bullets are passed. In the early introduction of breech-loading guns, naked bullets were used, which clogged up the bore. In 1851, at the time of the visit of Kossuth to this country, R. S. Lawrence, who was making the Jennings rifles at Windsor, Vermont, was telegraphed by Mr. Cortlandt C. Palmer to come to New York and bring a breech-loading gun that would hit a man 10 times out of 25 at 500 yards. On the trial, which took place at Ravenswood, near Astoria, Long Island, after a few shots the bullets struck 10 or 15 rods from the mark, the lead building up and fouling the bore. But next morning Lawrence tried lubricating the bullets with tallow, having previously grooved them, when at the second trial he was able to hit the mark two times out of three continuously. Mr. C. P. Dixon ordered a box of the lubricated bullets, and within fifteen days they had been sent to Paris, France, and immediately after came into general use.

Cartridges are found to deteriorate from the chemical action between the salts of the gunpowder and the material of the shells. This is prevented by coating the shells with an impermeable elastic varnish, which is effected by one of the most ingenious automatic machines used in the manufacture. The shells are placed in a hopper, and the arrangement for feeding is similar to that in the automatic wood-screw machines, the cartridge shells being picked up by hooked arms and delivered to a tubular duct, from which they are placed in chucks and varnished. The shells, after the varnishing, pass around a large circular disk or wheel, holding 40 shells, all set in chucks, which rotate, causing the varnish to set uniformly. All the operations performed are entirely automatic, one operative attending as many as three machines, supplying the reservoirs for shells and varnish, and exercising a general oversight. The hopper holds several hundred shells at a time. Forty shells at a time are in process of passing through the machine, which, with a product of 2,000 varnished shells per machine per hour, or 60,000 per operative per day, gives 1 minute 15 seconds for the time for the varnish to set in rotation, it being afterward thoroughly dried and hardened. The Pratt & Whitney Company have supplied these machines to a number of foreign governments, twenty machines to the French government alone.

Rim-fire cartridges have the priming contained in the rim, instead of having a separate primer inserted. Their manufacture is therefore more simple than that of center-fire cartridges. After the heading of the shells they are primed with fulminate, loaded with powder and bullet, crimped, tumbled, lubricated, and packed. In the operation of priming rim-fire cartridges the average number of attendants per machine is less than 1 to 5, and each machine has a daily capacity of 60,000 to 70,000. The loading with powder and bullet is done in presses with multiple presser-plates, one plate containing the shells and another the charges, which are thus pressed together in large numbers, 60,000 to 100,000 cartridges a day being loaded by one press, attended by one man with two girls, who prepare the plates.

In the manufacture of ammunition, each separate product may be considered to constitute a separate branch of manufacture, which may be traced from beginning to end without indistinctness or confusion with any other part of the work. Thus the manufacture either of caps or of paper shells constitutes a complete and separate system by itself. The process of making caps is similar to that of making primers. They are first cut and formed in a press, 150,000 a day, 4 at a stroke, with one attendant. The trimming is done by automatic machinery, 4 or 5 machines to an attendant, and the caps are then varnished, a long row of them at one operation; the fulminate is dropped into the cap from multiple feed-plates, and the foil is pressed down over it, a long row of caps being completed at every stroke of the press.

In the manufacture of paper shells the paper is first cut into sheets the length of four shells. It is then pasted and rolled by hand. From the tubes thus formed the body of the shell is then pressed to size and cut up into lengths, the reinforcing being formed in a similar manner. The wads are rolled by special machines and formed in a press, and a succession of presses is used for inserting wad into reinforcing, reinforcing into body, and body into brass case. The brass head is then inserted, and the shell is primed. The presses for the last six operations mentioned have a capacity each of about 40,000 a day.

NOTE.—After the publication of the report on fire-arms and ammunition in its preliminary form, the family representatives of Mr. Benjamin Moore, once master armorer at Harper's Ferry, called attention to his claims to be considered the originator of the interchangeable system as applied to fire-arms.

While Mr. Benjamin Moore is undoubtedly entitled to much credit for improvements in the manufacture of small arms, the publication here of the extended testimony regarding conflicting claims of priority would give undue prominence to the personal elements of the case, which are now being presented to Congress in connection with a claim for compensation.

III.—THE MANUFACTURE OF SEWING-MACHINES.

NOTE.—For statistical information regarding the manufacture of sewing-machines, see Table III, page 71.

The materials used in sewing-machine manufacture are pig-, bar-, and sheet-iron, iron and steel wire, bar- and sheet-steel, malleable iron, japan varnish, and power and machine supplies in general, woods for casing (largely walnut and poplar), beside a considerable range of other materials.

The cost of material used may usually be rated at from one-third to one-fourth the wholesale value of the product, the constituent material being the chief item of cost, and is ratable at about 20 per cent. of the wholesale value of the average machine, although subject to incessant fluctuations, both local and general. While coal is obviously cheapest in the great coal-producing states and those adjoining, the cost of iron, which is only about one-fifth as bulky, exhibits much less variation, the prices ruling low in all the commercial sections and high in those regions whose manufacturing requirements are not such as to demand great facilities for transportation, even though geographically near the mines. The seaboard states also have the advantage of a foreign supply, especially in certain grades of pig- and wrought-iron, although the finest castings are made from the proper combinations of iron from American ores.

The proportionate loss of weight, or wastage in the working of the material, is not as great as in gun-making, probably not rising above 20 per cent., that is, for the metal parts; and it is obviously greater in the small steel and wrought-iron than in the cast-iron parts. The weight of metal cast is usually from 85 to 90 per cent. of the weight of pig and scrap used.

The weight of the metal parts of a treadle machine is usually from 60 to 65 pounds, the greater part of which is in the cast-iron legs and stand. The weight of the head, which includes the arm, the bed-plate, and the finest and most essential mechanism, varies from 12 to 25 pounds in the different styles of family machines.

It is unquestionable that in the whole industry much more material is now handled by the same number of operatives than in 1860 or in 1870, which, other conditions being equal, as they often are not, would require a greater capital, a less ratio of value of product to cost of material, and a greater ratio of cost of material to wages. The returns appear to bear out these natural conclusions in many cases, although not invariably.

The manufacture of sewing-machines may be regarded, for all the proper machine parts, as a manufacture of a fine class of special hardware, with a system for the assembling of these parts into machines of accurate and finely-balanced action, the small working parts comprising a great variety of cams, hooks, shuttles, levers, connecting-bars, plates, pins, and flat and spiral springs. Of the whole number of metal parts, some 75 per cent. may be roundly reckoned to be made direct from manufactured wire and plate, full 50 per cent. being screws, and the rest pins, studs, punched, bent, and swaged plates, and springs. The remaining parts are gray and malleable castings and forged and machined parts of various descriptions.

The operations in sewing-machine manufacture may be enumerated, in kind, as follows: In general, there is gauging, inspecting, assembling, testing, and packing; on the wood work, milling, kiln-drying, re-sawing, planing, scraping, forming, gluing, turning, grubbing, wood-filling, and varnishing; on the metal work, milling, polishing, and drilling are the most general operations; the principal remaining operations being the pickling and japanning of cast, wrought, and sheet metal; the cutting of wrought and sheet metal and of needles; the annealing and plating of wrought and sheet metal; the swaging and stamping of sheet-metal parts and needles; the casting, cleaning, tumbling, and ornamenting of cast metal parts; the forging, turning, filing, and hardening of wrought-metal parts, and the tempering, scouring, and straightening of needles.

Of the metal work, the bulk of the material passes successively from the foundery through the tumbling-room, annealing, japanning, drilling, turning, milling, grinding and polishing, ornamenting, varnishing, adjusting, and proving departments. The tool-making, screw-making, attachment-making, and needle-making departments are auxiliary, and the wood-working and cabinet-making departments constitute a separate and distinct manufacture.

In the proper manufacturing departments of sewing-machine works the operatives are not commonly employed by the day. There may be considered to be two systems, which are often more or less merged, viz, subcontract and piece-work, under salaried foremen. In the former the greater part of the work is done by subcontractors, who, under the superintendent, exercise the functions of foremen, and usually give the work their personal supervision, employing their hands by the day or by the piece. It is to their interest and profit to increase the productiveness as largely as possible, and to the devices of this class, in the development of minor details to secure the greatest result from the smallest outlay, the improvement in productive efficiency in this and in kindred manufactures is largely due. The system of employing head machinists by piece-work or contract may almost be esteemed a germinant principle in the development of special machinery and a higher productive efficiency in the manufacture; but works are now very commonly conducted under salaried foremen, some classes of operatives working by the piece and some by the day. The strict subcontract system, despite its advantages in the hands of men of mechanical genius, depends for its continuance upon a rapidly-changing condition of manufacture and the promise of liberal margins of profit, and this was the state of the sewing-machine industry until the expiration of patents, closer competition, and the collapse of inflated values after the civil war wrought such a change that in some factories the system was abandoned. It was said in these cases that the efforts of subcontractors to maintain their profits caused them to make shift with an underpaid class of help, while by

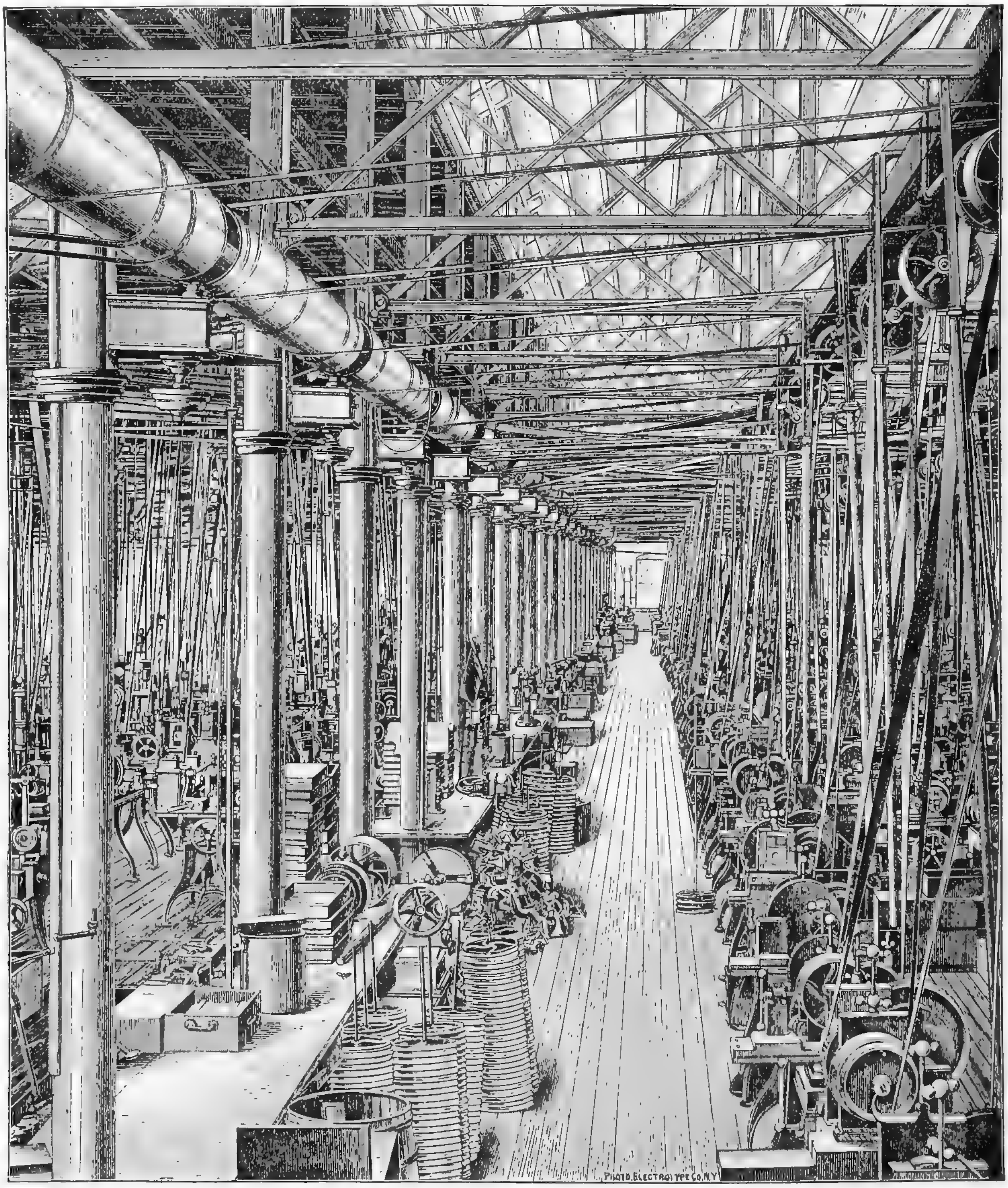


PHOTO.ELECTROTYPE CO.N.Y.

No. 1.

the direct employment of operatives by piece-work under salaried supervision the product was improved both in quantity and in quality, and a body of operatives of superior competence was secured, to whom higher rates of wages could profitably be paid.

At the factory of the Wilson Sewing-Machine Company, Chicago, Illinois, there is employed a uniform method of accounting for material used and work done under the piece-work system by means of tickets. In the assembling department duplicate checks are used. There are, in the assembling process, a number of classes of work, each characterized by a separate form of tag or check, and on the completion of each kind of work a check is attached to the machine, and the duplicate is held by the operative till the end of the month, when the number of checks handed in should agree with that of those taken from the machines before shipment.

In keeping account of piece-work on small parts, trays, with or without compartments, are commonly used, as is the case in watch and, to a less degree, in pistol work.

An illustration is presented (No. 1) of a small portion of the main machine-shop of the Wheeler & Wilson works at Bridgeport, Connecticut, as it conveys as impressive an idea of these machine-shop interiors as could be furnished by any other example.

Not more than three or four concerns in the country extend their operations over the whole range of work. including case-making and needle-making. In some cases, however, the management covers the wide range from the ownership of forests and getting out raw material to extensive transportation facilities and ramifications of agencies for marketing the product throughout the world.

The advantages of large wholesale manufacture and handling are great, but are difficult to define. Perhaps in the machining and assembling the difference is from 10 to 20 per cent. between a factory turning out 400 and one turning out 40 machines a day. But the smaller factories also avail themselves of wholesale facilities by making favorable contracts with large founderies, cabinet works, screw factories, and the like, and confining themselves to a portion of the machining and the japanning, assembling and proving, or what might be called—to borrow an expression common in watch factories, and not to be understood in any general sense—the manufacturing end of the work.

In general, it may be said that the interchangeable system is carried to its fullest extent, parts of cases and the smallest machine parts being furnished separately as a regular feature of the trade, and long illustrated lists of the pieces being supplied to customers and to agencies, to facilitate the ordering of these detailed parts.

Between 1860 and 1870 a notable change in the industry took place, the number of establishments, as reported, diminishing from 75 to 49, and the average number of operatives per establishment increasing from about 30 to about 150. For the same number of operatives in 1870, as compared with 1860, the wages, cost of material, and value of product were only slightly increased, and the value of product above material was diminished; but the capital investment returned in 1860, amounting to $62,158 per 100 operatives, if compounded at 6 per cent. for ten years, would not reach the sum of $120,140, the ratio of capital per hundred operatives returned in 1870. Most of this apparent increase is due to the more complete returns obtained in 1870; but an increased investment in capital per operative was undoubtedly required by the enlargement of factories and the introduction of improved plant, machinery, and manufacturing facilities. In 1880 the capital requirement appears still further increased relative to the number of operatives, the number of establishments being smaller, and a greater proportion of the operatives being employed in the larger factories. In 1860 nearly one-half the operatives were employed in factories having from 10 to 50 hands; in 1870 nearly all were employed in factories having between 100 and 500 hands; and in 1880 about one-half were employed in factories having 1,000 or more hands and about 30 per cent. in factories having between 300 and 1,000 hands.

The movement of the industry, so far as observed in some notable instances, has been toward those points enjoying the greatest commercial advantages, which strongly emphasizes the necessary connection between manufacturing and commercial facilities.

Owing to variations in design and in workmanship, no very definite figures can be given; but it is estimated, upon deductions drawn from the manufacture of several prominent styles of machine, that in the production of 100,000 ordinary treadle machines per annum there will be required about 175 operatives for the machining, about 120 for the assembling and proving, about 120 for the foundery work, about 40 for japanning and ornamenting, and about 100 for packers, teamsters, clerks, etc. And by way of illustration it may be further said that, under equal conditions, where a factory doing the whole proper manufacturing work will turn out 120 machines per annum per operative, a factory omitting the cabinet-, case-, and needle-making may be considered to have a capacity of about 160, and, omitting also the foundery work, of nearly 200 machines per annum per operative. Upon some unusual styles of machine the machine work is much less, while for the heavier styles, such as are specially designed for manufacturing purposes, much more labor is obviously required; but the cases stated approximate to averages of actual conditions.

The increase in productive efficiency per operative in 1880 over 1870 may be stated as not less than 20 per cent. for favorable conditions of present manufacture—a statement which will not appear excessive when we come to consider in greater detail the nature of the improvements made in the several departments. There has also been a continuous improvement in fineness of workmanship. Cams, which in 1870 were machined with a variation from exactness of one and one-half thousandths, are not now allowed a discrepancy of half a thousandth of an inch. When the manufacture was first commenced, sewing-machine work was considered coarse as compared with gun work, but it is now very accurate, sometimes more accurate than much of the gun work. The requirements of light, rapid, and easy running have, within the past decade, secured a great improvement in nicety of fit and balancing in all the working parts. This change is the result of many gradual improvements, not only in the design of the sewing mechanism (most of the large establishments having introduced new and improved machines since 1870), but in the machine tools, for, whatever device is used in machining, nicety of work must be secured by nicety of manufacturing mechanism.

As a part of the manufacturing process, sewing-machines are usually tested both by sewing muslin and by sewing several thicknesses of duck or beaver. It is hard to speak further of the workmanship and perfection of operation attained in American sewing machinery without appearing to make distinctions inappropriate to a report treating of the manufacture of sewing-machines generally, rather than of the merits of particular machines. Suffice it, then, to say that family machines are made which will make over 2,000 stitches a minute, which will sew 600 stitches a minute with No. 60 cotton, using the same cotton as a driving-belt for the machine, and which will sew either the thinnest gauze and tissue paper or many thicknesses of the heaviest goods, such as leather, heavy duck, beaver, and even tin, and will execute other work requiring a combination of delicacy, accuracy, easy action, strength and speed probably unapproached by any other class of ordinary machinery. This is the more remarkable, because they are adapted to household use and require only a slight degree of skill in the operative.

Of the labor employed in the manufacture the greater part is not of any skilled trade, about one-third of the whole number of operatives being usually paid the wages of skilled men—as good a criterion as any by which to estimate the ratio of skilled labor.

FOUNDERY WORK.—Great advance has been made in the rapidity of molding, which is due to the use of improved flasks and molding-machines; and in many branches of the work within a few years past skilled labor has been displaced by unskilled labor, or only so far skilled as a man may become after a few days' experience. One man will in a day mold 54 legs or sides of the machine stand, 69 cross-pieces, or 100 treadles. One man with a boy will now mold 300 balance-wheels in a day, the labor being unskilled, whereas in 1870 one skilled molder could only mold 65 balance-wheels in a day. This advantage is due to the use of flasks of improved construction and convenience in handling, enabling an unskilled man to mold two wheels in each flask, and to the use of molding-machines. Using molding-machines, one man with a boy helper will in a day mold from 150 to 180 band-wheels of such a kind that 40 was formerly considered a good day's work for a skilled molder. Of a small casting, called a spooler, 10 patterns being set in one flask and the molding-machine being used, one man with a boy helper will mold from 1,600 to 1,750 a day, where but 750 to 900 spoolers were formerly molded by one skilled man in a day. Where one skilled molder, using a common flask, molded from 35 to 50 arms of sewing-machines in a day, a comparatively unskilled man, using improved hinged flasks, and not using a machine press, will now mold 112 arms in a day. A citation of such instances as these gives an idea of the nature and extent of the improvement taking place, as well as of the difficulty in making statements as to its exact amount. The utilization of unskilled labor to such purpose, and the increased efficiency of working, are not commonly as great as in the examples cited.

The great bulk of the iron used in the manufacture of sewing-machines is American iron, although for the softer iron some Scotch pig is occasionally used in favorable conditions of the market. The usual proportion of coal to iron in the cupolas is about one to five by weight, but in general a greater proportion of coal is necessary to insure greater fluidity in the molten metal. On sewing-machine castings, under conditions of efficient working, between 200 and 300 pounds of castings are made per man per day for all classes of labor in the foundery, the molding occupying the greater part of the day, and the casting commencing about three or four o'clock in the afternoon. There are more molders and fewer common laborers and core-makers in proportion than are required for heavier and less uniform work, but the introduction of skill-saving appliances makes it difficult to draw the line between skilled and unskilled labor.

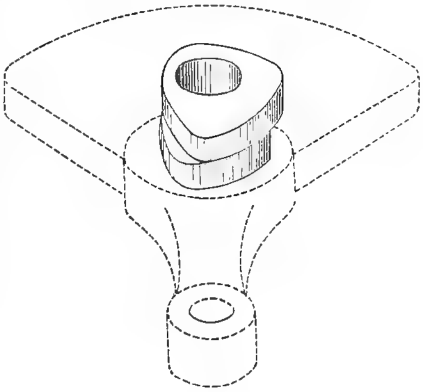
Even the largest castings, such as legs, cross-pieces, and treadles, are cleaned in rumblers or tumbling-barrels with small bits of star-iron. With the larger castings these small bits do all the actual tumbling, the castings being firmly set within the barrels. Some of the smaller barrels are hung off the geometrical axis, which causes the pieces to rush endwise of the cylinder as well as to revolve. It is stated that in some factories the rapidity of machining sewing-machine castings has within a few years been nearly doubled by the judicious annealing of the pieces. This, however, is only local, since an equal rapidity of work is attained by other factories using a softer quality of iron, without annealing, which is liable to distort pieces of such shapes as lack uniformity and rigidity. The arm of the sewing-machine is sometimes smoothed with a hand-file instead of being tumbled, on account of difficulty in packing into the tumbling-barrel and liability to break the edges.

Sixteen or eighteen tumbling-barrels, with an attendance of five or six men, will suffice for a factory with an output of 100,000 machines per annum. For such a factory from 50 to 60 horse-power will be required for the barrels, cupola blasts, and other foundery purposes.

FORGING.—One of the characteristic differences between a gun factory and a sewing-machine factory is that the material is in the former case forged, while in the latter the great weight of it is cast, and blacksmithing plays but a small part in the whole economy of the work. It is, however, an important part, and of growing importance, drop-forgings being sometimes substituted for malleable castings, making a stronger but not a cheaper article.

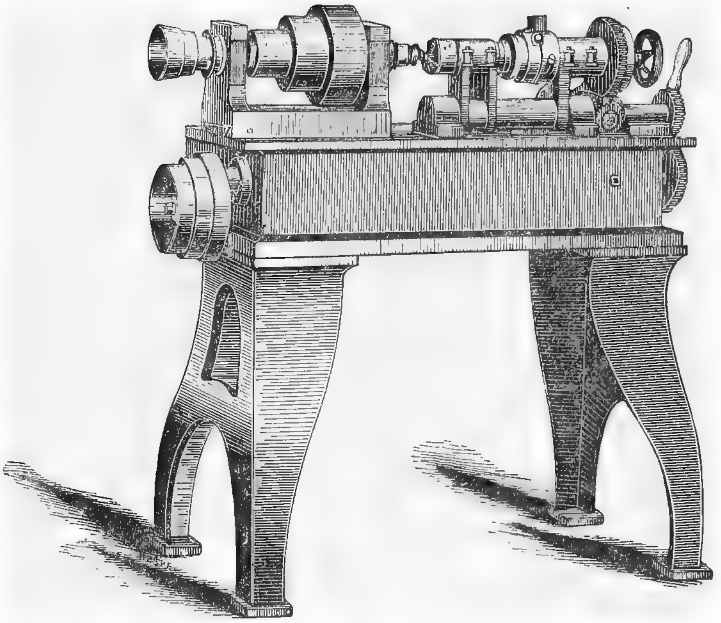
Among the earlier instances of the introduction of drop-forging with dies was its use by Albert Eames, in 1856, in the manufacture of the hook of the Wheeler & Wilson machine. This hook, being of peculiar form, required an ingenious succession of dies for the upsetting and swaging of the metal, so that it might be brought without cracking or injury from the merchant bar to the form ready for machining.

As a large factory may require only a few drops and hammers, and as in some forms of sewing-machines very few special forgings are used, most of the parts being machined directly from forms of merchant iron or from gray and malleable iron or steel castings, the place of this work in the general system of manufacture need not be considered at great length; but it may be noted that the manufacture of shuttles from drop-forgings for the supply of sewing-machine makers is specially carried on by a company at Hartford, Connecticut, under a process of forging the shuttles from solid bars, instead of, as previously, making them by bending up pieces of sheet-metal and brazing or soldering in the points. These shuttles are made from one-third to one-half inch square rods, are swaged to the desired shape between suitable dies, and are then cold-pressed. They undergo a considerable number of machine cuts in the finishing, some of this work being done with great rapidity by special machines. Two machines, tended by two boys, will finish between 4,000 and 5,000 spools for shuttles in ten hours.


No. 2.

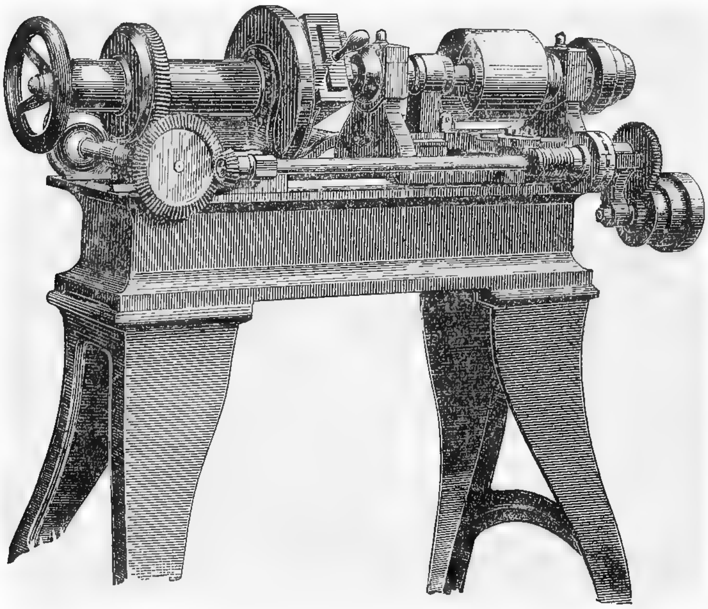
MACHINING.—The machining, especially of the wrought-iron parts, is similar to such work in gun-making. The work may be rated by cuts or operations, and is usually done by the piece. There are, for example, in all, 34 operations on a "Weed" shuttle, 128 operations on the "Wheeler & Wilson" hook, 70 operations upon a hemmer, 32 upon a presser, and so on. The number of operations required upon a piece is sometimes used by contractors in estimating the cost of its production, but only with a special knowledge of the case, as an operation is not always a well-defined quantity. Some of the operations are slight, involving little labor and a small expense per piece (which may be rated in tenths of a mill), while others are much more costly.

In machining with irregular-outlined mills or cutters a great variety of work is done, and there is a great range of practice in speeding and feeding the cutters and work, depending upon the depth of cut, hardness of material, rigidity of machine, heating of work and tools, and strength of cutter teeth. With a slow feed and slight depthing a high velocity may be given to the cutter, but with a deep and rapid feed its velocity must be slower. In order to secure the highest efficiency without injury to the quality of the work, the speed and feed demand great watchfulness and adaptation to varying conditions, the tendency being to run the tools at too high a speed for piece-work and at too low a speed for time-work. As an example of work in milling, a "Wilson" feed-plate undergoes seven milling operations—three on hand- and four on power-feed machines. A man and a boy will tend eight milling machines, and will in a month of 260 hours do the milling on 5,000 feed-plates, 5,000 long and 5,000 short connections. The average time of a milling operation is two or three minutes, including setting and stopping. In steel the speed of cut is about two-thirds as great as in cast-iron, most of the cast-iron being either soft iron as cast or else softened by annealing. In case of facing-mills and mills of irregular form the speed is rated for the greatest diameter, the surface speed in inches per minute; that is, the tangential velocity of the greatest circumference is for heavy cuts in steel as low as 120, and in cast-iron as low as 180 inches. A surface speed as high as 500 inches is more common for ordinary cuts in soft cast-iron and 300 to 400 inches in steel. Smoothing cuts, which take off only a few thousandths of an inch, are sometimes made with mills running at a surface speed of upward of 1,000 inches per minute.

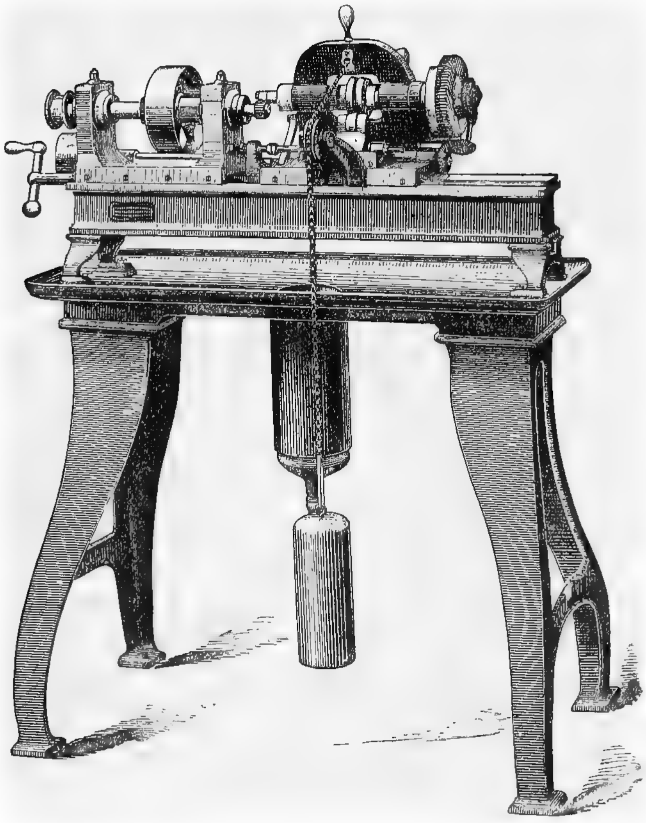

No. 3.

Cam-cutting is one of the most peculiar operations in machining sewing-machine parts, and it is usually effected by special machinery, supplanting ordinary profiling-machines.

The sewing-machine part shown in the figure (No. 2) is called a feed-cam. Upon this the edges and faces of two small cams have to be cut, the cams being shown as though one were slightly in advance of the other, the entire part being a single solid piece. A machine for cutting these cams is here illustrated (No. 3). The head-stock carries upon its spindle two mills, one for facing the upper surfaces and the other for forming the cams. The work is held upon a rock-shaft spindle, and has a turning feed, while its position relative to the cutter is determined by a cam pattern which guides the rock shaft. After one cam has been milled, a single motion of a pin throws the work forward and shifts it to a new position for the milling of the second cam. Its capacity is 200 a day, two facing and two circumferential edging cuts in an average of three minutes. One man is capable of tending three or four machines.


No. 4.

The heart-cam milling-machine embodies a peculiar principle, namely, that of turning modified by profiling. The heart-cam groove is of a peculiar form, approaching that of a portion of a circular ring, but is not circular, although the profiling is based upon a rotary oscillating movement, the work-plate upon the spindle shown in the illustration given (No. 4) having such a movement, while the variation from the circular is effected by the movement of a slide, also shown, which is actuated by a former. One of these machines, at an average of two cuts, roughing and finishing, in three minutes, working in steel, will cut 150 heart-cams a day, one man tending three machines and cutting 450 cams. This machine displaced profiling, at which one man is required to a machine. Probably one operative with three heart-cam machines will do four or five times as much work as one operative with a profiling-machine. Another form of feed-cam machine is also shown (No. 5). This exhibits a swinging spindle, on which are the former cams, which are pressed against a guide roller by the action of a weight, the feed cam to be milled being carried by the "former" spindle, which is driven by bevel gears.


No. 5.

Another machine of high efficiency completely finishes the band-wheels of sewing-machines. With ordinary machine tools the chucking, boring, and grooving of the rim and squaring of the hub could not be done by a man at the rate of 25 a day. With the machine illustrated (No. 6) upward of 110 a day are completed. When the work revolves and the tool is held in place the operation is called chucking. The wheel is first chucked, that is, placed in a rotary holder, in which it is successively acted upon by five tools in a turret-head, viz: an entering drill, a through drill, an enlarging drill, a reamer, and a face-mill for squaring up the front side of the hub. A tool actuated by a handle is then pushed forward through the power spindle, which is hollow, and thus faces off the back of the hub, and the groove in the rim is then turned by a tool advanced in a tool-rest at the side. Even more ingenious is the machine for turning the compound balance- and band-wheel, which, in addition to all the foregoing work, has to turn the rim of the large balance-wheel to a half round. This is done by a side tool fed in a semicircle. An entire wheel, with its eight distinct machine cuts, is perfectly finished at the cost of labor of 1½ cents each, rating the boy tender required for the work at $1 50 a day.

In an ordinary gear-cutter, working on the small bevel gears of machines of the Singer and other types, about forty gears can be cut in a day, but with a special gear-cutter having an automatic feed one man can tend two machines, each cutting 150 bevel-gears a day, or at the rate, per operative, of one gear in two minutes, each gear having about 25 teeth. An illustration is shown (No. 7) of a valuable special form of milling-machine, a double-spindle machine, for milling the heads of sewing-machine arms, the term "head" being sometimes applied to the top of the machine, and again in some styles of machine to the fore-end of the arm. This machine does away with the difficulty of setting or bedding the arm for the second or finishing cut, and thus gives an exactitude of cut very necessary in this part, beside a saving of upward of 25 per cent. in the labor. The second setting, or bedding, increases liability to inaccuracy.

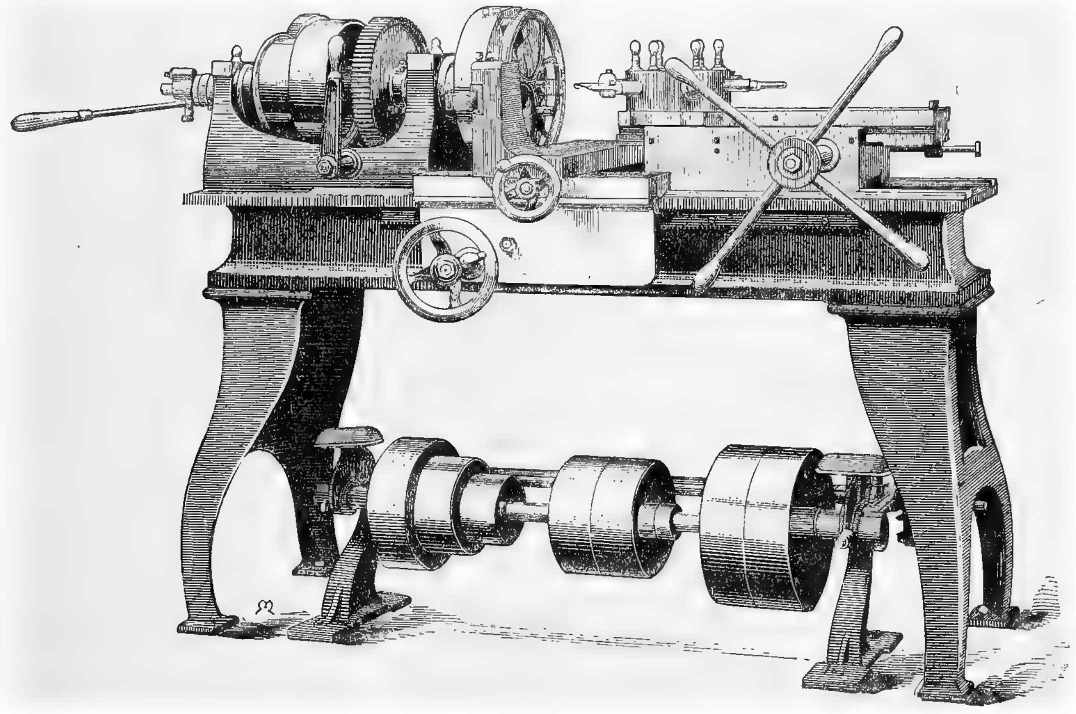
The shuttle-race milling-machine here illustrated (No. 8) is a curious form of two-spindle machine, roughing and finishing. It cuts the curved shuttle-race in the bed, which in the machinery is fastened upon vertical work-plates actuated by sector gears and turning upon pivots. Such a double-head machine, or such a pair of machines as shown, will rough cut and finish 300 shuttle-races in a day, requiring but one attendant.

In lapping rolls and arbors as done by hand one man reduces from 80 to 100 in a day; but as done by special machinery, one man reduces 400 a day with much greater precision, the machine occupying only about half of his time, leaving the rest for attendance upon some other work.

In surface and round grinding a great deal of effective work is done by the use of solid emery or corundum wheels.

Considerable advance has been made in the operation of turning. In a machine for circle-turning balance-wheels, with an automatic circle-feed, the tool being carried by a sector gear, one man tends six machines, turning out 6,000 balance-wheels per week.

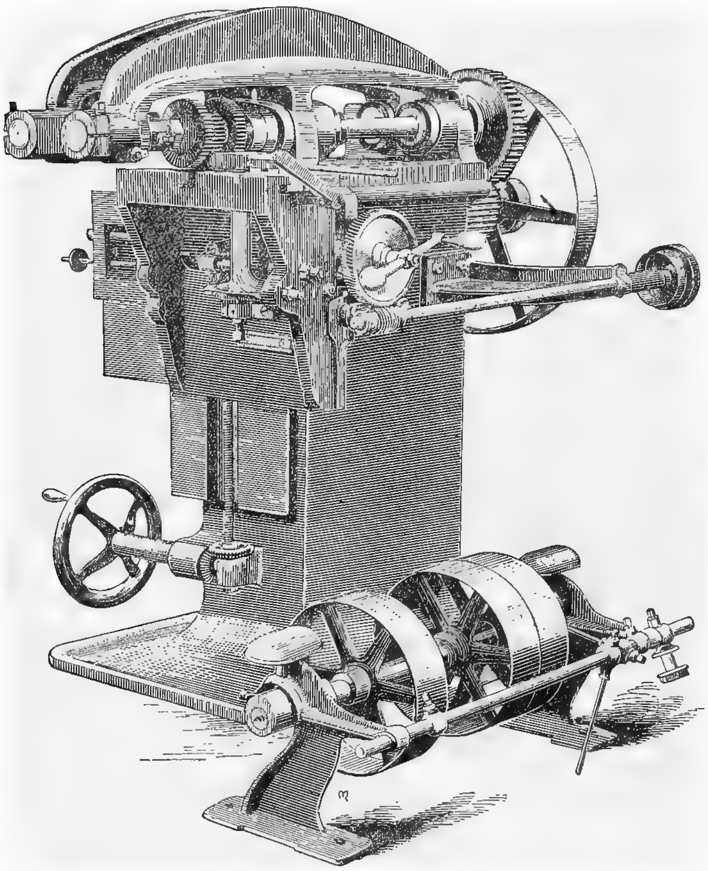
In simple turning the highest present efficiency obtained in piece-work (as distinct from wire-work, in which the articles are machined from a continuous rod) is when the workman loses no time; that is, when all his time is employed in setting the work in lathes. The number of machines he can tend will then be directly as the time spent by the tool in passing the length of the work. One of the most effective arrangements is used in the turning of small sewing-machine arbors. The lathes are arranged side by side in sets of six, the attendant being at the ends toward the tail-stocks, and he is thus enabled to place and remove the work for two sets, or for 12 lathes, but has no time for false motions. Such sets of machines are sometimes given the expressive name of batteries. Machine work of this kind is like type-setting; the amount of work that may be done depends on individual alacrity, and some workmen will by practice attain a phenomenal efficiency.



No. 6.

In turning band-wheels by special machinery, one man tending eight automatic-feed machines (having four consecutive operations without resetting the work) is fully equivalent to five men turning with ordinary lathes.

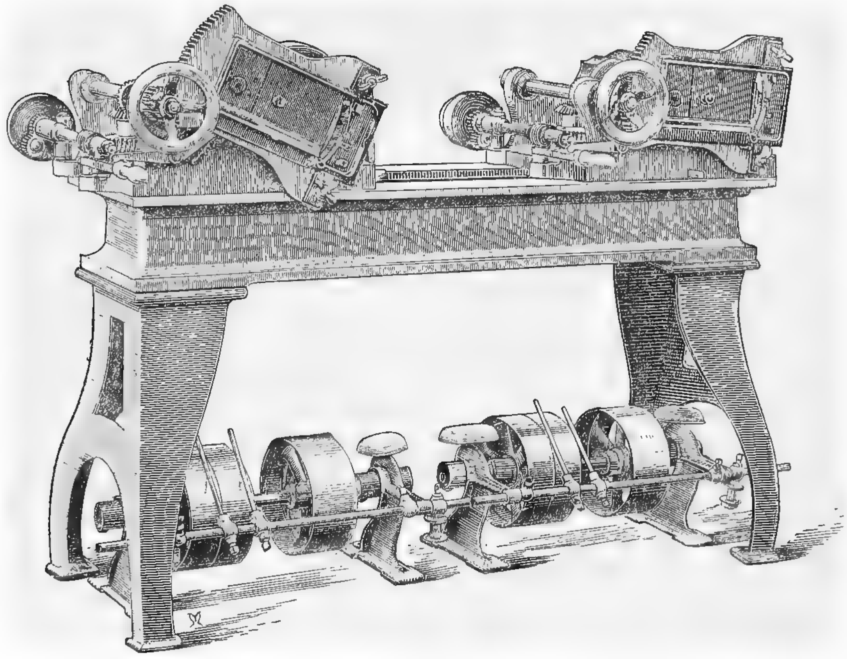
In drilling great strides have been made, and in many instances the efficiency is two, four, or even ten or twelve times as great as by the methods in use in the same work in 1870. Many examples of such saving might be stated, and there is scarcely a factory from which such instances might not be drawn. A boy tends two machines, each drilling two holes at a time, one-quarter of an inch in diameter and 1½ inches deep. Each drill is stated to feed at the rate of over 1½ inches a minute, and the holes are drilled at the rate of six a minute. Other machines drill three or four holes at a time. In a machine for drilling castors, one boy in attendance, there is a chucking arrangement, the work-holder turning on a vertical pivot and three drills working at a time, there being a set of three holders on each side of the pivot. While the holes on one side are being drilled the tender unclamps the holders on the other side, turns a hinge, and throws out the castors and chips, and by the time he has placed the blanks the other three holes are drilled. Thus one boy will drill 2,000 castors a day, it being merely a question of placing blanks. Other and larger work is drilled on chucking arrangements of a similar character. On such a one a treadle-bearing is counterbored, and the pitman-pin on the treadle turned, not only at one operation, but three or four at one operation. With a drilling and counter-sinking machine for another description of large special work, one man tending two machines does as much work as twelve men could do with common drill-presses, or as sixty men could do in drilling by hand with ratchets.


No. 7.

The speed of the drilling-tool varies greatly with the hardness of the iron. Where 400 balance-wheels may be drilled in soft iron without resharpening the drill, in hard and variable iron the drill has to be resharpened after drilling fifty, or sometimes even as few as seven or eight holes.

An illustration is given of a horizontal chucking-machine (No. 9) for special sewing-machine work. This class of special machinery has greatly increased the efficiency in drilling, reaming, tapping, and other work upon small and special parts, and the machine in question has a third set of chucking-spindles at right angles with two others, so that the operation of the chucking (and turning) tools in line upon opposite ends of the work is perfectly concentric, and the tools of the third set are successively brought up to center truly upon a point of that line. Thus, with the proper fixtures upon the bed, work can be machined on three sides with a variety of cuts. The possibility of such a result in exact work will commend this magnificent tool to the machinist, not only as an example of a labor-saving machine, but of the highest attainment in the manufacture of precise and accurate mechanism.

In screw-making the machines used are turret-lathes, such as illustrated in cut No. 10, and these automatic machines are so prolific in operation that for the most exact work the chief hinderance is in the necessity of frequently replacing the dies and tools that become worn in the work. These machines will turn out from eight to twenty times as many screws per operative as the hand turret-lathe, which is itself a labor-saving machine of great facility and usefulness in many branches of manufacture.


No. 8.

The wire is fed by a gripping and centering chuck. It is advanced to gauge length, the heads, steps, and shanks of the screw are turned by successively-operating tools; the thread is put on by a die-tool, and the hollow mandrel carrying the wire is then reversed to draw the thread out of the dies, and if the head is to be "milled" or chucked it is turned against an impression roller, after which the screw is cut off, the chuck opens, the wire is fed forward, and so on in repetition. The movements in this machine are effected from cams on a shaft below the mandrel and turret, separate cams serving to shift the belt, turn the turret, operate the chuck, and bring forward the cutting-off and stamping tools. Some of the cams in question are placed upon the faces of large pulleys, thus affording a large and exact movement with little wear.

In the wire-griping and feeding chucks the grip is effected by the closing in of jaws by a simple slide movement, and the feed is obtained by a movement of the chuck, or, in some cases, by a simple stop pressing against the back end of the wire rod and actuated by a weight upon the release of the grip. Some of the tools in use are illustrated (No. 11). The die-holder (which may be made to hold a tap instead of a die) has a shank revolving in a sleeve, which engages with the holder, by a right- and left-hand chuck, to prevent jar or break in the reversal of the movement. The box-tool is a holder made to receive a number of cutters.

Automatic turret-lathes require one man or boy to four or more machines, sometimes as many as eighteen for the slower work. The machines for turning out small work require more attendance, but each machine turns out a much greater number, upward of 4,000 a day for the simplest and smallest screws. In some forms of machine the throw and stoppage of the turret are effected by the action of a lever with a pin moving in a cam groove in a disk. The machine known as the Brattleboro' screw-machine is a peculiarly ingenious but complicated construction which performs all the operations, including slotting the head; but it lacks simplicity, and a higher efficiency can be obtained by using automatic turret-lathes in combination with separate slotting-machines. Taking the run of sewing-machine screws in a large factory, it is found that the slotting-machines averaged nearly 300,000 screws per machine per month, making fifteen or twenty slots a minute. A lathe attachment for slotting screw-heads is shown in the cut (No. 12). This is fastened to the bed of the lathe and carries the blank, a horizontal movement of the lever opening the jaws for its insertion, while a downward movement governed by a stop brings the screw-head up against the mill or saw, which is placed upon an arbor between the centers of the lathe. With this an active boy can slot from 10,000 to 15,000 screws in a day.

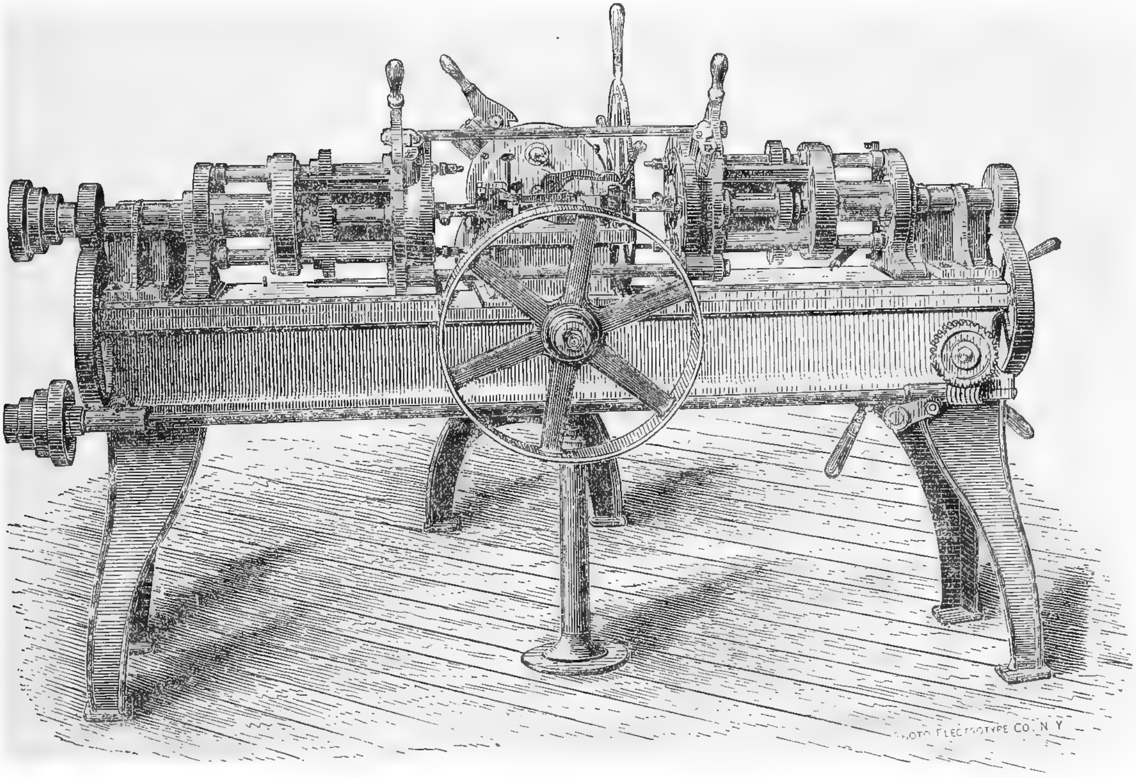


PHOTO ELECTROTYPE CO. N.Y.

No. 9.

In machine work on sewing-machines it may be said, in general, that screw-machines average about one attendant to six; milling-machines, one to six; cam-cutters, one to three or more; and engine lathes, one to three. Most of the other operations require an attendant to a machine. In polishing, one man on an average appears to polish the equivalent of the polished parts of fifteen or twenty machines, although the work is of course apportioned among the operatives according to the kinds of parts to be polished.

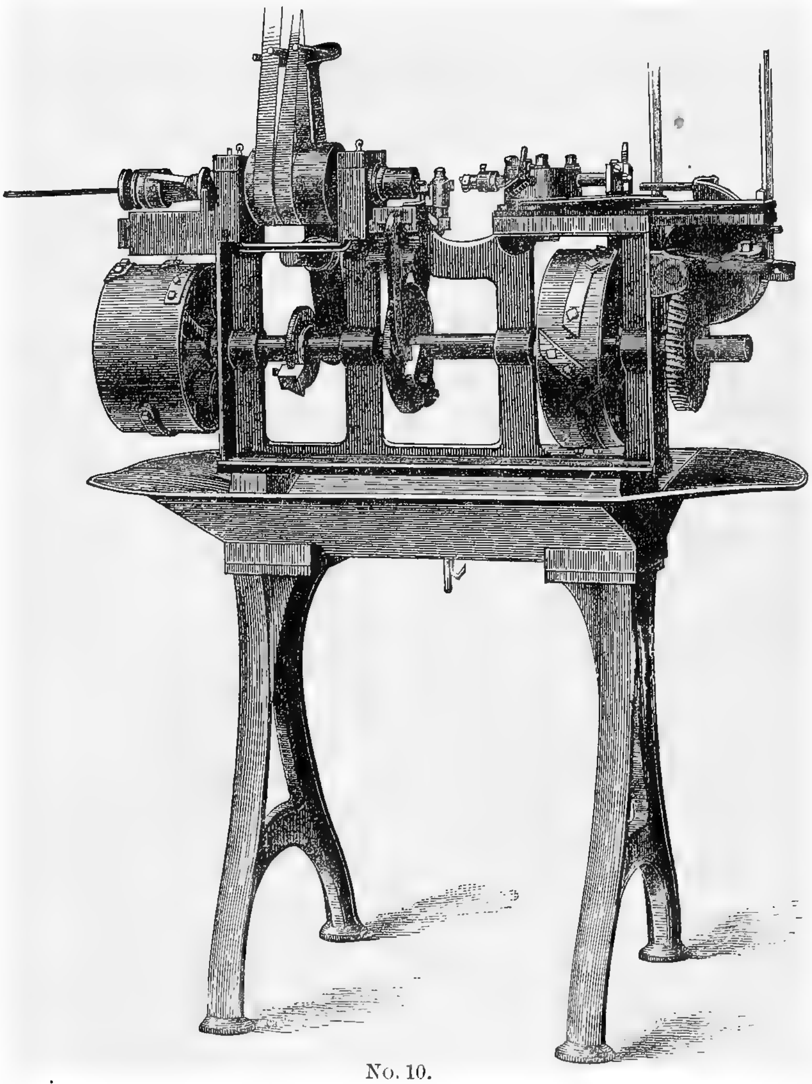
Tool-making constitutes a considerable factor in the machine work, sometimes employing 15 or 20 per cent. of all the operatives engaged in machining, this prominence being due to the requirements of fine gauging and interchangeable work, and to the great consumption of tools by rapid working, and because much of it, being job work of a special nature, has not shared in the increased efficiency of other work.

Needle-making.—Needle-making constitutes a distinct branch of manufacture, and the product bears no necessary relation to the product in sewing-machines. Some of the operations in needle-making are: cutting, grinding, tipping the blank, swaging, cutting to length, rough-pointing, tipping, grooving, eye-punching, burring, hardening, tempering, polishing, brushing, scouring, and buffing. The machinery used is largely of private designs, of which a detailed description is not permissible; but it is essentially wireworking machinery, involving, perhaps, no new principles of metal-working, but with features of special adaptation which have resulted from costly experiment and experience.

The steel wire is first straightened, then turned to taper, cut off and passed between two small mills, that groove it; but as the groove does not extend the full length after grooving, the rough needle is in automatic machines grasped by a small lever with jaws, withdrawn, and deposited in a tray. This grooving is sometimes done in a separate machine.

The punching of the eye is done with great rapidity, either by a small punch press or by a miniature drop. In polishing the needle and the needle eye, rolling, burring, and other finishing operations, ingenious contrivances are used, but the straightening after annealing has still to be done by hand-hammer and anvil.

The productive efficiency in needle-making has been greatly increased by automatic movements, and by combining mechanism so as to effect a transfer of the piece from one operation to the next without resetting by the human hand. In these respects needle-making has simply kept pace with other wire-working processes, in which such great development has been made within the past ten or fifteen years. From 6 to 8 per cent. of all the operative labor on sewing-machines may be considered to be employed in needle-making.

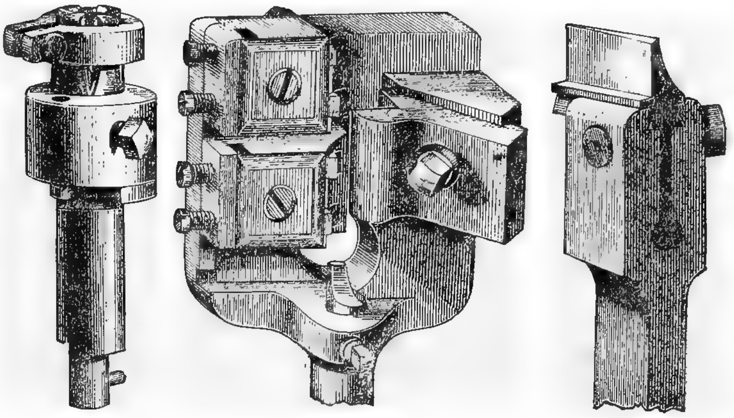


No. 10.

WOOD-WORKING.—Case-making for sewing-machines is a manufacture which, it is most obvious, may be entirely different from and independent of the manufacture of the sewing-machine movement; but since it is embraced among the departments of a complete sewing-machine factory, under one common system and management, it is here briefly considered. In sewing-machine work proper the value of product per operative is but little more than in the case work, but in the former the value of material used is about one-fourth, while in the latter it is about two-fifths the value of the product. In the former the horse-power required is about one-fourth of one horse-power, while in the latter it is upward of two-thirds of a horse-power per operative, and in the cruder operations of wood-working as much as four or five horse-power per operative. About six times as much power per machine is required for the wood-working as for the other machinery. While in sewing-machine work proper ten machine-tenders on the average attend seventeen to twenty machines, in case-making ten machine-tenders on the average attend eleven or twelve machines. In cabinet-shops the machine-tenders are less than half of all the hands. In the other departments of sewing-machine work (including the foundery and other non-machine work) the machine-tenders constitute as many as 60 per cent. of all the hands, and of the machine-shop work alone a very much larger proportion.

Of the machine plant required for case-making nearly 50 per cent. of the whole number of machines are sawing-machines, about 12 per cent. drilling and boring, 10 per cent. molding and carving, 10 per cent. sand-papering and polishing, 6 per cent. turning, 6 per cent. planing, and the rest machines for jointing, matching, dovetailing, sticking, and so on. But it is obvious that the numbers of many wood-working machines are increased for convenience of access rather than for anything like continuous use, and the output, as a measure of mechanical efficiency, becomes an impracticable consideration, as is the case with many machine tools. One saw-table, with an attendant, might, for example, suffice for doing the saw-table work on a vast number of table-tops of a specified pattern, but such figures might convey distorted ideas of the actual product and methods of manufacture. Wood-working machines require, when in use, an attendant to a machine, excepting in a few machines, such as surface planers, where two men are required to handle the stock. The machinery used in cabinet work exhibits some-notable improvements, especially that of the molding and dovetailing class, and that used in the shaping of knobs, fancy moldings, and ornaments. In one case, in a nice operation of molding formerly done by hand, one man tending a special machine does a work equal to the hand-work of fifteen men.

Between metal- and wood-working machinery there may be stated this prime distinction: In metal-working the man has most frequently to wait for the machine, but in wood-working the operation is so much more rapid, and the material requires so much more handling, that the machine may be said to wait for the man. In the former case the problem is to devise rapid or semi-automatic machinery which will enable a man to utilize all his time; in the latter case the problem is to give a higher value to time already fully occupied, which may be best done by a wholesale manufacture, in which each man, by devoting himself to a single kind of work in repetition, insures a great saving of cost as compared with ordinary mixed cabinet work, a saving often four- or five-fold. A special machine will, for example, turn knobs faster than a boy can place them. Its highest efficiency is attained when the boy is fully occupied, and its productiveness is then so great as to reduce the cost to a very small sum compared with other portions of the work. It will not be profitable to introduce expensive mechanism for setting knobs faster than a boy can do it. This is cited to explain the absence of automatic machinery in wood-working and in many kinds of metal-working. In order to make it profitable to save labor by expensive machinery there must be a large principal of labor to be saved, and if this labor is already slight, by reason of the expedition of methods in use, the subject becomes less interesting to the capitalist than to the ingenious mechanic. The cost of other labor, and of handling, marketing, tariff duties, and so on, becomes so disproportionately large relative to the item of labor to be saved that the saving will not secure such a reduction of price as will, by an increased demand for the product, warrant the expenditure.



No. 11.

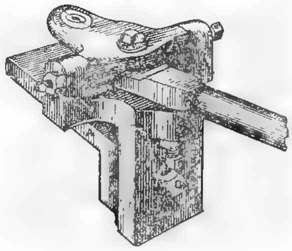
No one who examines the fitting and jointing of a piece of fine wood-work can fail to see the importance of interchangeability in the manufacturing system, although the parts may not be designed to be separated after finishing. Interchangeability saves a great amount of fitting and job work in the manufacture, and by careful kiln-drying and the filling and finishing of the wood, so as to prevent dessication or reabsorption of moisture with the consequent shrinkage or expansion of the finished wood-work, a high and enduring degree of interchangeability is attained in the most careful and substantial work.

Other work.—The small working parts of sewing-machines are annealed in oil. Being heated in furnaces, in iron boxes, the boxes are removed by suitable tongs from the furnaces, the lids are struck off, and the small pieces are poured into an oil-tank with a sieve-bottom, which can be raised for their removal.

In japanning, the legs of the stand are usually dip-japanned, the head being painted with japan of a different quality. Dip-japanning saves a great deal of labor, and in some cases, by special methods, it is applied to the finest work with results unexcelled by brush-work.

Until within five or six years past ornamenting has for the most part been done by skilled labor, some of the operatives attaining great efficiency in the work; but at some factories the work, by a process analogous to stencil work, is done by boys.

The assembling, setting up, and running of machines occupies a man on the average, with the division of labor, to from two to four machines per day. A girl employed in testing machines by stitching will try upward of twenty machines a day. In the matter of boxing, with the division of labor, one man will make and pack boxes for as many as twenty machines a day, using about 200 feet of lumber. For all the work about one foreman to thirty-five operatives and one clerk to fifty operatives may be considered average ratios. Teaming, porterage, and common labor occupy a considerable number of men, the common labor being partly general and partly divided among the several departments. Such figures as the foregoing are intended to convey average ideas of the division and efficiency of labor in large factories. As such, they are offered without apology, although for different factories such ratios will often vary greatly.



No. 12.

For the information embodied in this section of the report, the writer is indebted to many parties; but for courtesies extended, especial acknowledgment is due to Hon. Nathaniel Wheeler, of Bridgeport, and Mr. F. A. Platt, of Hartford, Connecticut.

IV.—THE MANUFACTURE OF LOCOMOTIVES AND RAILROAD MACHINERY.

A report on the manufacture of locomotives must needs be prefaced by some account of the product, and this may best be defined by briefly recounting the changes in that product from the earliest days until, by years of experience and by changed requirements, there have been gradually developed the salient features of the present types of American locomotives.

It is nearly fifty years since locomotive building was inaugurated, and when fairly beyond the experimental stage more men were required in the work per locomotive per annum than are now required. The locomotive of that time cost nearly as much as a standard passenger locomotive of the present day, while the latter is, on the average, three or four times as heavy, even more powerful in proportion, and incomparably superior in finish to the former.

In 1832 the "Old Ironsides" was built by Mr. M. W. Baldwin. It was modeled after the English "Planet" type, with a stiff wooden frame and inside connections. Up to 1840 most of the Baldwin engines were built with inside connections, as were also the earlier Rogers engines; but outside connections afterward became more generally approved, inside-connected engines having now become practically obsolete. Mr. Thomas Rogers was an early advocate of outside connections, and in 1837 filed in the patent office a specification for counterbalancing, which was not in general use until some years later, and even then was considered less essential to the inside- than to the outside-connected engines. In 1839, in Mr. Baldwin's practice, the outside frame was abandoned, and the machinery, truck, and pedestals of the driving-axles were attached directly to the boiler. From that time the wood parts of the frame were gradually displaced by iron. About 1837 equalizing beams were used on the Eastwick and Harrison engines, some method of equalizing being necessary to distribute the weight upon the two pairs of drivers then introduced. In 1841 Mr. Baldwin built some engines for freight traffic with the drivers geared, but in 1842 his six-wheel connected engine met with more general favor. In this the four forward wheels had inside journals running in boxes held by wide and deep wrought-iron beams, one on each side and disconnected, the engine frame on each side having a spherical pin bearing in a socket midway between the axles of the frame. The cylindrical boxes used could also turn in the pedestals, and the connecting-rods had ball-and-socket joints, with play enough to enable the engine to pass short curves.

The driving-wheels of "Old Ironsides" had cast-iron hubs, wooden spokes, and wrought-iron tires, and the driving-axle was placed in front of the fire-box. The "half-crank" for inside-connected engines was patented by Mr. Baldwin in 1834. The "E. L. Miller" (1834) had driving-wheels of solid bell-metal, which soon wore out, but later driving-wheels were built with hubs and spokes in a single iron casting, and wood fellies, breaking joint in thicknesses, and bound with wrought-iron tires, secured by bolts. In 1834 Mr. Baldwin built his engines with the driving axle back of the fire-box, and Mr. Norris built engines with drivers in front. The latter plan gave the greater adhesion, and the former the longer wheel-base. To obtain the necessary adhesion, Mr. Baldwin had recourse to the Miller patent for throwing part of the weight of the tender upon the driving-wheels of the engine. It was at this time considered impracticable to cast a chilled car- or truck-wheel in one solid piece, and the hubs were cast in three pieces and banded together with wrought-iron, the interstices being filled with lead or spelter. The "Brandywine", Baldwin's eighteenth engine (1835), had brass tires, to give more adhesion, but they soon wore out. Mr. Rogers began the manufacture of wrought-iron tires in 1834, but in 1838 S. Vail & Co., Morristown, New Jersey, are said to have been the only American manufacturers of tires, which were then made only 1½ inches thick. In 1838 Mr. Baldwin began using chilled wheels for trucks, the truck-wheels having previously been made with tires; and in 1836 Mr. H. R. Campbell patented an eight-wheel engine with two pairs of driving-axles, one before and one behind the fire-box. This combined the plans of Messrs. Norris and Baldwin, and, with the addition of equalizing springs, was substantially of the same type as the standard American locomotive of to-day. The last half-crank engine was built at the Baldwin works in 1849. Steel axles were tried as an experiment about this time, and chilled tires for drivers began to be used a few years later. The use of steel tires shrunk upon the wheel centers was not begun until after 1860. These tires were then imported. In 1863 the Rogers works built their first engine of the "Mogul" type (three pairs of drivers with a pony truck), and the first engine of the "Consolidation" type (four pairs of drivers with a pony truck) was built by the Baldwin works in 1866. In these large freight locomotives some of the many drivers are made without flanges, to facilitate the turning of curves. In 1870, the practice of shrinking on steel tires, without the use of bolts or rivets, was begun at the Baldwin works in building some locomotives for the Kansas Pacific railroad.

In 1868 the introduction of narrow-gauge roads began to create a demand for suitable locomotives. Some of these narrow-gauge locomotives have been built of a weight of not less than 25 net tons, and within the past decade the manufacture of steam and compressed-air street cars and motors has been fairly inaugurated.

The use of four-wheeled swiveling-trucks was one of the features which characterized the early American as distinguished from the English locomotives; but one of the most notable improvements of American practice was in the invention by Mr. Baldwin of ground steam-joints, instead of joints made with canvas and red lead, then the English practice. With this change the steam pressure employed was raised from 60 to 120 pounds.

"Old Ironsides" had a loose eccentric for each cylinder. These loose eccentrics were reversed by a pin in a stop on the axle working in a half-circular slot. This was changed to a fixed eccentric for each cylinder, with rods extending from the eccentric straps to the arms of a rock-shaft beneath the foot-board of the engine, the reversal being effected by shifting the connection between the rods and the rock-shaft arms. In these early engines fixed eccentrics were commonly used, but Seth Boyden's "Essex" (1838) had valves worked without eccentrics, moving by levers from the cross-heads, each cross-head communicating motion to the valve of the opposite cylinder. In 1838 Mr. Baldwin adopted the use of double eccentrics, each terminated by a straight hook and reversed by a lever. He used, under specification, a form of link motion in 1840, and in 1842 a link motion similar to that used by Stephenson. (The link motion had been used by William T. James, of New York, in 1832.) In 1845 Mr. Baldwin adopted the half-stroke cut-off, in which there were two slides operated by separate eccentrics, the cut-off eccentrics being set at half-stroke. The same year Mr. Rogers began using independent cut-off valves, operated by various combinations of links and V-hooks, and in 1850 he introduced the present form of shifting link. Meanwhile Mr. Baldwin continued experimenting, introducing several forms of variable cut-off, one of which had a wrapping connection on a quadrant and curved link, for varying the position of the block. He then used the "Cuyahoga" cut-off, with lever and shifting link. Finally, in 1857, after putting on a number of them, under specification, he adopted the present form of link motion.

The "Old Ironsides" had a D-shaped smoke-box with sides concaved, to make room for the cylinder. The boiler was 30 inches in diameter, with 72 one and one-half inch copper tubes 7 feet long. The "Sandusky" (Rogers, 1837) had a bonnet smoke-stack with deflecting cone. Most of the early engines had high domes over the fire-boxes. In 1835 Mr. Baldwin commenced the practice of driving copper ferrules on the outside of the copper tubes, to make a tight joint with the tube-sheet, instead of, as before, driving the ferrule or thimble inside the tube. At present, with iron tubes and copper ferrules, the end is swaged down, the copper ferrule brazed on, and the iron projecting end turned or riveted over against the ferrule and tube-sheet. For copper tubes wrought-iron thimbles had also been used. These were found liable to leak, but about 1850 this defect was obviated by the use of cast-iron thimbles, a device of Mr. W. S. Hudson. In 1844 iron flues or tubes were first used in the Baldwin engines. Morris, Tasker & Co. had made lap-welded tubes in 1838, and butt-welded tubes prior to that year; and Ross Winans had also made iron tubes by hand for his locomotives. Experiment showed no appreciable advantage in copper over iron tubes. Mr. Rogers first used expansion plates to provide for the lengthening of the boiler under steam, and about 1850 the wagon-top was substituted for the dome boiler. Prior to this time there had been many experiments, with the view of burning anthracite coal, and in 1854 deflectors in the fire-box began to be used, sheet-iron, water-leg, and fire-brick deflectors being tried. In 1856 there were built at the Baldwin works for the Pennsylvania railroad locomotives having straight boilers with two domes, and in 1859 locomotives having "Dimpfel" water-tube boilers were built for the Philadelphia, Wilmington and Baltimore railroad. Fire-boxes of low steel began to be built in 1861, and had come into very general use by 1866; and in 1868 all-steel boilers (fire-boxes, barrels, and tubes) were built for the Pennsylvania railroad. In present practice both straight and wagon-top boilers are built. In 1876 steel boilers, with corrugated sides, were built at the Baldwin works for the Central railroad of New Jersey.

The "Old Ironsides" had 9½ by 18 inch cylinders, the "Sandusky" 11 by 16 inch cylinders; in 1840 the largest Baldwin pattern had 12½ by 16 inch cylinders. The "Gov. Paine", a fast passenger engine (1849), had 17¼ by 20 inch cylinders, and in 1852 a freight locomotive, weighing 56,000 pounds, had 18 by 22 inch cylinders. The first "Consolidation" engine (1866) had 20 by 24 inch cylinders, and the "Uncle Dick" (1878) had 20 by 26 inch cylinders. The cylinders of the early engines were generally inclined, but by 1865 horizontal cylinders had become the rule. Mr. Baldwin was the first American builder to use an outside cylinder, which was made with a circular flange, bolted to the boiler. In 1852, on some engines for the Mine Hill railroad, these flanges were brought around, nearly meeting, with only a spark-box between, and later each cylinder and half saddle was cast in one piece, and the saddles set face to face, and when horizontal cylinders came into general use the rights and lefts were made interchangeable.

The early engines had neither cabs nor sand-boxes. Cabs were first used in New England, and the first Baldwin engines provided with sand-boxes were built in 1846.

"Old Ironsides" was estimated to draw 30 tons gross 40 miles an hour on a level. In 1838 Mr. Baldwin believed that an engine weighing 26,000 pounds, loaded, and with 12½ by 16 inch cylinders, was as heavy as would ever be called for; but the requirements of heavy freight and passenger service demanded, for economy no less than for convenience, larger and stronger engines, the heaviest ever built at the Baldwin works ("Uncle Dick", 1878) weighing, with water in the tank, 115,000 pounds. In 1849, at the Baldwin works, there were built a number of fast passenger engines of the type of the "Gov. Paine" (Vermont Central railroad), which could start from rest and run a mile in 43 seconds; but these engines lacked sufficient adhesion. Within the past few years some attention has been given to the manufacture of fast passenger locomotives, a number having been built which, with light trains, will run 60 miles or more an hour. Of these, a locomotive for the Bound Brook line has a single pair of 6½-foot drivers and a patented arrangement for varying the distribution of the weight between the drivers and a pair of trailing-wheels.

At the Brooks locomotive works the average weight of locomotives built in 1869 was 28 tons for passenger and 30 tons for freight engines; but the average is now 35 tons for passenger and 42 tons for freight engines, showing a rapid increase in weight, and it is believed by many that 50-ton consolidation engines will soon become the prevailing type and size for American freight service.

Examples of the performance of engines might be given at great length and in great variety. For the Baldwin engines the loads are calculated on the basis of the utilization for adhesion of fully one-fourth the weight on the driving-wheels. A standard "American type" passenger locomotive, with 35,000 pounds on the driving-wheels, will pull 1,000 tons gross on a level, and on 1, 2, and 3 per cent. grades will pull 25½, 12½, and 7½ per cent. of that load respectively; a consolidation engine, with 94,000 pounds on the driving-wheels, will pull 2,740 tons gross on a level, and on 1, 2, and 3 per cent. grades will pull 26¼, 13½, and 8 per cent. of that load respectively. In some heavy freight- and switching-engines the entire load is upon the driving-wheels, consolidation locomotives having usually 85 to 88 per cent., Moguls 80 to 85 per cent., standard American passenger locomotives 60 to 70 per cent., "double-enders" about 50 per cent., and fast passenger locomotives as little as 35 to 40 per cent. of their total weight upon the driving-wheels.

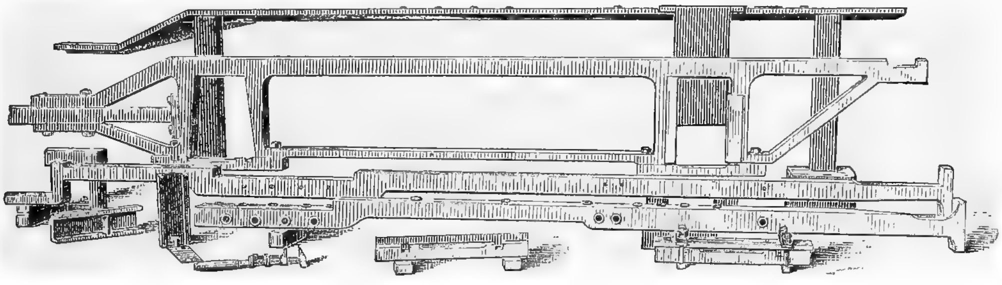
The endurance of an engine in service is very great, but the necessary repairs will average from 1½ to 6 or 7 cents per mile, according to service. Steel tires last six or seven years before wearing out. In the transitional stage of locomotive building, engines capable of much longer service were not infrequently broken up, laid aside, or made over on account of the introduction of improvements in design. At present the high quality of material and of workmanship promises a degree of endurance which will require many years to ascertain, and the uniformity of parts cannot fail to lessen the cost of repairs. It must, however, be remembered that the service required of a locomotive is much heavier and more exacting than it was ten years ago, cars often being loaded twice as heavily, and the weight of trains actually drawn averaging nearly twice as heavy for the same size of locomotive.

The present American locomotive may be fairly considered an established criterion of excellence. It is characterized by accuracy and beauty of workmanship and strength, combined with flexibility and adaptability to many difficult conditions of service—an adaptability which has given it the precedence where such conditions have to be met. Although the great demands of railroad traffic and travel in this country have absorbed the greater part of the product, American locomotives have been supplied to foreign countries using railroads in such numbers as to make them an important factor in the extension of facilities of travel and communication abroad.

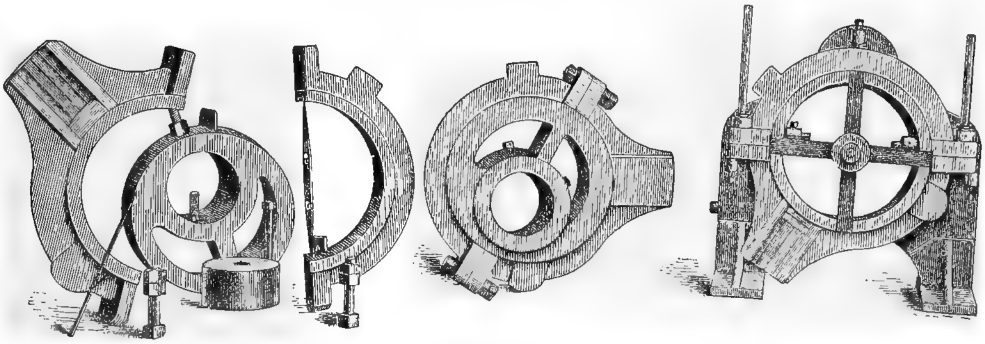
The manufacture of locomotives in locomotive-works is so far based upon the use of costly and partly-finished materials that the additional labor and expense involve less than half the value of the final product. The iron and steel plates, steel tires, sheet-brass and iron, copper pipe, smoke- and feed-pipes, chilled wheels, bolts, rivets, hardware, fittings, boiler-tubes, flues, and other materials are in themselves costly products, and some of the forgings and the steel and iron castings are often produced for the work by separate establishments having special facilities. On the whole, the raw material, properly speaking, has its value more than trebled before it is brought into the locomotive-works as material for the manufacture. In comparing the manufacture of locomotives with the manufacture of small engines or of sewing-machines, where the value of material in locomotive manufacture is doubled, in that of small engines it is nearly trebled, and in sewing-machines quadrupled; but in locomotive building the same increment of added value requires the employment of a considerably greater number of artisans (at similar rates of wages) than are employed in the manufacture of small engines; principally because the prices of locomotives are ruled by the wholesale purchases of large railroad corporations, while the prices of small engines and machinery are ruled to a great degree by small buyers making single purchases. In short, in the manufacture of locomotives, the cost of putting the product upon the market is reduced to a minimum, and of the same added value given in the manufacture and marketings about 50 per cent. additional goes for the employment of artisans in locomotive building, as compared with the general manufacture of steam-engines. The composition by weight of the various crude and finished materials in a locomotive and tender weighing about 45 tons (net) may be stated as follows: About 32 per cent. pig-iron, 18 per cent. bar- and hammered-iron, 9 per cent. boiler-iron and steel (about one-fifth of which is for the fire-box), 8½ per cent. steel tires, slides, springs, and the like, 7 per cent. wheels, 7 per cent. wood for cab, tender, and lagging, 5 per cent. axles and connecting-rods, 4 per cent. flues, 3½ per cent. tank-iron, 2 per cent. lead, tin, copper, smoke-pipe, glass, hardware, and fittings, 1½ per cent. bolts and rivets, 1½ per cent. cast- and sheet-brass, and 1 per cent. sheet-iron.

The market value of a locomotive in 1880 was less than three-fourths as great as it was in 1870, the descent in value being very gradual, with the exception of a very notable rise in 1873 and a slighter appreciation in value after 1879.

These fluctuations have mainly followed the general shrinkage of money values and the fluctuations in the cost of material, influences great enough to conceal any evidences of improvement in the methods of manufacture such as might here be looked for. Nevertheless, there has been a very general advance in the details of system and machinery, which is confirmed in aggregate results of the capability of a given number of men to perform a given work. Locomotive-works have each their individual status, some having had less room for improvement at the beginning of the decade. Although interchangeability of parts is coming to be so general in almost every line of machinery, the system of gauging may still lack thoroughness, partly requiring measuring-rods and adjustable calipers, till a well-maintained system of standard gauges is secured. The character of such standard gauges is very well shown in some illustrations here adduced from the practice of the Grant locomotive works, of Paterson, New Jersey. There is shown (No. 1) a locomotive frame, with pedestals and fittings and a number of the gauges, the most noticeable of which is a long gauge with hardened bearings for drilling. In the second illustration (No. 2), showing eccentrics, eccentric straps and gauges, there is on the right a jig-frame, which is of the nature of a gauge, being a frame designed to hold a machine part while certain exact operations are performed upon it. In planing, the hardened templates used are of the sections of the forms to be planed, and limit the operation. In turning, collars and rigid calipers are commonly used. Now, while by such devices there is secured a practical uniformity in all the proper machine parts of a locomotive of the same class and make, yet, if there was not such a multiplicity of standards or different designs of locomotive, the advantages of the system would be much greater. As nearly every leading railroad and nearly every locomotive establishment has its special designs, the system is largely impaired, not through any lack of standard sizes or accuracy of workmanship, but because standard is opposed to standard, and the expense of changing designs is an obstacle to uniform standards. Thus it is the uniform system that stands in the way of its own advancement. If the locomotives of a great railroad were built without reference to any close degree of uniformity, it would be comparatively easy to gradually effect the introduction of any uniform system; but if, as is the case, that railroad already has great numbers of locomotives of a specified design and standard, the effort to bring its standard into conformity with that of any other road or of any locomotive-works meets at once another standard and a standing obstacle. On a great railroad the slightest changes in equipment are usually the subject of careful and conservative thought, because a small innovation, running through the whole equipment, becomes a serious matter of expense.



No. 1.



No. 2.

But when we consider how large a proportion of the whole railroad service is engaged in the work of railroad repair-shops the importance of a uniform system of standard locomotives becomes sufficiently obvious. On this subject I quote the following from the circular of the Baldwin locomotive works:

> By its means the expense of maintenance and repairs can be reduced to a minimum. A limited stock of duplicate parts, either ordered with the locomotive or at any time thereafter, can be kept on hand by the purchaser and drawn from to replace any worn-out or broken part when required. Repairs can thus be made in the shortest possible time, and the use of the locomotive lost for only a few hours or days, or not at all. The first cost of duplicates will be much less than the cost of manufacture in the shop of the railroad company; in many cases it will be less than the cost of carrying the stock of raw material necessary for the purpose; while if the line is equipped with a limited number of classes of standard interchangeable locomotives, the quantity of duplicates necessarily carried in stock will be small and comparatively inconsiderable in the amount of capital represented. Much of the ordinary outlay for shops, machinery, drawings, and patterns can be saved, and the necessity of maintaining for the purpose of repairs a large force of skilled workmen at a constant expense may be in great measure obviated.

Without uniformity of parts repairs of locomotives, like any other species of tinkering, are costly out of proportion to the original expense of manufacture. As the requirements of a railroad in the matter of repairs vary greatly from time to time, the surplus force of skilled workmen, which must be maintained to meet contingencies, is usually employed in the building of locomotives, many repair-shops turning out a few locomotives per month or per year.

But while the advantages of the uniform system might be of still greater avail in the economy of railroad management in the manufacture of locomotives, this system has within the past twenty years wrought a great change, improving the product both in quantity and in quality, securing a more economical division of labor, putting the more skilled work into the hands of fewer men, and preserving administrative conditions of order and simplicity.

The advantages derived may not appear great in descriptive detail, but they are by no means small in the aggregate. It may be said of machine work in general that the following were some of the evils to which the old methods of working were strongly liable: The lack of uniformity began in the drawing-room. The drawings were of various shapes, sizes, and scales, and when sent to the blacksmith-shop would often become so singed and discolored that new ones had to be made. In the machine-shop the machinist would need to be skillful in interpreting the drawings, and when in doubt as to the meaning of lines or figures intended for other parts of the work, or as to discrepancies between figures and scale, he would need to consult the foreman or the draughtsman. No two men will measure exactly alike with a graduated rule or an adjustable pair of calipers capable of being sprung, and when these are used slight discrepancies will occur. And so when it came to the erection of the work, filing and fitting and making over, and perhaps conferences of the various fallible parties to apportion the blame for mistakes, were not unusual. Old castings and materials were often left lying about the shops, to the inconvenience of skilled workmen, and the whole work was carried on with trial and fitting and the apprehension of occasional mistakes.

In contrast is presented the following outline of the system pursued at the Baldwin locomotive works, where the interchangeable system was introduced about 1860. Standard office drawings to a uniform scale, with all parts figured, are first made of any new design proposed to be manufactured. Small sketch drawings, mounted on pasteboard and shellacked, are furnished to the pattern-makers for castings, to the machinists for each finished part, and to the erecting shops to show the relative positions of parts only. These cardboard sketches are on uniform sheets, and are carefully numbered and recorded, with all necessary reference to the engine to which they refer, in a considerable system of book-keeping. They are given out as the work demands, and are required to be promptly returned to the accountant on its completion. But the drawings for the blacksmith-shop are so liable to become destroyed that, with a view to this, they are made on tracing material, and the record is preserved in the original of the tracing. Each sketch, before being given out, is examined and verified by three men, the measurements which concern the work of each class, and these only, being figured on the sketch, which is not generally drawn to scale. The gauges are made in a gauge-tool shop, which constitutes a separate department. From this shop the gauges are furnished as drawings are furnished from the draughting-room, and to it they are returned for comparison with standards. The calipers, rods, and templets made for the work in the gauge-tool shop are the only standards of measurement allowed in the machine-shops, no graduated rules or scales being used. Most of the machinists have only to work to the templets given them, and cannot possibly misunderstand or make errors. All the bolts, fittings, and small parts for a particular engine are kept in a separate cupboard, in readiness for assembling, and are interchangeable for the same class of engines. It is the duty of one class of laborers to remove to their proper places all refuse pieces of material which may be left about on the floors of the shops, and to keep all material stowed away with economy of space. In short, the whole system is so ordered that each man has a simple work to do, in which he is unfettered and unhampered, and in which it is scarcely possible for him to err. No mistakes are made, nor is time or material wasted. These considerations are so valuable that in large works the saving in such a system, displacing less thorough and orderly methods, may be rated in the labor of hundreds of men.

At the Baldwin locomotive works all parts of the locomotive are made interchangeable, except the fitting strips for the boilers. It was formerly regarded impracticable to make check-pipes and valves interchange, on account of the variation in the length of the boiler; but they are now made interchangeable by starting measurements uniformly from one end of the boiler. Valve-gears are made interchangeable to the setting of the valve. The eccentric straps are drilled to templet, and the work would generally interchange, but as a precaution the eccentric is drilled with the strap fitted. The frames are planed and slotted to gauges and drilled to steel-bushed templets; the cylinders are bored and planed to gauges; the steam-ports, valves, and chests are finished and fitted to gauges; and the tires are bored to gauges. The centers are turned, and the axles are finished to gauges; every bolt is made to gauge, every hole is drilled and reamed to templet, and the cross-heads, guides, guide-bearers, pistons, connecting-rods, and parallel rods are finished in a similar manner.

At the Grant works the ports in the valve-seat are milled to size by a cutter from a gauge which is bolted upon the valve-seat. This cutter works in a block, which slides in slots in the gauge corresponding to the ports. The guide-blocks also are faced off in a special chuck (which receives a full set) to an exact thickness. Some parts of the work are finished by jig-filing to hardened templets.

In respect to capital required, it will be found in general, although with the exceptions to which this item is specially liable, that if the number of operatives be taken as a basis of comparison the capital reported will range somewhat less for locomotive building than for the wholesale manufacture of certain classes of smaller mechanism, such as sewing-machines, fire-arms, and small steam-engines. The capital required in a manufacturing business may be classified into that necessary for carrying stocks of material and finished goods, for the cost of real-estate plant and of machine plant and power and the floating capital necessary to cover the conditions of trade, and the payments for labor and expenses until the avails are realized.

In locomotive building the cost of carrying material is a large item, but in point of fact, as far as the mere weight is concerned, a single operative will on the average turn out nearly as many thousand pounds product in a large sewing-machine factory as in the locomotive-works, and although the material is more costly in the latter case no finished stock has to be carried.

As to machine plant, the power per operative will not average much greater for the locomotive-works than for a sewing-machine factory (perhaps one-third horse-power per operative in one case and one-fourth horse-power per operative in the other). The estimated value of machinery per operative is often greater in sewing-machine than in locomotive work. As to real estate, where a given acreage suffices for the turning out of a given weight of locomotives, the same acreage is found to be utilized by the larger sewing-machine factories in turning out a less weight of sewing-machines, and in some instances a less value and less than half the weight for the same area of floor space.

And, finally, in the marketing of goods, the maintenance of agencies and city offices, and the contingencies of trade, the manufactures of smaller mechanism often require a capital which places the aggregate beyond the requirement for locomotive building.

Taking as an approximate unit of comparison a standard eight-wheeled engine of the American type, with tender, the engine weighing about 30 tons net, and being worth in 1880 about $8,000, we may estimate for the various functions of locomotive manufacture under the usual range of work that to make 100 locomotives per annum will, on the average, require about six (generally between five and seven) men per locomotive, and that about 28 per cent. of the operatives will be occupied in erecting (including some fitting, finishing, wood-working, cab-making and common labor, but not including boiler-shop work), about 17 per cent. in the foundery (including the laborers, who will constitute a large proportion), about 22 per cent. in the machining (including machine-tool work in the erecting-shop, but not the machining of boilers), about 10 per cent. in the forging (exclusive of boiler work), about 14 per cent. in boiler and tank making, and about 9 per cent. in clerking, teaming, and general and unspecified service. It should be said, however, that these proportions vary greatly from the different ranges of work and conditions embraced in the manufacture, and that it is not easy to draw a definite line between some of the departments, nor to eliminate the uncertain factor of common labor. Increased efficiency appears to result more from improved general system than from devices of mechanism, the gain in erecting and some other branches of the work being so great in some cases as to leave the machining a greater percentage than before. But the saving in labor in some actual cases has been from one-fifth to one-third, as evidenced by various methods of comparison.

The number of locomotives produced per annum per acre of plant is found to range from 20 to as high as 50, and three or four operatives (all included) may be estimated per piece of power machinery and about one horse-power per power machine, about two-fifths of the power being for steam-hammers.

FOUNDERY WORK.—In heavy foundery work there has been no such notable improvement as in the casting of light hardware. In locomotive-works comparisons between the same foundery in 1870 and in 1880 are not always significant, since steel and other castings may be manufactured at separate establishments, and while the output in locomotives is increased the foundery may not be proportionately enlarged. Cast-steel, which is usually made by separate concerns, is coming into more extended use, displacing cast-iron, on the one hand, on account of its threefold greater strength, and displacing difficult wrought-iron forgings on the other, on account of its less expense. Cross-heads, rocker-arms, wrist-pins, links, and blocks are very commonly made of cast-steel and purchased as material for the work in the form of manufactured castings, not costing half as much as forgings for the same parts, and being so much closer to size that there is also an economy in the machining. Steel castings for these purposes range at about 10 cents per pound. Within the past few years steel cross-heads have very generally displaced cast-iron cross-heads. Springs are of cast-steel. Tires were formerly made of wrought iron, turned and welded; but cast-steel tires are now used, being first cast, then punched and hammered under the steam-hammer, then hammered upon the beak of an anvil to bring them to size for rolling, three rolls being employed, the central and largest one carrying the tire, while the others roll upon it. The advance in the use of cast-steel, it may be here observed, has been common to many manufactures. In 1831 it displaced double shear-steel for sword blades (in the practice of the Ames Company), and over ten years later began to be used in the manufacture of fire-arms, in which it has now displaced wrought-iron to a great extent. In agricultural implements (notably in plows, in which it was used at an early date) and in machine parts its use has been continually advanced, and since 1860 it has had a steady growth in locomotive building, as in other manufacturing.

In some cases the foundery facilities of locomotive-works are partly applied in making heavy castings for turn-tables and other work, so that the weight of lump coal and pig-iron (with due allowance for wastage) appears in excess of the weights that would be required in the castings of the locomotives turned out. For a standard passenger locomotive the weight of iron castings may be reckoned at a little over a third of the total weight, or, to give it roundly, for a 30-ton locomotive the weight is 11 tons net, of which a large proportion is in the wheels and the two cylinders and half-saddles, the balance being made up in the weight of eccentrics and straps, mud-hole plates, smoke-box front, dome and sand-box bases and tops, smoke-stack base, pedestal wedges, saddles and seats for springs and trucks, glands, steam-chests and covers, piston-heads and followers, shaft stands and brackets, axle-collars, boxes, counterbalance weights, dry pipes, T-pipes in smoke-box, slide- and throttle-valves, coupling castings, mud-rings, grates, roof-ribs and furnace castings, and sometimes pumps, cross-heads, and other parts. The average weight of metal cast per day in locomotive founderies is observed to be about 75 pounds per operative per day, which would require about 100 men to make the castings for 100 locomotives per annum.

Cylinder iron is sometimes specified as Lake Superior charcoal. Grades of American iron from native ore furnish castings of great excellence for various purposes. Cylinder iron is hard, being commonly of a mixture of the grades known as No. 2 and mottled, No. 3 being the hardest grade usually run out of the furnaces, which will sometimes run one grade of iron and sometimes another. The pig-iron is sorted to insure the flowing of the desired grade from the foundery cupola.

FORGING.—Of the wrought-iron used in locomotives, the heavier parts, such as the frames, axles, and connecting and piston rods, are commonly of hammered iron, the lighter parts, such as truck-frames, roof ribs, bolts, and rock-shafts, being made of bar-iron. But of the aggregate weight of wrought-iron, exclusive of plates, sheets, bolts, rivets, and tubes, the greater part is of bar-iron. In the early history of locomotive manufacture a blacksmith was not able to weld a piece of iron upward of 2½ inches in diameter, but since that time there has been a great growth in the facilities for forging.

Some parts of locomotives are, as staple goods, largely merchantable in a more or less finished form, and improved facilities may sometimes not only effect a greater division of labor among the men of a factory, but in a wider commercial sense among parties and companies. This, however, for locomotive building, should not be overstated, as the great body of the work remains intact, and any diminution of work which may result from such causes is more than compensated for by the greater requirements of finish and workmanship. Each manufacturer is disposed to make all the parts of his machine, where a specially large investment is not required. If, for example, locomotive-works were capable of consuming the entire product of a rolling-mill, it might profitably be established as a department of the works; but since such an establishment would generally involve the general manufacture of boiler-plate and sheet- and merchant-iron, it is left in separate hands. The manufacture of cold-rolled iron, which illustrates this point, deserves some mention in this connection. The superiority of this material as compared with ordinary turned and machined wrought-iron is sufficiently established by a series of tests made by Messrs. Whipple, Fairbairn and Wade, and more fully by Professor Thurston, showing it to be from 25 to 40 per cent. more tenacious, 50 to 80 per cent. stronger in ultimate resistance under transverse stress, 80 to 125 per cent. stronger in resistance to permanent set, whether of twisting, tension, or bending, and much more capable of enduring shocks, and more uniform in strength and density. While the introduction of steel, cold-rolled iron, and other improved materials is, so far as these materials are made by outside parties in partly-finished form, a guarantee of the better quality and endurance of locomotive work, the manufactory is obviously relieved of this portion of its duty. The use of cold-rolled iron saves some forging, and even lessens the work of machining, as it may be more easily worked than hot-rolled iron, and for round section and other forms of bar may be rolled exactly to gauge, requiring little further preparation. It is now made as large as 4½ inches round, and is applied for a few locomotive parts, such as guide-bars and pump- and piston-rods.

While in the special manufacture of large forgings, such as axles, upward of 400 pounds of forgings are sometimes turned out per operative per day, in the forging-shops of locomotive-works the forgings, large and small, will average about 80 or 90 pounds per operative, and there are about two-thirds as many fires as blacksmiths. Such forgings as axles, rods, and shafts, which, from their regularity of form, can be easily hammered or rolled, are made cheaper than steel castings.

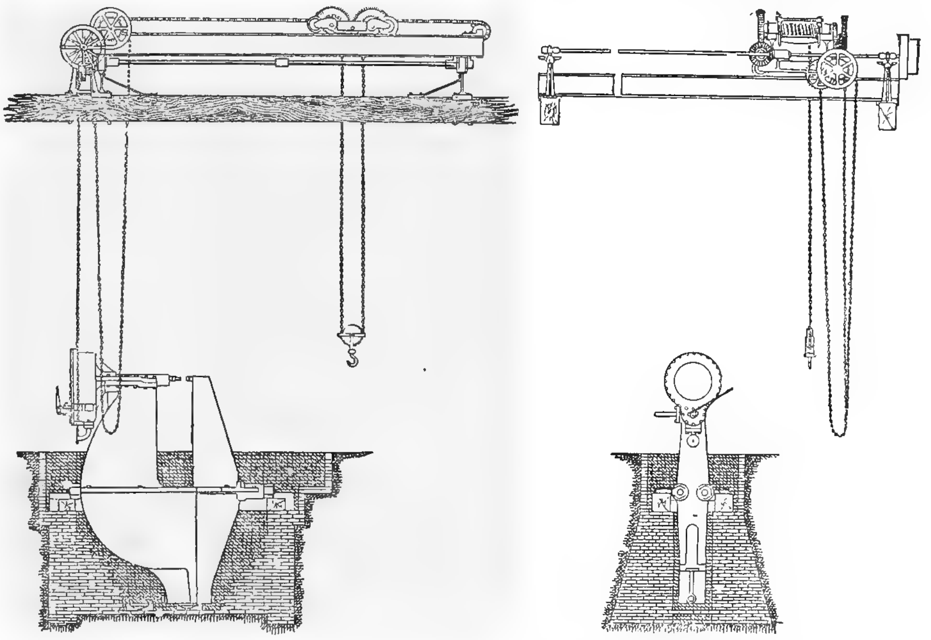
Blacksmithing, on the whole, involves more skilled labor than any other department of the work. The weight of steam-hammers in active use ranges near 145 pounds per operative in the blacksmith-shop for a number of works, 10 or 12 horse-power being required per ton of hammers, and about 24 tons of soft coal, for blacksmithing and boiler-making, are required per locomotive produced. Such statements as these may serve to convey tolerably correct ideas, but the conditions are so diverse in all this class of work that it is difficult to find any fact or ratio which can be stated as the invariable rule. Of two locomotive-works of almost the same capacity, one may, for example, be equipped with much heavier hammers than the other, and, so far as can be estimated, may, from the character and condition of its machinery, consume a very different amount of power.

BOILER AND TANK WORK.—In boiler and tank making about 60 pounds of material, boiler- and furnace-plate, tank-iron, tubes, bolts, and rivets, will be handled per operative per day. The barrel of the boiler is usually specified to be of the best cold-blast charcoal-iron, although sometimes it is of flange-iron or of steel. English locomotives are generally built with fire-boxes of copper, which, although more costly, is considered by American builders as inferior to a proper steel. Steel fire-boxes began to come into general use ten or twelve years ago.

Formerly either copper or laminated iron (made by rolling three plates together) was used. Such iron had a sufficient tensile strength, and was used in wood-burning locomotives, but would not suffice for the fire-boxes of coal-burning locomotives, on account of the imperfect welding, unequal expansion, and the strain between the plates. This was in some degree remedied by hammering the iron before rolling, but steel was found to answer the purpose better. Crucible steel was first used, afterward Siemens-Martin steel. The foreign steel was found to work less satisfactorily than the American, being of too high a grade and containing too much carbon (about one-fourth of 1 per cent.); but the American manufacturers began to produce a low steel, containing from one-sixth to one-tenth of 1 per cent. of carbon, and sometimes called homogeneous iron, which, on account of its uniformity and excellence of quality, was found especially adapted to the requirements of locomotive work.

While all steel sheets for fire-boxes or boilers are required to be thoroughly annealed before delivery, those which are flanged or worked in the process of boiler construction are usually annealed a second time before riveting. Longitudinal joints are generally double, bias joints triple, and straight cylindrical joints single riveted, the spacing ranging from 1¾ to 2 inches for ¼ to ⅜ inch boiler-iron and ⅝ to ¾ inch rivets.

The plate work is principally comprised in the machine work of rolling and shearing plate, punching, drilling, riveting, and plate-planing, and the bending, flange-turning, rivet-heating, and hand-riveting, the fitting and setting up of the boiler, and the calking. The skilled trades in the work may be esteemed of two grades, the boiler-making, or fitting, and the flange-turning ranking first in point of skill required, and the hand-riveting and calking second. In hand-riveted work the riveters and calkers will each outnumber the flange-turners three or more to one, and there will be one rivet heater (usually a boy) to every two riveters, and about as many ordinary helpers or laborers as rivet heaters. Locomotive boilers are, for the most part, riveted by power. The boiler is suspended from a traversing crane or hoist, and upward of five or six rivets may be placed in a minute. With a permanent steam riveting-machine on light bridge iron thirteen or fourteen rivets can be placed in a minute, but this is too fast for boiler work, and the boiler cannot be swung into place and the rivets set with any such rapidity. In the plain work on boilers, when done by hand, the boiler is rested horizontally in chains over a beak, and shifted from rivet hole to rivet hole by moving the chains. Two men will in this way place a rivet in two minutes. In other special hand-riveting, with one man holding a heavy hammer as anvil within the boiler and two men striking, as much as five minutes is observed to be occupied in placing and hammering the rivet. In general, as compared with hand-riveting, the advantage of power-riveting is upward of fivefold in the matter of speed, beside producing a better quality of work. An illustration is given (No. 3) of a steam riveting-machine, with crane or hoist, and fixtures for hanging a locomotive boiler. An illustration is also given (No. 4) of a riveter built by William Sellers & Co. Compressed-air riveters are used with similar advantage.

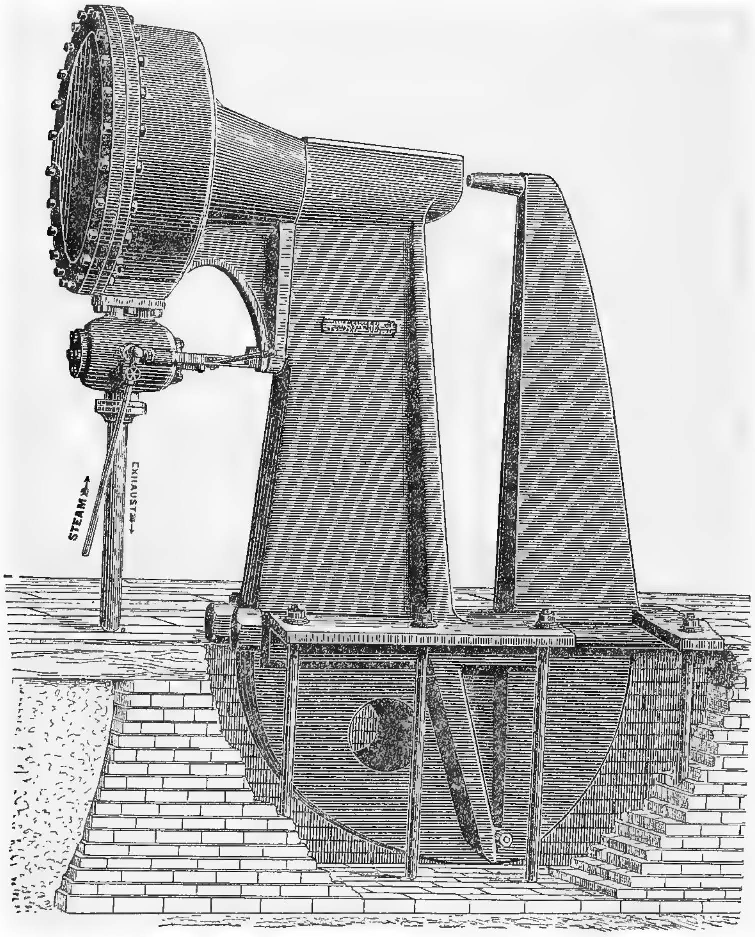

No. 3.

An illustration is given (No. 5) of a labor-saving arrangement for punching plates. This machine is driven by fast and loose pulleys, and has a clutch for starting and stopping the head. The punch-lever is actuated by a cam moving on a friction roller, and is connected with the punching slide by vibrating links, with adjustment for wear. A device called a stripper, adjustable to any thickness of iron, holds the sheet while being punched. The table, as shown, will hold iron under 15 feet long, and of any practicable width. The automatic movement of the table is effected by a screw, placed diagonally in the bed, moving the table by a nut fitted to slide in a transverse groove, the obliquity of which may be changed at pleasure, so that any spacing under 3 inches can be obtained automatically, and so correctly that two sheets so punched may be rolled into cylindrical form and the holes will exactly coincide for the fitting. This machine will punch 14 or 15 holes per minute in ¾-inch iron. In punching heavy plates some form of table, chain support, or rest is necessary, but the plate is often moved by hand. Plates are often held by chains from a crane and fed forward by hand. Five men thus holding a rather small ⅜-inch plate (one of them also throwing the punch-press in and out of gear) were observed to punch 18 holes in a minute.

An illustration is given (No. 6) of a multiple drill for drilling boiler-plate. These multiple drills are built with from 12 to 20 spindles, and with this amount of spindles will, upon plain work, drill the holes about as fast as they can be punched, leaving a smooth, clean cut, and the strength of the iron unimpaired. The drills may be accurately spaced by means of stop-gauges, and the spindles may be adjusted separately for different lengths of drills, although all are brought into action and reversed by the movement of a single lever.

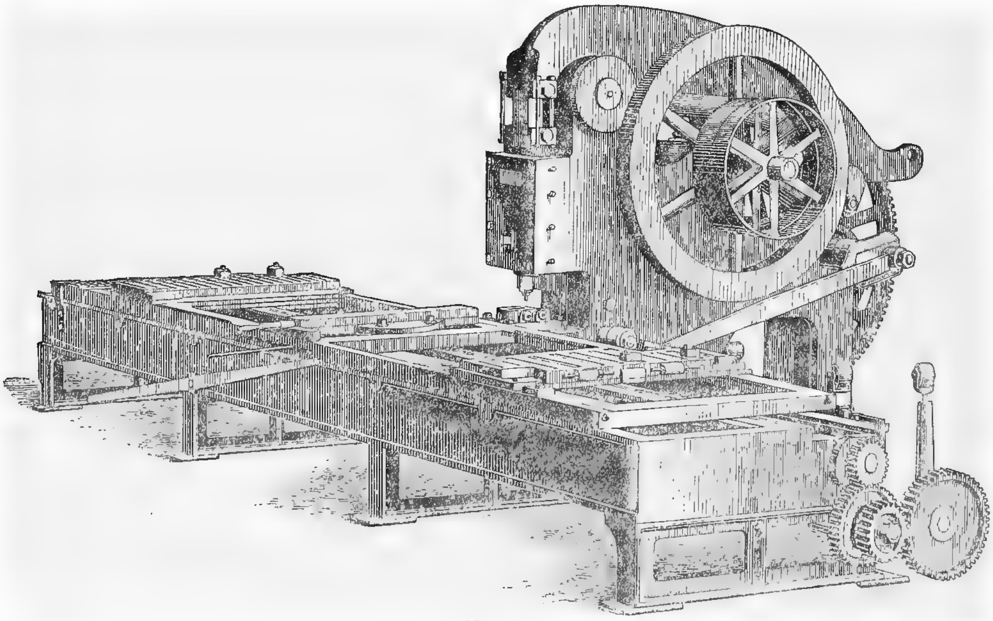
One of the most notable labor-saving machines that has been introduced into locomotive work is the Bement plate-planing machine, shown in the illustration (No. 7). It is necessary to chamfer or bevel the boiler-plates before calking. Prior to the introduction of this machine the work was done by workmen chipping with hammers and chisels. This machine, with one attendant, will plane plates 15 feet long and 1 inch thick, from one to three tools being carried on the traversing carriage, and will do the work formerly done by fifteen men with hammers and chisels. A 15-foot plate may be planed in ten minutes, and on rough work three or four plates are planed in an hour.

MACHINING.—While in some species of forged work, where dies and rolls can be conveniently used, the forgings are made closer to the required form than was the previous practice, in common shop forgings the reverse is the case, the metal-working machinery now in use handling and working the material with so much greater facility that the forgings need not be brought so closely to size. Thus it is, within limits, more profitable to machine them than to forge them down to size, and we have an economy in one department effected at the expense of another, although in the multiplicity of other conditions it might be useless to seek for the evidences of such minor tendencies in any general statistics.



No. 4.

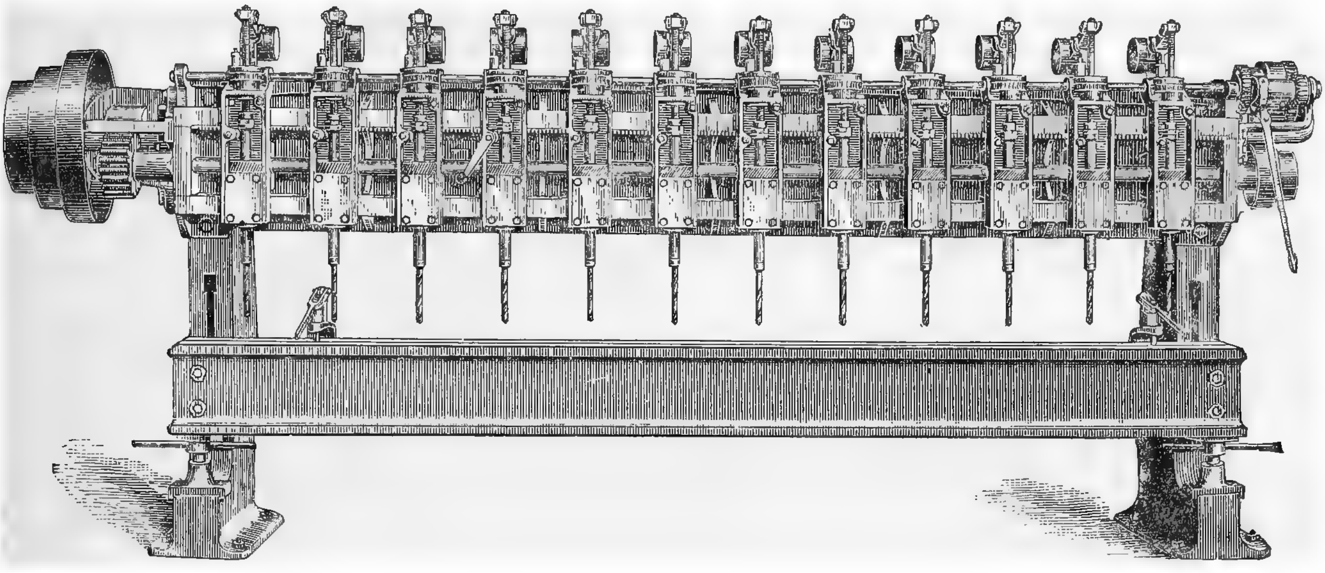
A piece of mechanism is not a precise unit, and statements regarding the numbers of machines constituting a plant are of little account without a pretty full understanding of the nature and efficiency of the machinery thus enumerated. The number of operating tools is another basis of enumeration, but is scarcely more definite. A tool to a machine is the common ratio, but many of the improved planing- and turning-machines rest their essential merit upon the labor-saving and the speed resulting from the simultaneous operation of from two to five tools. The percentages of the different classes of machinery constituting a large plant are found to be 28 per cent. planing- and slotting-machines, comprising large, medium, and small power planers, pony planers, link-curve planers (which might be rated as turning-machines), slotting-machines, and special frame-slotting machines; 26 per cent. turning- and boring-machines, comprising wheel lathes, axle lathes, large, small, and medium power-feed lathes, hand-feed lathes, cylinder-boring and vertical turning- and



No. 5.

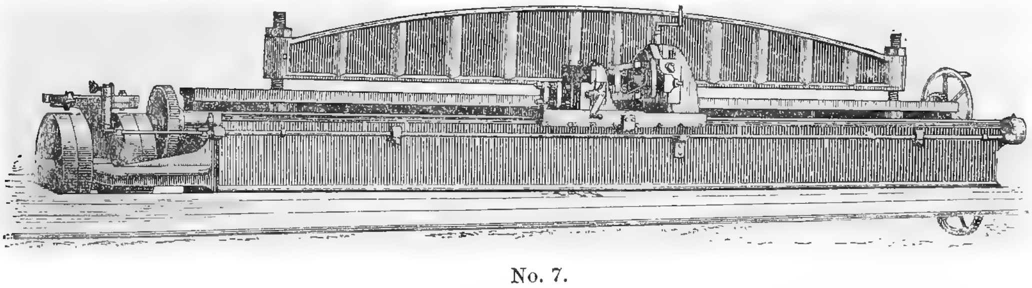
boring-machines; 13 per cent. drilling-machines, comprising drill presses and traverse drills; 12 per cent. power presses (exclusive of shearing, punching, and riveting), cranes and hoists; 5 per cent. punching and riveting presses; 5 per cent. screw-cutting machines; 3 per cent. grinding and polishing apparatus; 3 per cent. forging machinery, comprising steam-hammers, sets of rolls, and bending and bolt-forging machines; 2 per cent. power shears; 2 per cent. wood-working machinery; 1 per cent. milling machinery. In many cases the turning- and boring-machines would outnumber the planing- and slotting-machines.

The number of operatives per power-machine in locomotive-works ranges from five to three. The number of men per machine in the machine-shops has in some shops been greatly reduced within the decade on account of improved machinery and system, and the introduction of improved machinery has been a source of increased productive efficiency. The power required will usually average about three-fourths of one horse-power per power machine, exclusive of steam-hammers.


No. 6.

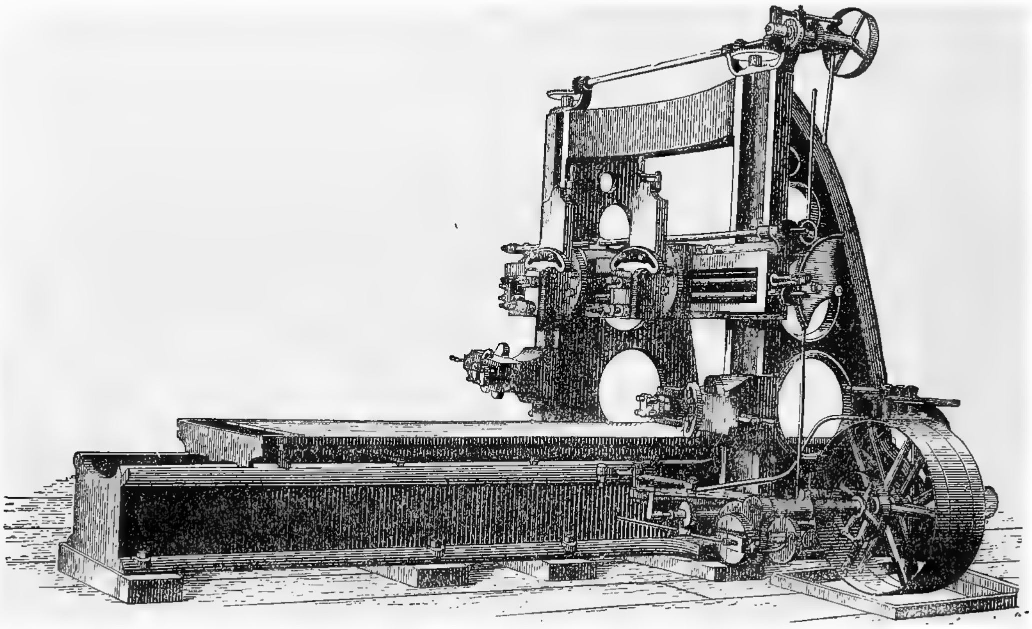
In the planer, of which an illustration is presented (No. 8), three or four tools operate simultaneously, and in some instances, in actual practice, three times as much is done as can be done with an ordinary single-tool planer.

A machine more specially characteristic of locomotive work is the locomotive frame slotting-machine, shown in the illustration (No. 9), and which may be seen at any of the large locomotive-works. This standard machine has two opposite heads and saddles traversing a 24 to 36 foot bed. The maximum stroke is 16½ inches, and each head may be independently driven with two speeds, the movement of the saddles upon the bed being independent of the driving and feeding. The longitudinal and cross feeds are independent and variable, and the cross-slide can be set at a sufficient angle for slotting the inclined edges of jaws and pedestals. The saddle has a clear area of 34½ inches across by 17 inches vertically, so that two frames may be piled together and slotted at one operation.

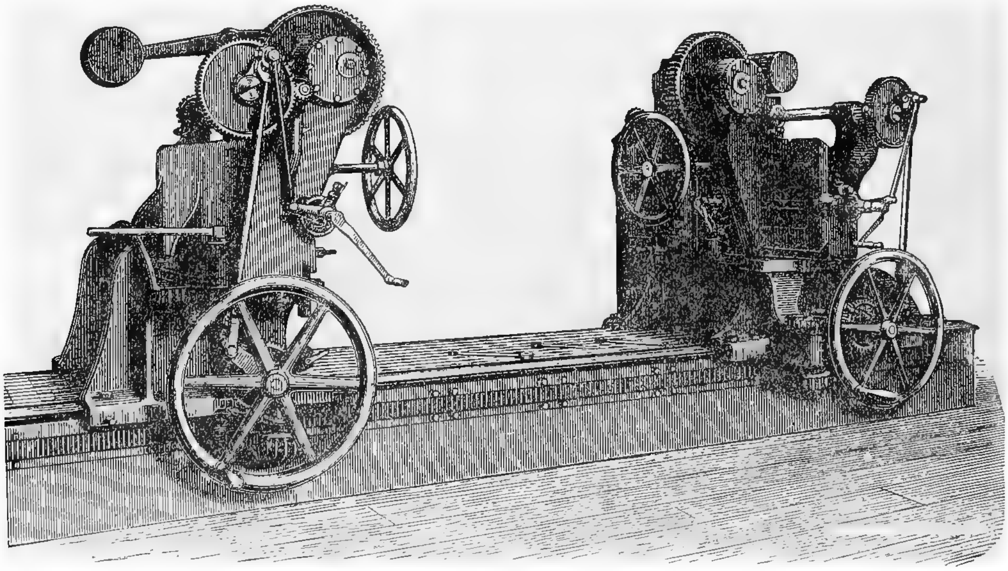

No. 7.

In slotting locomotive frames the advantage in the use of this machine is at least four to one, as compared with the use of ordinary slotting-machines. One of these machines has a capacity of one pair of frames for an engine, class 8 to 30 D (Baldwin's locomotive works' designation for an eight-wheel, 18-inch cylinder engine, with six driving-wheels, "Mogul" type), in twenty-one hours, and for an engine of class 8 to 30 C ("American" type) in fifteen hours. In general, it may be said that locomotive frames are more solidly built than formerly, although the front end of the frame is commonly made fast to the pedestals by bolts, so as to facilitate taking apart for repairs. The frames are first planed to templets in horizontal planers, and are then slotted.

As locomotive building antedates the introduction of power planers into this country, the plane work on the earliest locomotives had to be done by chipping and filing, hand-planing, and slabbing. Probably the earliest power planer built in the United States was in the fall of 1839, at Chelmsford, Massachusetts, where it is still doing good service at the shops of Messrs. Silver & Gay. This great tool was justly considered a wonder of the time, planing 22 feet long, 3½ feet wide, and 3½ feet high, and was used in making machinery for the Concord railroad shops and for the shops of the Erie railroad at Dunkirk. The slides were set upon stone blocks faced with iron plate, there being one V-ridge and one plane-slide, as it was then out of the question to make two V-guides true enough to work together. The V-guide was itself planed by the use of a temporary wooden carriage. The upright slides were chipped and filed, and as it was impracticable to make both sides parallel one pair of slides was brought to a true plane, while the variations in the other were compensated by heavy semi-elliptic springs upon the vertical carriage, which springs yielded to the inequalities as they slid over the less even slides. There was a heavy chain-feed, the links being of wrought-iron, with steel studs. The belt shipper was operated by a dog, acting through a long connecting rod and levers. On the reversal of the chain movement, the end arbors, on which the chain was carried, began to move in the opposite direction, which movement was shared by a halved arm, bolted upon one of them, until it struck a stud of the frame, when it slipped and stopped. This movement, by means of a connecting rod, drove a wheel, which, as a pulley, drove a tool-flip by a train of small pulleys with an endless cord, and as a disk-crank, with slot, pin, and connecting rod, actuated a vertical rack with two sets of teeth, whose gears, by click motion, effected the vertical and horizontal feeds. In all the earlier planers the V-slides were made as ridges, instead of being, as now, grooves capable of holding oil.



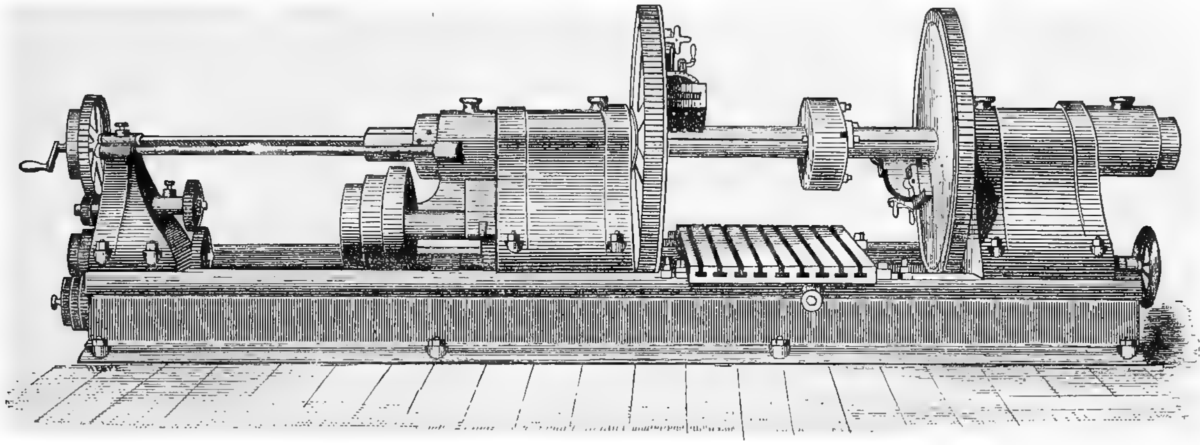
No. 8.



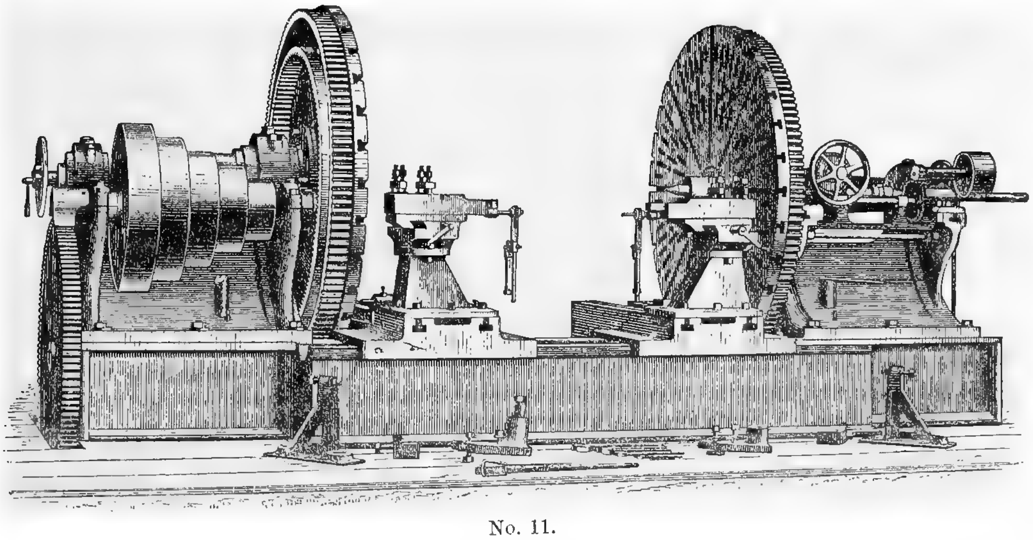
No. 9.

The account of this machine is introduced not only as a remarkable example of early achievement, but in illustration of the difficulties of workmanship in the earlier stages of the work. The advantage in labor-saving and in quickness and quality of work derived from the use of the close-fitted, accurate, and conveniently designed special tools, of which some examples are given, will then appear more manifest.

In turning and boring machinery the most notable improvement is in the Sellers cylinder-boring and facing-machine. This being a special machine for performing the special work of boring locomotive cylinders, its work may be satisfactorily compared with former and less effective methods in terms of piece-work, being capable of boring, facing up the flanges, and counterboring the largest sized cylinder commonly used in express passenger engines, viz, 18 by 24 inches, in three and a half hours. Before the construction of this machine the quickest known time for this work was nine hours, and the usual time was upward of thirteen hours in this country, while from two to four days were occupied in the work in the practice at some foreign shops, where the statements of its performance were received with positive incredulity. One cut with a fine feed takes out the greater part of the metal. While this roughing cut is being made, the sinking-head of the casting is cut off by independent slide-rests provided for facing off both ends of the cylinder, and the flanges are turned. Two finishing cuts are then run through with a feed one-half an inch broad, and the cylinder is afterward counterbored at the ends for the clearance of the piston. If the flanges are turned up separately, when no other cut is in operation, the whole work can still be done inside of five hours. The machine which is shown in the illustration (No. 10) has six changes of boring feed, with a quick hand-feed, cutter-heads to bore from 10 to 22 inches. The speed of cut on a 22-inch cylinder is 18 feet a minute for 140 revolutions per minute of 18-inch pulleys on the counter-shaft. John Anderson, LL. D., C. E., Woolwich arsenal, Great Britain, in the report accompanying an award at the international exhibition of 1876, says of the above machine:



No. 10.

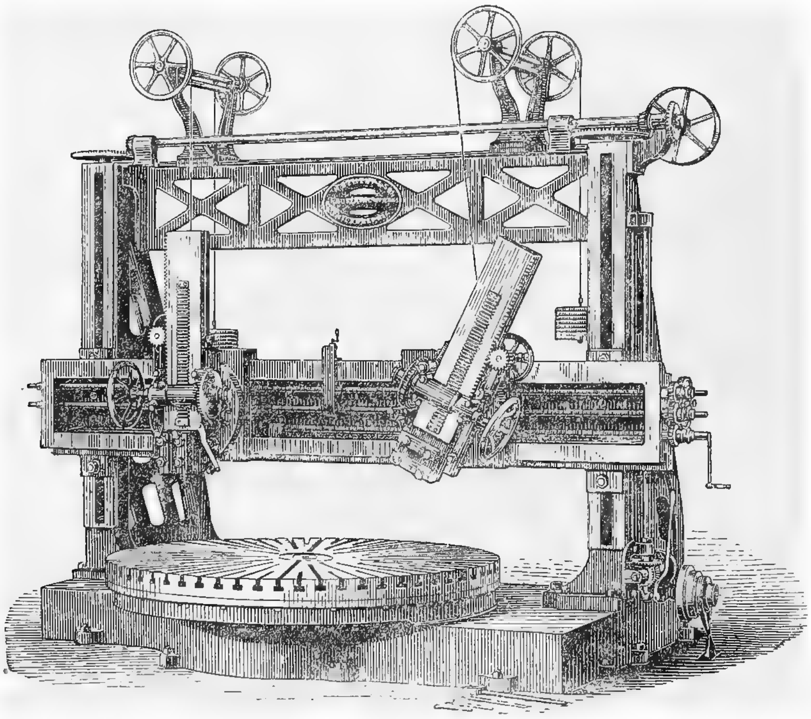


No. 11.

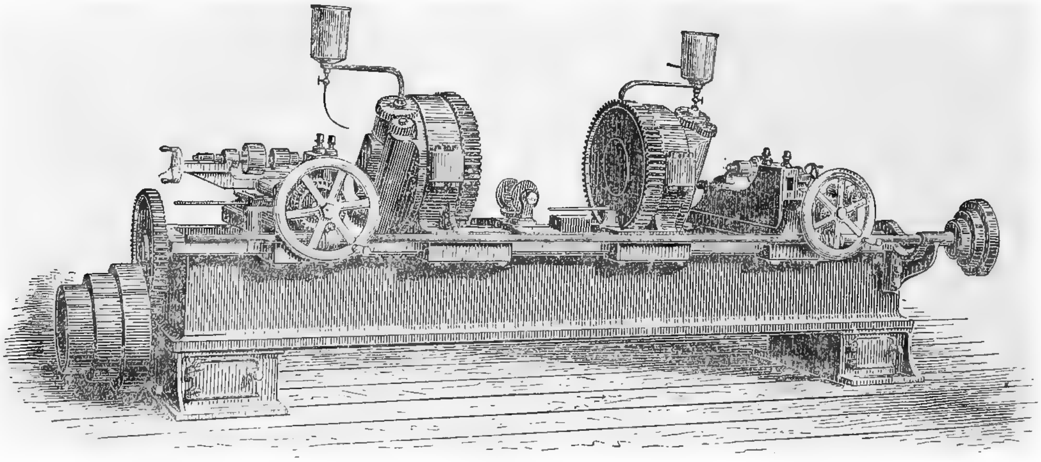
> This grand tool is an embodiment of all the tool virtues that can be enumerated, resulting in the transmission of mathematical truth and accuracy to the work performed, combined with great rapidity of execution and subsequent economy, thus realizing the highest ideal conditions. Still more, this machine is constructed in such a manner as will enable it to maintain its inherent faculties unimpaired for a long time.

An illustration is given (No. 11) of a double-wheel lathe, practically two lathes and a quartering machine in one construction. The quartering device is particularly designed for repair-shops, in which it obviates the use of a separate quartering machine. This machine has a 79-inch swing, ten changes of speed to one and five to the other face-plate, the face-plates being driven separately or together at the same or at different speeds, and the feeds being variable and self-acting at any angle, and are derived from an overhead rock-shaft, in connection with the gearing shown upon the tool-rests. This machine suffices for the turning of the wheels and tires.

The vertical turning- and boring-machine shown in an illustration (No. 12) is a tool almost indispensable in locomotive work. The face-plate has twenty changes of speed, and the feed is self-acting at all angles with four changes. An economy may generally be effected by having several tool-slides upon the cross-head, but the nature and position of the work usually limit the number of tools to two, or three at most. This class of machines dates back as early as 1850. A vertical turning- and boring-machine, capable of operating three tools at once and turning 16 feet diameter work, was built at Chelmsford, Massachusetts, in 1850, and is still in active service. The machinery at Chelmsford was at the time considerably in advance of the general usage. In 1848 horizontal lathes were used in boring car-wheels, and by this means two or three wheels were bored in a day. About this time a vertical boring-mill was introduced at Windsor, Vermont, by which three times as great an output was obtained, the present output being still greater.


No. 12.

The double cutting-off and centering machine for axles, here illustrated (No. 13), is a labor-saving machine, which, from its special application, can be compared in efficiency with the piece-work of former practice. With an attendance of two men forty car-axles can be cut off and centered in a day, both ends of the axle being operated upon simultaneously, the axle revolving in self-centering jaws. There are three changes of speed, and each has an acceleration of speed as the tools approach the center of the axis. As compared with cutting off and centering axles in a common lathe, the advantage to be derived from the use of this machine is at least fivefold.


No. 13.

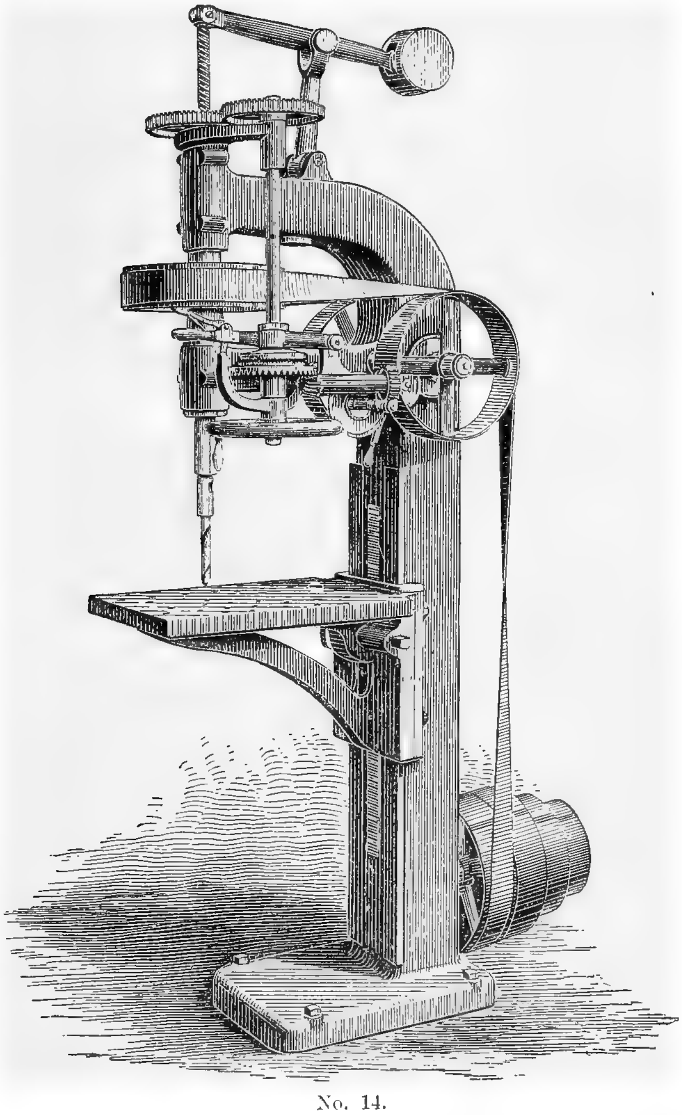
A bolt-cutter, much used in locomotive building for making bolts for accurate work, is designed to supersede the method of chasing them in a screw-cutting lathe. The bolts are placed upon centers exactly as they are secured in the screw-cutting lathe, but are threaded by running into dies. Where a skilled workman is required in chasing screws in a lathe, an ordinary hand is enabled by the use of this machine to thread from six to ten times as many bolts in the same time. The dies may be set to the required length of the thread, and will then open automatically at that point, while the bolt-carrier is thrown back to receive a new bolt. This feature, beside insuring a uniform length of cut and avoiding danger of breakage, enables one operative to tend two or more machines.

In drilling, besides the use of multiple drills, which are employed principally on boiler parts, an improvement is to be noted in the use of belted instead of the common form of geared drills. An illustration of such a belted drill is here given (No. 14). Gearing transmits power by a constant succession of shocks, which, however small, are the means of wearing out the drill. With belts the motion is smooth and without shock, so that the drills last longer and may be run at a higher speed.

The hydraulic wheel press is a machine characteristic of the manufacture, and as such is illustrated (No. 15). The primitive method of pressing wheels upon axles was by screwing up bolts upon rods. In car work, at Windsor, Vermont, in 1848, a power wheel press was built which was considered a novelty and an improvement on previous methods. It was powerful enough to double up a 3½-inch axle.

From the foregoing examples a fair idea will be derived of the nature of a machine plant for locomotive work and of the improvements which are in process of introduction, the full benefits of many of which have not yet been made available.

ERECTING AND OTHER WORK.—The work of erection, which has been diminished by the introduction of the uniform system, still requires the equivalent of upward of a year's work by a single man. "Old Ironsides" was a year in building, but in 1873, at the Baldwin works, a small locomotive was made from the raw material in sixteen working days, and in 1878 forty heavy "Mogul" locomotives were built for Russian railways inside of eight weeks from the receipt of order, the first being turned out in three weeks.

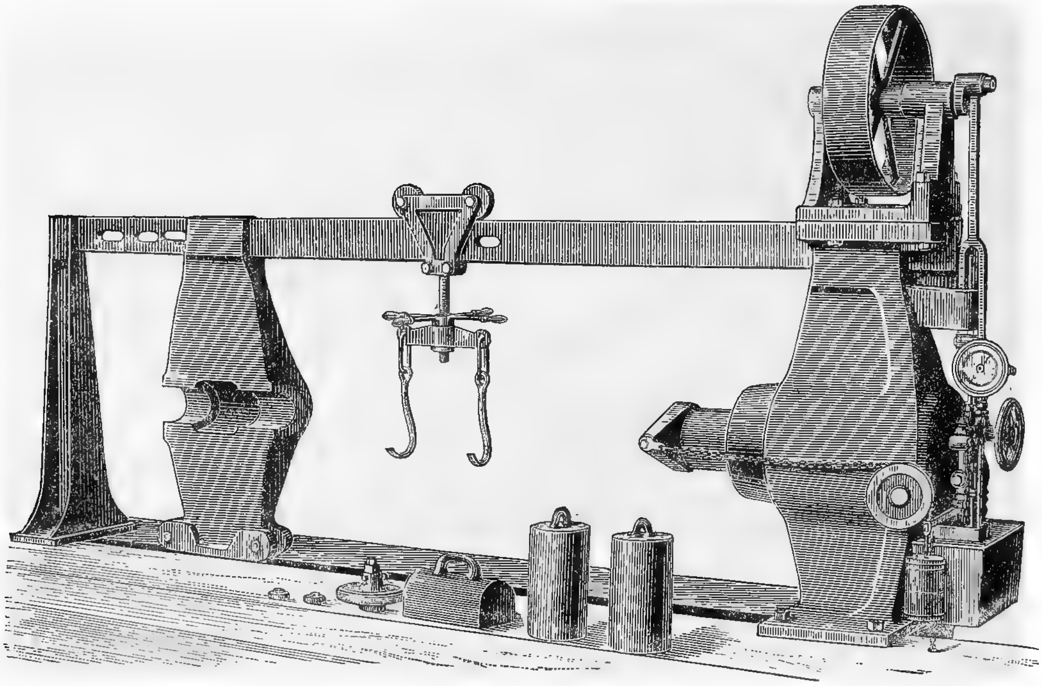


No. 14.

From the annual product and the number of locomotives in course of erection at locomotive-works something may be judged of the usual time spent in erection and finishing. This may average four or five weeks for erection and a few weeks for the preliminary work, but the time is of course varied to suit the exigencies of the case.

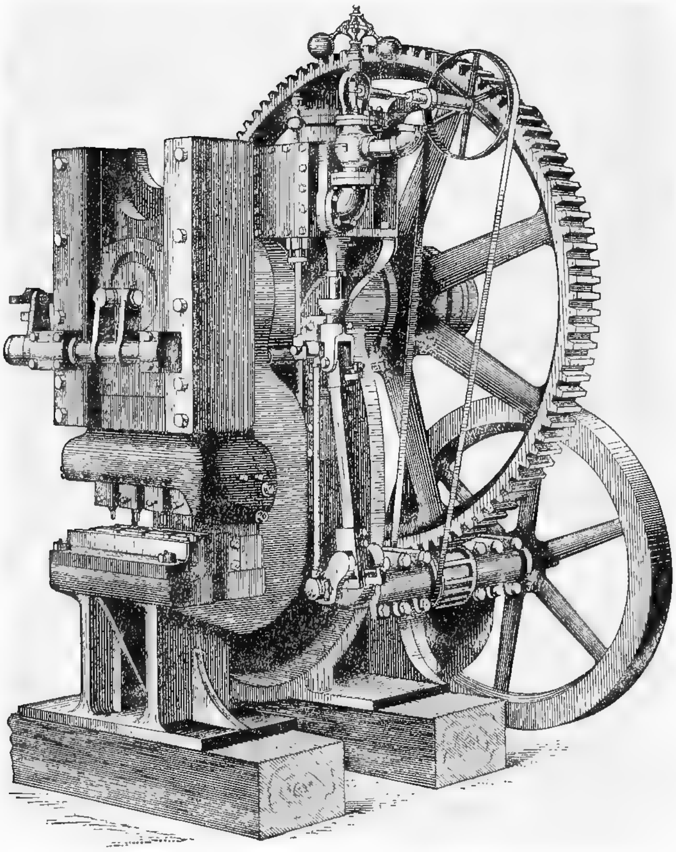
The manufacture of springs sometimes constitutes a small separate department in the locomotive-works, and the wood-working is also a small department, the small number of machines required in making the wood-work for several hundred locomotives in a year affording marked evidence of the rapidity of wood-working processes.

In general railroad repair work many labor-saving and convenient machines have been introduced, some of them, such as the special car-box drill, for removing broken bolts from car-boxes, indicating the vastness of an interest which demands special devices for convenience in such minor details.



No. 15.

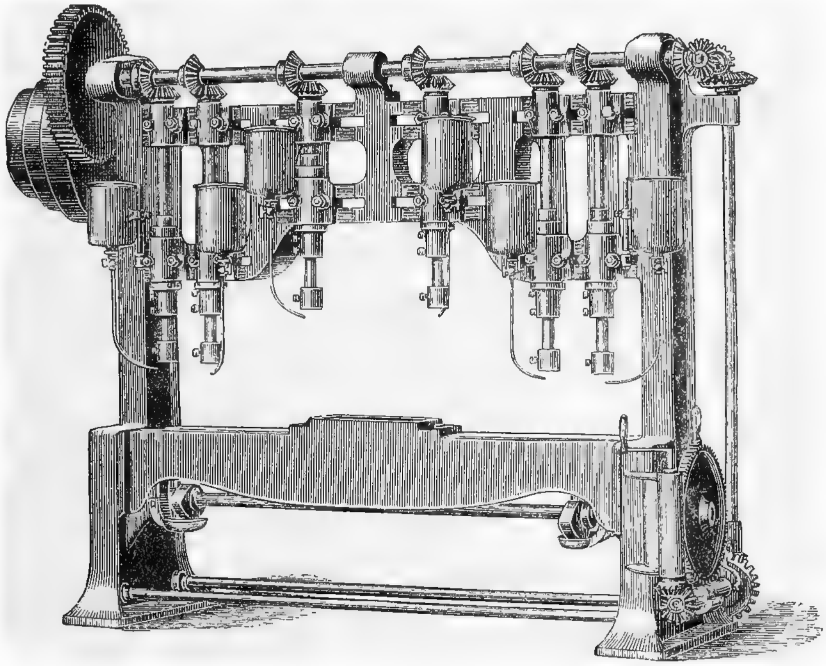
One of the most notable and prolific machines in use for any class of railroad work is the Bement fish-plate punching-machine (No. 16). The fish-plates are eleven-sixteenths of an inch thick, and the holes are oblong, fifteen-sixteenths by one inch and thirteen-sixteenths A 25 horse-power engine is required to drive the punch, which is capable of operating (four holes at a stroke) as rapidly as the plates can be supplied, and in actual usage does turn out 110 tons of fish-plates in ten hours, eleven car-loads in a day.



No. 16.

The last example of a labor-saving machine which will be here noted is the truck frame drilling-machine (No. 17) for railroad-car trucks, introduced nine years ago, and now in extensive use. This will drill one truck frame every minute continuously, the truck irons being usually 3 inches wide by 1 inch thick, and each requiring six holes to be drilled. There may be no exact comparison between the work of this machine and the same work by hand; the machine may do thirty times as much work as the average operative with a hand-drill, and it may do forty times as much or more, depending upon the diligence and activity of the average operative.

The introduction of labor-saving and automatic machinery is always slowest and most difficult in heavy work, because of the greater expense of innovations and the relative smallness of the numerical demand. In locomotive building the great growth of railroad facilities has supplied the condition of large demand, and the responsive enterprise of locomotive builders has pushed the work to its present high efficiency; but the conditions once admitting of the introduction of labor-saving machines, their application is seldom limited to the industry which has first called them into play; and as the conditions of fire-arms manufacture introduced the interchangeable system and improved machinery into a great range of small manufactures, the conditions of locomotive building are exercising a like influence in the introduction of uniform and labor-saving methods in the manufacture of marine engines and other heavy work.



No. 17.

In conclusion, acknowledgment should be made to the officers of the Rogers, Grant, Danforth, Brooks, and Schenectady locomotive works, and more especially to Messrs. Burnham, Parry, Williams & Co., of the Baldwin locomotive works, for the kindly extension of courtesies and the facilities of inquiry upon which the foregoing review of the manufacture has been based. Also to Messrs. William Sellers & Co. and William Bement & Son.

V.—THE MANUFACTURE OF WATCHES.

NOTE.—For statistical information regarding the manufacture of watches, see Table III, page 84.

The constituent material in watch-making comprises a small portion of the cost and a small cost also relative to that of the factory supplies and materials used, which are of great variety. The jewels, mostly garnets and rubies, with some sapphires, are of no great value when in the rough, most of their value in the works of a watch being due to the labor of making and setting. The brass, steel, and copper punchings are the most essential materials. These are largely furnished, even for remote sections, by the brass-works of Waterbury, Connecticut, being punched from dies furnished by the watch manufacturers and sold by weight. For hair-springs the best imported steel wire is used. The range of work in factories usually extends to every part except the largest punchings. In some cases also the mainsprings, and in others the jewels, are bought, since in the making of jewels the improvement in mechanical facilities has not been as marked as in some other portions of the work. In order to insure purity, the diamond dust is sometimes ground, and other material is prepared at the watch factory. The diamond dust is ground from the "bort", or outside cuttings of the stone, in hard steel mortars, and grinds about eight times its weight of steel dust from the mortars, being afterward separated from the steel. Of course the higher the grade of the watch the smaller out of all proportion is the relative cost of the material used, which, inclusive of mill supplies, may be commonly rated at about a third of the value of the product; but it must be said that the census returns of material relative to product or number of operatives are no indication of the grade of watches made, but indicate rather a discrepancy of views among manufacturers as to what constitutes material and may properly be reported as such.

The manufacture of watches is conducted under conditions which admit of the fullest development of systematic detail, but these conditions, in opposition to much prejudice, have themselves been developed by the ingenuity and the administrative talent of American enterprise. The manufacture of watches by machinery on the uniform system was first attempted by and at the instance of Aaron L. Dennison, of Boston, in 1848, and was first made a commercial success by the American Watch Company, of Waltham, Massachusetts. This company, as it was thus the pioneer, has also been the standard-bearer of the American system of watch-making in the competitive displays and trials at all the world's fairs since 1876, with such brilliant success as to stimulate the most strenuous efforts of foreign watch-makers to equal its results. The essential features of a system so successful and so widely published can scarcely fail of ultimate adoption in other countries.

In the American system the watches are made with parts practically interchangeable, except at a few points, upon which can be concentrated as great a nicety of adjustment as may be necessary to secure the highest accuracy; but by accurate machining the liabilities to error and the expense and necessity of skillful adjustment and rectification are eliminated from the greater part of the work. In the quality of a watch the American system, properly conducted, furnishes the most substantial foundation for accuracy.

The same mechanism which secures interchangeability increases the product, the interchangeability itself facilitating the work of assembling, finishing, and adjusting, and the division of labor resulting therefrom enables skill to be made perfect by practice upon a single kind of work. The establishment of standard forms and sizes of the component parts secures the closest attention to their best proportionment and the development of the most precise mechanical facilities for producing them. There has thus been a continuous improvement, the delicacy of the work and the rapidity with which the pieces are produced being advanced step by step.

The facility in repairs insured is also a great and obvious merit of this method of fabricating watches.

The manufacture of certain classes of large machinery may involve comparatively little system. There may be a foundery, a machine-shop, a blacksmith-shop, and an assembling-shop, but the work is only so rudely classified that attention is not concentrated upon details closely enough to stimulate their improvement. But in watch-making the system resolves the smallest items of the work into separate problems, and, as it were, puts them beneath a magnifying glass, so that under the eyes of skillful managers there is the closest pursuit of every advantage assured or promised in the existing knowledge of mechanical possibilities.

But comparison is suggested, not between two phases of the American system, the same now as ever in principle, though now with greater perfection of detail, but with a system of manufacture which has never existed to any appreciable extent in this country. This European system consisted in making watches by scattered labor, the manufacturing being technically only the assembling of the parts made by different artisans at different places. It was a system of farming-out work, which has no present analogy in American manufactures (except possibly in such work as the manufacture of gloves at Johnstown and Gloversville, New York). The number of skilled trades required for making a watch by this method is usually stated at about fifty, some of the work being done at the homes of the operatives, as gun components were once similarly made, a man having a bench or a foot-lathe, or even a little forge, under the roof of his cottage. To such methods the factory system comes like a clearing-house, saving trade by consolidating the interests of small buyers, relieving the manufacturer of onerous duties as a dealer in a vast variety of small and unreliable components, preventing wastage of material, diminishing the number of pieces rejected upon inspection, and bringing in the exact operations of machinery to swell the product for the same expenditure of labor, both by more rapid action and by the saving in fitting and finishing.

Leaving out of account the superiority of the product resulting from the precise machine methods of the American system, a comparison by number is afforded in the statement of M. Edouard Favre-Perret, that where 40,000 workmen in Switzerland make on an average each 40 watches per annum, in the United States the average is 150 watches. "Therefore," he adds, "the machine produces three and a half to four times more than the workman."

Under this uniform system the greater proportion of the operatives are paid by the piece. At the works of the American Watch Company, at Waltham, monthly cards are prepared by the superintendent for each foreman, stating the number and kind of watches to be made. Each foreman makes a daily report of work done and of the transfers of work between the several departments, and to facilitate this each foreman has a book-keeper, who is responsible to the superintendent.

The custom generally prevails of starting watches in large lots, say 1,000 of one kind or grade, 1,000 of another grade being started when these are out of the way, and so on. But the watches are not finished in the same order, the partly-finished portions being kept in store and given out in job lots of ten for assembling. In the process of assembling these parts are kept temporarily in trays with suitable compartments, but in stock they are kept in glass jars. Thus, while one lot of a thousand watches remains in the works, many subsequent lots may be completed. It is stated at some factories that the usual average time of completion is about five months, including the testing; it being obvious that no such time is required in the simple fabrication of the movement.

The watch parts to which interchangeability does not extend are the jewelry pivots, which are selected to fit the jewels, and the balances and hair-springs, which are adjusted or selected of weight and strength to correspond; but records of these parts are carefully preserved for every watch, so that they may still be replaced with accuracy.

The quality of interchangeability is specially utilized in some styles of stem-winding watches made by the Elgin National Watch Company, which, by the transfer of a single bevel gear, are made to wind either at the figure 3 or at the figure 12, so as to permit the movement to be conveniently fitted to an open-face or a hunting-case watch.

Owing to the more complex and detailed organism necessary in conducting the manufacture, the capital investment required in making watches upon a large scale is much greater relative to the product than in clock-making. The machinery is a very heavy item of expense, and the more so, as most of it is of private design, made in machine-shops of considerable size connected with the factories, and made as the finest job-work, without regard to the expense. The number of machinists in these shops is usually 6 or 7 per cent. of the whole number of operatives. As neatness and order are matters of the highest consideration, the factories themselves are handsomely laid out, built, and equipped, and require a heavier investment in real estate than is necessary for most other classes of manufacture.

We now come to the consideration of the labor, its division in the work, and its efficiency in all, and, so far as may be stated, in the several departments; but as these departments and the requirements put upon them differ somewhat in the various factories, they cannot in some cases be more than vaguely defined. Apart from the machine-shop work and the case-making, there is the press-work, from which the plates, bridges, and so on, go to the frame-making, and thence to the stoning, gilding, and engraving; the wheels and similar parts to the train-making or the pinion roughing and finishing, and then to the stoning and gilding; the dials to the enameling and painting, and the stem-winding, balance, and escapement parts to their special departments. The jewel-making and the jewel-setting, the flat steel work and the tempering, the nickel-finishing, the spring-making, and the springing and the screw-making are departments naturally separated by the character of the work. The assembling—both in the gray, that is, before gilding, and finally—and the finishing and adjustment complete the enumeration of all the usual departments. All these involve essentially different classes of work; and as each embraces work upon a variety of pieces, it is easy to see where more than 50 skilled trades might be required in the manufacture of a watch. The work of several of these enumerated departments may be executed under one foreman, or the work of one of them may be divided among two or more foremen, such divisions being termed "jobs" or "ends" of the work, the subdivision in this respect being, as might be expected, more minute in the larger factories.

The percentage of the numbers of persons occupied in the various duties of watch-making is here given roundly in an average of the practice at several factories, viz: The springing and finishing, including the train-finishing, 17½ per cent.; the pinion roughing and finishing, 15½ per cent.; the screw, flat steel, and escapement work, 12½ per cent.; the jewel-making, 7½ per cent.; the jeweling, 7½ per cent.; the plate work and engraving, 7½ per cent.; the balance-making, etc., 7 per cent.; the machine-shop work, 6½ per cent.; the dial work, 6 per cent.; the carpenter and blacksmith work, clerical work, watching, and time-keeping, 6 per cent.; the stoning and gilding, 3½ per cent.; the mainspring making, 1½ per cent.; the nickel-finishing, 1½ per cent.

The percentage of female operatives to the whole number ranges as follows in those parts of the work upon which females are employed: In pinion roughing and finishing, 70 to 80 per cent.; in screw-making and flat steel and escapement work, 30 to 64 per cent.; in gilding, 36 to 50 per cent.; in jewel-making, about 50 per cent.; in balance-making, 44 per cent.; in springing and finishing, 21 to 43 per cent.; in plate work, 20 to 39 per cent.; in dial-making, 17 to 37 per cent.; in jeweling, 30 to 35 per cent.; in nickel-finishing, etc., 10 to 33 per cent.; and for the whole work, from about 33 to over 40 per cent. Relative to the employment of female labor, we may quote from the report on horology by Professor James C. Watson, at the international exhibition of 1876, as to the practice of the American Watch Company:

> There are many important operations in the manufacture of watches by this method where the delicate manipulation of female hands is of the highest consequence, and it ought to be mentioned here that for this labor the amount of wages paid by the company is determined by the skill and experience required, not by the sex of the operative.

Upon much of the work either sex might be employed, but it may be of interest to note some of the items of work upon which women are usually engaged, viz, the cutting and setting of pillars, the drilling of pin- and screw-holes in plates, the cutting of the teeth of wheels and pinions, the leaf-polishing, the gilding, the making of hair-springs, the setting of springs, the making of pivot jewels and balance screws, the putting of movements together, and the fitting in of roller jewels and jewel pins. Beside the machine-shop and general work and superintendence, some items of work usually performed by men are the punching and press work, the brazing, enameling, firing, and lettering of dials, the plate-turning, fitting, and engraving, the fitting of wheels and pinions, the uprighting and end shaking, the stoning and oxidizing prior to gilding, the rosette-turning, cutting of scape wheels, milling of pallets, balance-making and handling, and the final work of finishing and adjusting.

From the minute division of the work it will be seen that it is almost entirely specialized, and that the labor required is skilled. In a few cases, such, for example, as the cutting of pinions, the machinery may be so far automatic or conveniently arranged that the operations of attendance are simple and easily performed; but even here the smallness and delicacy of the work and mechanism and the rapidity of action demand much more careful oversight than in a similar duty in the manufacture of coarser work. We can scarcely indicate one of the numerous departments mentioned where trained intelligence and skillful manipulation are not required in a high degree by the nature of the operations. The operatives are for the most part of American birth, and although some are young, none can be classed as boys or girls or unskilled laborers; and despite the many instances of manual skill which may be witnessed by a person in passing through a watch factory, he may, on the whole, be no more impressed by the dexterity of the fingers than by the high intelligence of the faces of the operatives.

The number of watches produced (correct time-keepers of a good medium grade) may be rated at over 150 per operative per annum for all hands employed, the number at some factories ranging higher for an average of all grades produced, all being fine full-jeweled watches. At some factories the productive capacity per operative has within the decade been more than doubled—an advantage attendant upon an increase of the gross capacity of the factories no less than upon the introduction of labor-saving methods.

The power required may be rated at about one-tenth horse-power per operative and one-fifth horse-power per power machine, and although watch-making machinery is in most cases very light, it is very rapid running, and rapid movement consumes great power at a small stress. In fabricating the movements from six to eight hundred processes are estimated to be employed, there being upward of 100 and sometimes more than 150 pieces in a watch, over a fourth of which are usually screws.

The manufacture of watch movements usually commences with the punching, but in case-making the material is first rolled into sheets. The old style of sets of rolls for rolling silver plate had the driving spurs of the same size as the rolls, so that large rolls had to be used to get pinions large enough to resist breakage. The spacing of the rollers was effected by a loose square coupling, involving knocking and lost motion. A form of rolls has been devised by Mr. Charles V. Woerd, in which the rolls carry large spurs, driven by smaller pinions and movable in a vertical slide, the pinions turning upon spindles in set positions. The space between the rolls can thus be considerably varied without sensibly affecting the engagement of the gears, which, nevertheless, have epicycloidal teeth.

The heaviest press used in this country in watch-making is at Waltham, and has a capacity of 2,700 tons. The frame weighs 9 tons, and is cast of gun-iron, which may be reckoned at double the strength of ordinary cast-iron. The uprights of the frame are two solid 12-by-12 inch pillars, and the moving die is forced up by an eccentric upon a shaft below. This press is used for silver cases, but for the heaviest plates, bridges, and the like, the metal is rolled and punched at Waterbury, Connecticut, the punchings being one of the products of brass and one of the materials of watch manufacture. The smaller punchings are pressed out at the watch factories by comparatively small presses. One man with a 20-ton punch will blank out 10,000 watch wheels a day.

In the die-presses used by the American Watch Company the blanks as they are formed are forced up into the upper member of the press, passing into a cavity opening outward and with a sloping top, so that in the process of the work there is a column of blanks being continuously pushed up and out.

In punching the dials one stroke cuts the blank from the copper strip, punches the holes for hour and second hands, turns up the edge of the plate so as to retain the coating of enamel afterward put on, and makes the impressions into which the dial feet are brazed. Three men will do the work of punching and brazing dials for 200 movements in a day.

The plate work may be considered to include the following principal operations: The turning or facing-off of the pillar plates (which is done in lathes, the plates being set in revolving heads and the tool being brought up on a slide-rest by a lever); the drilling of holes for screws and steady pins, which is done in jigs of hardened steel; the countersinking of the holes to remove the burrs left after drilling; the cutting of threads in a tapping lathe; sundry finishing operations on bridges, potences, and the like; the numbering of the parts by stamps; the screwing of steady pins into the plates; the finish-turning of steady pins; the milling of steady pins; the fitting of plate parts together; the turning of plates to fit cases; the uprighting of jewel holes, and the drilling of pivot holes. Over one-fourth of the labor is in the turning of the plates. The eight last-named operations are briefly executed, one man doing the work of each operation for from 100 to 200 movements a day. There are considered to be some 275 operations of turning, beside about 100 other operations upon the plate work. In drilling holes the plate is put into a jig. In one instance 26 holes are drilled by one operative, using five different sizes of drills before the removal of the plate. A variety of raised circles, part circles, rim cuts, and grooves have to be made on both sides of the plate. At the outset the bottom plate is a disk one-sixteenth of an inch thick, half the weight being afterward machined away. The largest hole drilled is usually one-sixteenth of an inch in diameter. The countersinking of the holes is done upon lathes by cutters running at a high speed. This lathe is the most essential piece of mechanism used in watch-making, and the vast majority of the whole number of machines are lathes more or less fitted with appliances for special work. In cutting and setting case pillars one operative, with the Elgin pillar cutter and setter, cuts 2,000 pillars a day; by hand-work one man would cut and set only 30 in a day. In cutting threads upon pins they are run into a little die which finishes the thread. The finest pitch cut is about 250 to the inch, and in drilling pivot holes the finest drills are near the size of a human hair. In one instance the pivot containing the drilled hole and the wire polishing the same are revolved at high speed in opposite directions, making an aggregate relative revolution of 14,000 turns a minute. After completion, the watch parts are distributed in trays of ten compartments each, ten watch plates to a tray. The device most commonly employed for holding the plate, case, and other work is a simple chuck with three jaws, so characteristic of the manufacture as to be sometimes called the first element in watch machinery. Machines in which cutters work to formers are used in cutting bridges of irregular outline. These are simply neat little profiling-machines. The power is communicated from a horizontal drum at the back of the machine to a pulley on the vertical cutter-spindle, which is carried by a frame with a transverse traverse and vertical adjustment by a handle in a universal pivot, while the bed carrying the former and the work holder (against which the guide-pin and the cutter respectively bear) has a horizontal traverse perpendicular to that of the frame.

In some factories there is a single department comprising the plate work, pinion roughing and finishing, and train work, under the style of train, plate, and motion department.

In the pinion room are usually made the balance and center staves, the center, minute, third and fourth wheels and pinions, the scape, cannon, and winding pinions, the barrel, the barrel-head, the barrel and pallet arbors, the intermediate and stem-winding wheels, the dial feet, and the hair-spring collets, beside the handling of other parts. The stem-wind work sometimes constitutes a separate department. In one factory thirty different parts are made in the pinion roughing room; and in general it may be said that pinion roughing comprises the cutting of teeth and some operations of threading and turning to size from brass and steel wires and brass blanks. The brass and steel wires are usually received in three-foot lengths. A cutting-off machine, operated by one person, is capable of cutting 6,000 pieces an hour. Turning to length and size is done upon lathes. In cutting teeth, one operative, with machine, will cut 60 piles of 20 eighty-leaf watch wheels (1,200 wheels, 96,000 teeth) a day. In pinion cutting, the finishing cuts, which give a fine epicycloidal shape to the finest leaves, are sometimes made by an index pinion cutter, the index regulating the turning of the blank so as to admit of cutting variable numbers of leaves, there being a three-mill rotary tool-stock, the pinion blanks reciprocating for the traverse and the pinion holder shifting for every leaf, and stopping the motion when all are cut with one mill. The tool-stock then turns, and a second cutter repeats the operation, the work being finished by a third. Another form of automatic pinion cutter has a horizontal chuck for holding the pinions, and a three-cutter horizontal tool-stock perpendicular to and above it, with a feed motion of the cutters and a pivoted lift to bring them clear of the work for the return movement. The term chucking is applied to the intermittent turning of the pinion blank so as to bring tooth after tooth under the cutter. Strictly speaking, chucking is the placing, centering, or adjusting of work in a chuck, although a chucking-machine is sometimes understood to signify a machine in which the tool remains stationary while the work revolves, being held in a chuck.

In cutting the wheels they are piled together and a large number are cut at once, the process being the same as in pinion cutting. Some machines for cutting wheels with long sleeve-bearings cut only one wheel at a time, a cutter with a horizontal axis moving vertically, while the wheel being cut chucks about a vertical axis. All of these machines are exceedingly prolific in output. Even with hand machines the output is large. The cutting mills usually make about 7,000 revolutions a minute. In the hand machines the mills are given a reciprocating motion from a lever operated by hand. The indexing or chucking is also done by a hand-click, the attendant operating the index wheel with the left and the reciprocating feed of the cutter with the right hand, the mills, of course, being driven by power.

The mechanical requirements for wheel and pinion cutting may be briefly recapitulated. The work, if wheels, must be carried on an arbor and held fast; if pinions on staves, they must be held fast in a centering chuck. The work must automatically or manually turn and stop as many times in a revolution as there are leaves to be cut. This is usually accomplished by a click and ratchet-wheel or some other arrangement of intermittent link work. If it is desired to make the machine adjustable for cutting different numbers of leaves, an index ratchet-wheel is used, with an arrangement for regulating the stop so as to pass a given number of teeth in the ratchet-wheel, either by varying the throw of the click or introducing change wheels in the train. In automatic machines, after the leaves have been cut all around, the machine must stop itself. This is effected by a disengagement in the train, sometimes by the pushing out of a catch, allowing a bearing to drop, or removing a half-nut from the screw thread in which it works. The cutter must of course be upon a power spindle; and if there are several of them, they must chuck or turn and stop to work successively upon the pinion, each in turn engaging with a driving spindle. Either the work or the cutter must move longitudinally to furnish the feed. If the work moves longitudinally, the return movement may be utilized to turn the work into position for a new cut. In case the cutter with its carriage moves longitudinally, its power motion has to be continued by means of a drum and belting, as in profiling machinery.

An automatic pinion cutter of fine design, used at the works of the Hampden Watch Company, is stated to have cost $4,000, and to be capable of cutting pinions for fully 100 watches a day.

In one instance the output of pieces from the pinion-roughing department was 160 per operative per day. The finest piece made is the pallet arbor, a pivotal bolt, which for a small size of watch has a thread of 260 to the inch, weighs $\frac{1}{130000}$ of a pound, and undergoes twenty-five operations, costing 2.27 cents for all. Measurements are gauged to $\frac{1}{25000}$ of an inch, sometimes called a degree.

Pinion finishing comprises leaf-polishing, which is done with fine crocus in reciprocating apparatus, sometimes called "wig-wags" (the pinion being turned and the polishing piece passing over each tooth space in succession); facing or polishing the ends of leaves; burring and turning under (sometimes done by hand with a graver), and staff polishing by reciprocating machinery.

The train work, in the practice of one factory, comprises the finishing of the brass barrel, the end-shaking, the truing and inspection of the wheels, and operations of fitting, such as fitting the cannon pinion to the hour wheel, the arbor to the barrel, and the staves to the wheels. In this case about a fourth of the operatives engaged in the train work are occupied in fitting staves to wheels, and nearly as many in end-shaking. End-shaking is usually gauged to $\frac{1}{10000}$ and side-shaking to $\frac{1}{25000}$ of an inch. These measurements are effected by dial gauges, with trains of gears for multiplying the discrepancy. These gauges are sometimes furnished with a screw adjustment of the height of the table, with a set screw, so as to take up wear and adjust the pointer to the zero of the dial. The end-shaking machinery is sometimes made to measure from each actual arbor to determine the depth of bearing to be drilled. The drill is driven by a belt, and is pushed down to the required depth by a handle with a pin, which arrests the motion by striking a stop upon a fixed frame. The rod of the handle is divided below the pin, the separate ends being held in place by a yoke. Between these ends the arbor is inserted, and by its length determines the height of the pin above the stop and the consequent depth of the hole drilled.

The manufacture of dials is in all its details a special and interesting process. At the works of the American Watch Company the muffle furnaces are of a specially ingenious construction, designed by Mr. Woerd, being built of interchangeable fire-brick blocks (which can be quickly replaced), and so arranged as to insure a vastly greater endurance of the muffles and a considerable saving of fuel.

The enamel is ground with pestles in Wedgewood mortars. In the form of paste it is spread upon the copper dials, being retained in place by the raised rim. The dials are then heated to about 1,100° F. in the muffles; are removed for surfacing, fired, reheated in the muffles, and then the figures and lettering are put on in black enamel, there being in all four operations of firing. The most expeditious method of putting on the hour figures is found to be by covering the figure ring with black and ruling out and scraping off all but the lines of the figures. But the fine lettering is done by skilled hand-work with brushes.

Dial sinking is the process of cutting out the seconds and other circles of the dial and cementing in circles at lower levels, to give an ornamental appearance to the face of the watch.

Stoning and gilding are usually done in the same room, stoning being the smoothing of the surfaces of the brass parts of the train and plate work preparatory to gilding. It consists in rubbing the pieces upon Ayr-water stone, the pieces being sometimes set in cork. After stoning, the pieces are strung upon wires, immersed in a hot alkali, and then in an acid bath, and are then "oxidized", which consists in brushing the pieces in brass-wire brushing-machines, the brushes revolving in a bath of beer. This gives them a frosted surface. Then follow, in succession, gilding with a galvanic battery, wire-brushing, regilding, drying (after an alcohol bath) in boxwood sawdust, and wrapping in tissue paper ready for the finishing department. In gilding, a cold solution is sometimes used with the best results, thus avoiding the poisonous fumes of the cyanide of potassium. Sixteen operatives will stone and double gild the work for about 240 watches in a day.

For the ordinary work of engraving, the impressions of names, lettering, and ornamentation are stamped, and afterward finished with a graver. Hand-stamps are commonly used, but elaborate presses are sometimes employed, in which the position of the work is nicely adjusted by verniers.

In jewel-making the jewels are first sawed into slabs one five-hundredths of an inch thick. These slabs are shellacked to plates, in which are concentric rings or grooves, so that the slab may be better trued to the plate. They are then surfaced upon one side with an ivory lap, and that side, being in turn shellacked to the plate, the other is similarly surfaced. From these slabs the separate jewels are obtained by sawing or by marking out and breaking. In making the pivot bearings the jewel is fastened by shellac to the end of a spindle, which during the working the operative heats at intervals by a small lamp. Thus held, it is in position to be worked on one side. The jewel is, in form, similar to a plano-convex lens with rounded edges. It is also drilled through the center, and there is a depression or cavity in the center of the convex side for an oil-cup. The cutters are diamond points carried by a holder, which first moves the cutter upon a long radius for surfacing the face of the lens, and is then unshipped and brought up on one side of the spindle to round the back edge. Diamond dust is also used for polishing, and sticks of pith for cleaning the jewels. The jewel, prepared for its bearing, will weigh about an eighty-thousandth of a pound troy. In turning the oil-cup side and edge of the jewel one operative does from 200 to 300 a day, the flat side not taking as long. On the average, one operative finishes over 150 a day.

The jewel is put into a setting, and the setting is then trued, so as to bring the jewel hole exactly in the center. The holes are opened to the required size with diamond dust. After washing, they are gauged on a needle gauge and distributed in boxes according to size. The pivot holes are also gauged, and records of these measurements are preserved. The jewels are then fitted into pivots of corresponding size, and all are fitted into the plates.

A machine has been devised by Mr. C. V. Woerd for the side-shaking of jewels, by which each pivot setting is bored to correspond with its jewel. In this the tool is carried upon a rocking-frame, and at double the distance from its center is the measuring device, an edge upon the rocking-frame approaching a fixed edge, so that the jewel or arbor placed between them will throw the boring tool half the diameter of the jewel off center, causing the tool to bore a hole to fit the diameter of the jewel.

The jewel bearings are polished by a wire with diamond dust, and afterward by a pointed splint of wood. In the straight gauge for measuring the holes in jewels the jewel is run upon a fine graduated wire point as far as it will go. The point is then pushed back against a spring, the jewel acting as a stop and determining the movement of a pointer along a scale, one of whose divisions is equivalent to the twenty-five thousandth of an inch in the diameter of the jewel hole.

Machines in which cutters work to formers are used in nickel-finishing, and also in cutting rosette work upon the watch-case. The rosette-cutting machines have a spindle for holding the work, pivoted below upon parallel bearings. The formers are escalloped or fluted wheels upon this swinging spindle. In its revolution these bear upon a guide which moves the spindle relatively to the cutting tool, causing these wavy lines to be reproduced upon the watch-case to a diminished scale. Very beautiful ornamentation is executed upon the nickel work of watch plates, a great variety of curious forms being produced by the movement of an ivory style or steel point over the nickel surface, the movement of the style being obtained by elliptic gearing, escalloped wheels acting as formers, or other aggregations of cam motions, to vary the position of the style as the rotation progresses. This is called nickel-finishing.

The stem-winding movement usually comprises some twenty-five or more additional pieces, the most characteristic being bevel gears, requiring bevel-gear cutters and angle grinders and polishers. The movement usually consists of a train with bevel gears for stem-winding, and another train for stem-setting, which engages upon pressing a button or pulling out the stem itself, so that the hands are also moved as the winding proceeds.

In the common screw-machine for watch screws the wire is first stopped and shouldered; the die is then carried over it, and the motion is reversed, running the die off, when the screw is run into a screw plate and the wire is cut off, leaving the head. A screw plate full of screws with plain heads is thus obtained, which is placed under a mill for slotting the heads. In this way one man can make 1,200 screws a day, not including the slotting. When more than one operation is performed on the wire blank before cutting off a pivoted tool-stock is used. Such tool-stocks for this and for other work in watch-making, instead of being like ordinary turret lathes, are often centered back of the work, so that the cutting tools converge toward instead of diverging from a center.

The unslotted screws are sometimes run into a cylindrical holder, so that they may all be slotted by one operation of turning. Automatic screw machinery, which is very prolific in output, is used by the American Watch Company, having been designed by Mr. Woerd in 1872. With the same attendance it will turn out fine watch screws about as rapidly as the most prolific automatic screw machines used in sewing-machine work will turn out the smallest sewing-machine screws. Most of the movements in these screw machines are derived from cams on a side shaft. Such a cam causes a chuck to feed the wire forward and gives it a rotation by means of fast and loose friction pulleys; another cam moves a toothed sector, which by a pinion actuates the chaser-screw spindle, which drives the die spindle by a pair of adjustable gears; another cam operates, after the wire has been threaded by the die, to throw over an arm pivoted upon another spindle, which arm carries a small griping chuck, or holder, and on coming into line with the die (which is drawn back by a cam) is allowed to spring forward and take the screw just as the head is formed by cutting off with a straight automatic tool. Finally, another cam operates to lift and lower upon a pivot the frame carrying the mill, which is driven by pulleys with round leather bands, and slots the screw head after it has been brought into position by the return of the pivoted arm, which successively transfers the pieces from the die spindle after they have been threaded and cut off. The smallest watch screws weigh only about $\frac{1}{122400}$ of a pound. In polishing the heads of screws they are inserted in a metal disk, and are then passed over a glass and emery surface, being given an eccentric rotary motion, moving from the center toward the circumference.

The scape-wheel has 15 teeth. They are cut in piles of ten or more by a machine with eight sapphire cutters. With this one man in a day can cut 3,000 wheels, and, delicate as is the work, with the wheels once set the operative might turn the handles with his eyes shut.

The hair-spring studs go through sixteen operations. In grinding and polishing these studs one man will do 250 a day. The watch pallet is first punched from sheet-steel in the press-room, and is then slotted and milled on lathes fitted with suitable chucks and holders. Slips of jewel are inserted to form the acting surfaces and to take the wear. The pallet is often made in curious forms merely for ornamentation. The pallet jewels are sawed in strips with diamond saws, are polished by fine diamond laps, and in ten hours one man will complete 300 of these jewels, one of them weighing $\frac{1}{150000}$ of a pound. Roller jewels are made from long bits of jewel, which are fastened in a revolving spindle ground and polished to size. One man will make 200 a day, and one will weigh $\frac{1}{256320}$ of a pound.

An apparatus called a horizontal bar and pole is sometimes used for surfacing steel work, the pieces, by means of it, being brushed over a stone—that is, held and imbedded in a brush, which is swept over the stone. The tempering of the steel work and the hair-springs requires experienced judgment, but is only a small item of labor.

In balance-making the steel blanks are first pressed out and brass rims are fused or brazed upon them. The blanks are then repunched, and the sections, leaving the single arm, are also punched out. This cross-piece, or arm, is sometimes formed by four milling cuts, and the rest of the steel disk is turned out, excepting a narrow rim of steel within the brass. Screws of gold or brass are placed in the rims. Two machines, one operative attending each, turn out 400 balance screws a day, 1 pound of brass being enough to make 2,000, and 1 pennyweight of gold 50 screws. One operative can drill upward of 2,200 screw holes for the balance-wheels in a day. There are 80 operations upon a balance-wheel, 66 of them being drilling, threading, and countersinking holes. The drills revolve at 4,800 turns a minute. The balance, which at first is a steel disk rimmed with brass, weighs 72 grains, but after machining weighs only 7 grains, and, fitted with 16 gold screws, 7.20 grains. The hands are punched in two operations, the finished weight being one-fifth of the original weight of the blank.

The final operation of assembling is called the gilt training, in distinction from the assembling before gilding or in the gray, and the finishing and adjustment of the balances is commonly called the balance handling. In the finishing one operative will in a day set 90 mainsprings and fit them into the movements. The mainsprings are cut from rolled sheet, the remaining operations being tempering, polishing, and winding. The temper is very neatly drawn by bench apparatus with burners. The polishing and working are usually done by hand, the tools being drawn to and fro over the springs, which are extended flat and fastened in vises at the ends.

The hair-springs are made from spools of fine wire. These wires are polished by drawing them between diamond points, and are cut to length, coiled, hardened, and tempered. The coiling of the hair-springs is a very simple operation. The ends of two or more, generally of three, springs are inserted in holes in a small arbor, which is placed in a small cylindrical box and turned until the springs wind themselves within the box, the thickness of one or two springs being the space thus determined between the coils of a single spring. These boxes, with tops wired on, are bunched together, and the springs, after tempering, retain their form. Hair-springs are sometimes made of gold, and this is the case in the movements for the Yale time-locks for vaults, as steel is specially subject to corrosion from the dampness and condensation of moisture.

In common watches the fast and slow regulation of the hair-spring is effected by moving a lever on which are pins, which clasp the spring and extend or shorten its vibrating length by a little, causing the vibration to be slower or quicker. The inner end of the hair-spring is fastened by running it through a hole in the collet of the balance pin, where it is clinched by pushing in a tiny brass pin, made long enough to be driven from outside the spring and then nipped off close to the collet. The point at which the outer end of the hair-spring is held, in respect to the position of insertion of the inner end in the collet, having been once properly fixed, cannot be greatly varied without impairing the isochronism of the movement of the balance. In watches of the finest time-keeping qualities the balance is therefore carefully selected to accord with the strength of the spring, so that the least possible adjustment may be necessary in shortening or lengthening the spring. The balances are weighed to the fourteen hundredth part of a grain, and the strength of the spring is gauged relatively by winding and unwinding against a given spring. The time-keeping of a watch is perfected by a trial, so as to adapt it to a wide range of circumstances, and is subjected to high and low temperatures, and made to run with 6 up, 12 up, 3 up, 9 up, face down, and so on. The adjustments resorted to in consequence of the results of these experiments are such as seem justified by a long course of experience, and are of a nature and nicety which cannot well be explained.

The foregoing illustrations of the processes of watch-making outline more or less superficially the character of the work. The examples cited have been drawn from observation of the practice at all of the larger factories, and acknowledgments are due to the officers of the American Watch Company, of Waltham, Massachusetts; the Elgin National Watch Company, of Elgin; the Illinois Watch Company, of Springfield, Illinois, and the Hampden Watch Company, of Springfield, Massachusetts, for courtesies kindly extended.

VI.—THE MANUFACTURE OF CLOCKS.

NOTE.—For statistical information regarding the manufacture of clocks, see Table III, page 28.

The manufacture of clocks exhibits a much more rapid growth during the past ten years than in any preceding decade, there having been, in 1850, 82 per cent. as many operatives as in 1860; in 1860, 73 per cent. as many as in 1870; and in 1870, 47 per cent. as many as in 1880. At the same time the reported value of material handled and of product per operative is less than in 1870; against 47 per cent. as many operatives in 1870 as in 1880, there being a return of about 77 per cent. as great a value in the product. There thus appears a change in the character as well as in the extent of the industry. The value of material formerly trebled is now little more than doubled in the process of manufacture. At the same time it may be said that a smaller proportion of the labor is now devoted to the clock movement, more being expended upon the manufacture of ornamental cases in great variety, bronzes, and the like.

It is obvious that much less labor is expended upon the same weight or even upon the same value of material in clock- than in watch-making. A greater value of material is therefore handled by the same number of operatives, and the relative value of constituent materials for movements is three or four times as great, and the aggregate value of all materials is for the same number of operatives greater in clock than in watch manufacture.

Clock materials are almost entirely domestic, except a small proportion of foreign woods used in casing. Copper and zinc, the chief constituents of sheet-brass, are obtained in this country in unsurpassed purity and excellence; the steel and iron wire are also commonly American, and native black walnut is the wood in most general use for cases.

Clock-making was one of the earliest outgrowths of Connecticut ingenuity, and clock parts being coarse as compared with watch parts, practical uniformity has followed more in consequence of wholesale manufacture and the necessity of correct gearing for uniform velocity ratios than as an end deliberately sought or utilized for the interchanging of parts. The work upon the common clock movement is for the most part of two kinds: plate work and wire work. Dies for punching the plate parts determine their uniformity, and the wire gauge determines that of the arbors, pillars, and trundles. Even the wires are not formed into complicated shapes, and in common clocks screws are not used, the plates being riveted like lock-plates.

But clock-making, having been so long practiced (and the primitive processes being susceptible of such great improvement), exhibits perhaps more forcibly than any other manufacture of mechanism the great strides that have been made. The successful manufacture and general use of many kinds of mechanism has been consequent upon the prior existence of manufacturing mechanism, but from the single-handed manufacture of wooden toys clock-making has gradually come to be conducted in large establishments, having all the advantages of labor-saving machinery. Some of these produce an average above two clocks per working minute.

The departments of the work are principally two, devoted respectively to the manufacture of movements and of cases, of which the latter often requires the greater space and the greater number of operatives, although the material for the movements usually costs more than that for the cases. Metallic cases also are made for many styles of clocks, involving both metal working and foundery facilities in their manufacture.

The capital required is notably smaller in clock than in watch manufacture. The returns for the United States in 1880 show an average of $1,236 per operative for watch and $756 per operative for clock manufacture, the total products in the two cases being nearly equal, the total capital being twice as great in watch as in clock manufacture, and the average number of hands being about four-fifths as great in the latter as in the former.

In the earliest work of wood clock-making in Connecticut it took a man upward of a week, sometimes several weeks, to make a clock; but by 1820 the average time was about three and a half days.

In 1820 thirty hands made 2,500 wooden clocks in four different styles in the course of a year, or 83 clocks per operative per annum. These clocks were made with cherry wheels and laurel pinions, the teeth being set in. But in 1880, though the number of different styles made in a single establishment is fifteen or twenty times more, and many of them are of an elaborate ornamental character, an average of over 520 brass clocks per operative per annum is attained, and for the cheaper styles the output would of course be considerably greater. It may be said roundly that one operative will upon an average in a given time perform the work upon four times as many ordinary clocks, including casing, as upon ordinary watch movements. Of large calendar clocks, more than 125 are turned out per operative per annum, and since 1870 an improvement of as much as three or four fold is stated in some instances, the advantage being due to improved machinery and to the practice of manufacturing clocks of the same kind in very much larger lots at a time than before.

A large proportion of the labor in clock-making is unskilled, about 10 per cent. of all the hands being children and youths, while practically no children or youths are employed in watch-making. In clock-making, about 12½ per cent. of the operatives are females, in contrast with 36 per cent. in watch-making. Of the operatives, we may consider roundly that about one-third of them are machine-tenders, and the remaining two-thirds bench-workers, varnishers, packers, and so on. The number of power machines ranges from as many to half as many as the number of operatives, but many of the machines are not in continuous operation.

In clock as compared with watch manufacture the machine processes are generally similar, but without the same degree of refinement. The large proportion of wood-case work is also peculiar to clock-making.

In 1807 Eli Terry, of Plymouth, Connecticut, commenced using machinery in making wooden clocks. Clock-gears were then marked out and sawed by hand, a much slower and more laborious work even than fret-sawing. Such movements were sold at $25 each, but by 1840 the cost of a wood movement had been reduced to $5, and at this time the manufacture was fairly revolutionized by Chauncey Jerome, who introduced the one-day brass clock, the movement for which can now be made for less than 50 cents, three men being able to level the sheets and punch out wheels for 500 such clocks in a day. Mr. Jerome sent his first consignment of clocks as a venture to England in 1842, and the export business thus commenced has grown to such an extent that some American manufacturers have their catalogues printed in French, German, Spanish, Italian, Swedish, and Portuguese. Not only is the civilized world supplied, but American clocks are found to have preceded the American traveler in semi-barbarous lands.

The labor on a handsome wood clock-case often costs a surprisingly small sum, and the common zinc faces are cut, painted, and lettered at 3 or 4 cents apiece. In the case-making the processes are of great variety. Knobs and ornaments are turned and carved; stencils are used in laying out patterns to be carved; and curved, round, and half-round cases are formed by deeply scoring the wood at intervals upon the inner side and bending it to shape. Some of the most elaborate ornamentation is executed by pressing compositions of glue and sawdust, which, when finished, appear like fine wood carvings. Ornaments in glass are etched by acids. Wheels covered with sand-paper are used in smoothing wood work, the wheels for finishing moldings being molded to correspond to the work. Planing, sawing out, drilling, mitering, gluing, varnishing, bronzing, painting, and polishing comprise the balance of the work on ordinary cases.

Most of the work upon ordinary clock movements is done by those machine methods well known to be of the greatest rapidity, viz: Press work, turning pins and arbors from wire, and cutting small gears in piles. The making of main-springs and the riveting and other kinds of bench work are also rapidly performed.

Index gear and pinion cutters are commonly used, these being sometimes automatic. Among other instances, automatic machines are used for placing pinion blanks upon arbors. The blanks and arbors are held in proper feed receptacles, the blanks being allowed to drop successively into grooves, when the arbors are thrust through them. The arbors with the pinion blanks exactly placed are then thrown out ready for the pinion cutter. The little staves in the lantern pinions are placed by girls. There is much work of turning, and the turning tools are commonly set upon arbors, which rest in sockets parallel with the lathe spindles, the tools being brought against the work by handles set in the arbors, which will accommodate a number of tools placed radially in various positions.

It is, however, obvious that between the fine and the heavy, the plain and the fanciful, a great range of work is involved in clock-making. No mechanism is too exact for the manufacture of fine astronomical clocks, and tower clocks are large and heavy machines, involving nice work, and being sometimes built by special contract. The other extreme is in the manufacture of small alarm and other cheap clocks, upon which, however, the exactness of machine methods in wholesale manufacture enables a very excellent quality of work to be done at a low cost.

The power required in clock manufacture may usually be rated at from two-fifths to one-half horse-power per operative, of which the greater part is commonly consumed in the case-making.

VII.—THE MANUFACTURE OF AGRICULTURAL IMPLEMENTS.

NOTE.—For statistical information regarding the manufacture of agricultural implements, see Table VII.

GEOGRAPHICAL DISTRIBUTION.

In agricultural implements we have a product whose manufacture has a widespread geographical distribution. Many manufactures of interchangeable mechanism, as fire-arms, sewing-machines, watches, clocks, and hardware, will often be found in groups of factories in places within easy access of large cities. For agricultural implements accessibility to city markets is a matter of minor importance, and so small a proportion of the product is consumed by export trade that location in or near seaports is, in the present condition of the industry, a matter of no consideration.

Yet the manufacture is more centralized than the population. We find in Maine an average of 448 operatives, nearly all in Kennebec county, the product being mainly scythes, shovels, hoes, hay-forks, etc. In New Hampshire, of 178 operatives, over half are in Grafton and Merrimack counties, and the product is mainly scythes, hand-rakes, and hay-cutters. In Vermont, of 464 operatives, 297 are in Rutland, Windsor, and Windham counties, and the product is mainly scythes, hand-rakes, hay-forks, separators, and sirup-evaporators. In Massachusetts, of 973 operatives, over half are engaged in the great shovel and plow factories of Bristol county, and the manufacture of hay-cutters, tedders, horse-rakes, etc., is largely pursued in Hampden county. In Connecticut, of 565 operatives, over half are in Middlesex and Litchfield counties, scythes, hoes, plows, lawn-mowers, and fodder-cutters being the chief products. In New England the factories are commonly located upon river-courses, the seaboard counties producing few manufactures of this class. Hand implements, involving wooden ware, are of the most general manufacture.

Plow manufacture does not require a large factory organization, but from the great demand for plows and similar products the manufacture is often conducted upon a large scale, as well as at small shops widely distributed through nearly all parts of the country. It is obvious that the manufacture of grain-cradles and scythe-snaths may be conducted on a small scale, but the manufacture of mowers, reapers, and thrashing-machines, and of similar composite products, necessitates a factory organization for their economical production. Such composite products are mainly manufactured in the great belt of states from New York to Illinois, inclusive, which in 1870 employed 69 per cent. and in 1880 66 per cent. of all the operatives engaged in the manufacture of agricultural implements. Through these states the mechanical facilities are of a high order, and the factories are widely distributed; but the centralization of the greater part of the work is strongly marked. In New York, of 6,462 operatives, over half are in five counties—Cayuga, Rensselaer, Monroe, Onondaga, and Saratoga; in Pennsylvania, of 2,617 operatives, over half are in four counties—York, Allegheny, Philadelphia, and Lancaster; in Ohio, of 7,536 operatives, over half are in three counties—Clarke, Stark, and Summit; in Indiana, of 2,471 operatives, over half are in two counties—Saint Joseph and Wayne; in Illinois, of 7,300 operatives, over half are in five counties—Rock Island, Cook, Winnebago, Warren, and De Kalb; also, in Michigan, of 2,004 operatives, over half are in four counties—Calhoun, Jackson, Kalamazoo, and Kent; in Wisconsin, of 2,067 operatives, over half are in two counties—Racine and Rock; and in Minnesota, of 1,197 operatives, over half are in Washington county.

But this predominance of a few localities is equally noticeable in states in which the manufacture is not as largely pursued. In New Jersey, of 206 operatives, nearly half are in three counties—Mercer, Warren, and Somerset; in Delaware, of 66 operatives, over half are in New Castle county; in Maryland, of 356 operatives, over half are in two counties—Baltimore and Washington; in Virginia, of 530 operatives, over half are in two counties—Henrico and Dinwiddie; while in West Virginia, of 63 operatives, 58 are in the little tenon of the state between Pennsylvania and Ohio, comprising Marshall, Ohio, and Brooke counties; in North Carolina, of 202 operatives, over half are in Mecklenburg, Davidson, Edgecombe, Chatham, and Randolph counties; and in South Carolina, of a total of 88 operatives, 75 are in a single establishment in Charleston; in Georgia, of 274 operatives, more than half are in Fulton and Coweta counties; in Alabama, of 36 operatives, over half are in Cherokee, Monroe, and Morgan counties; in Mississippi, of 61 operatives, over half are in Attala and Lauderdale counties; in Texas, of 139 operatives, over half are in Marion and Fannin counties; in Tennessee, of 178 operatives, over half are in Gibson, Washington, Hamilton, and Montgomery counties; in Kentucky, of 1,033 operatives, Jefferson county has 700; in Arkansas, of 24 operatives, over half are in White and Washington counties; in Missouri, of 726 operatives, there are 448 in Saint Louis county; in Iowa, of 809 operatives, over half are in Scott, Lee, and Poweshiek counties; in Kansas, of 103 operatives, over half are in Wyandotte and Douglas counties; in Nebraska, of 54 operatives, over half are in Adams, Butler, and Otoe counties; and in California, of 295 operatives, over half are in the counties of Alameda and San Joaquin.

Clarke county, Ohio, has more operatives employed in this class of manufacture than any other single county, viz, 2,379. In Rock Island county, Illinois, there are 1,290 operatives employed; in Stark county, Ohio, 1,210; Cayuga county, New York, 1,136; Cook county, Illinois, 1,096; Rensselaer county, New York, 913; Saint Joseph county, Indiana, 910; Racine county, Wisconsin, 842; Wayne county, Indiana, 795; Summit county, Ohio, 753; Jefferson county, Kentucky, 700; Montgomery county, Ohio, 700; Washington county, Minnesota, 607; Winnebago county, Illinois, 543. The predominance of these fourteen counties, aggregating over 35 per cent. of all the operatives employed in the manufacture of agricultural implements in the United States, is due to groups of large factory organizations establishing labor centers. The relative growth of these particular centers is shown by the fact that in 1870 they employed a little less than 30 per cent. of the whole number of operatives in this class of work, but large factories were then already established in all of these counties except Washington county, Minnesota.

The largest factory organizations are employed in manufacturing mowers, reapers, and harvesters; factories first established by the demands of the surrounding neighborhoods, but now extending the benefits of their ingenious and labor-saving machinery to all parts of the country.

Ranking next in size of factory organization are establishments devoted to the manufacture of thrashing and separating machinery, farm engines, and horse-powers, and next we may rank the manufacture of plows, shovels, scythes, etc., as also the manufacture of seed-drills and planters. This is generally the existing order, but it must, of course, be taken with some notable exceptions. Some large factories are employed upon a wide range of work, but the largest will usually be found confining themselves to a few specialties.

In New York a broad sweep from Erie to Rensselaer county, covering the fertile country traversed by the Erie canal, will include the great bulk of the manufacture, of which mowers, reapers, harvesters, and separators are the most important of the many products.

In Pennsylvania the manufacture is most largely pursued in two sections, the southeastern reaching into Maryland and Delaware, and embracing the manufacture of thrashers, clover-hullers, horse-powers, cotton-planters, and lawn-mowers, and the western section extending into Ohio and West Virginia, the manufacture being of plows, hoes, cultivators, reapers, thrashers, etc. Between these sections are the ranges of the Alleghanies.

In Virginia most of the large factories are near Richmond and Petersburg, making plows (principally), hay-cutters, thrashers, cider-mills, etc. Some manufacturing is also done in the fertile valleys of the Alleghanies, extending into Tennessee, plows, hay-cutters, and cane-mills being the principal products.

A range of country widely embracing the course of the Tennessee river may be considered to include about a tenth of the manufacture in Kentucky, three-fifths of that in Tennessee, and two-thirds of that in Alabama, being principally of plows and harrows, with some cane-mills, cotton-planters, and sirup-evaporators. In Kentucky the manufacture is entirely confined to the northern and western portions, being mainly of plows, hoes, and cultivators, beside corn-, cider-, cane-, and fanning-mills, seed-drills, thrashers, evaporators, etc., which are made in Jefferson county.

In North Carolina the manufacture of plows, cane-mills, hay-cutters, cotton-planters, etc., is pursued in the central portions of the state, removed from both mountains and seaboard, and in Georgia the manufacture (mainly of plows, cultivators, cotton-planters, and cane-mills) is entirely confined to the north middle portions of the state, no agricultural implements being made in the mountainous parts of the north or in the seaboard and southern portions.

While Ohio, Indiana, and Illinois are characterized by a general adaptability to this class of manufacture, the country is so uniformly fertile and level, so well-watered with streams, and so intersected by railroads, that the manufacture is widely diffused, and few sections present distinguishing features. In Ohio the leading products are separators, seed-drills, corn- and cotton-planters, mowers, reapers, and horse-powers. In Illinois, plows, harrows, cultivators, reapers, and corn-planters are the most notable of many products. In Indiana the greater part of the manufacture is in the northern, eastern, and east central parts of the state, less being done in counties near the Ohio river and the Illinois boundary, seed-drills, thrashers, clover-hullers, cane-mills, plows, and cultivators being the leading products.

In Michigan and in Wisconsin the manufacture of agricultural implements is quite uniformly diffused through the lower counties, horse-powers, stump-pullers, grain-cradles, scythe-snaths, hay-cutters, hoes, harrows, seed-drills, separators, and fanning-mills being the chief products.

In Missouri the manufacture is chiefly conducted in the eastern and central parts of the state, cane-mills, evaporators, and horse-powers being notable products. In Iowa the bulk of the manufacturing is done in the eastern and central counties, horse- and hand-rakes, scythe-snaths, separators, and plows being the leading products. In Minnesota a large proportion of the operatives are engaged in making thrashers and separators, and in Kansas and Nebraska plows, harrows, cultivators, and stone-gatherers are the principal products.

The agricultural manufactures of California are mainly plows, separators, and horse-powers. The large ranches are necessarily supplied with jobbing shops of some sort, and these sometimes suffice for the erection of the large headers and separators forming a feature of farm practice in that country. Much of this machinery is brought from the East.

THE CHARACTER AND DIRECTION OF THE INDUSTRIAL GROWTH.

A machine for thrashing and separating is in the great majority of cases reported as one separator, but sometimes as one thrasher, and in a few instances, from the identity of numbers returned, there is a strong inference that the same machine has been returned as one thrasher and one separator.

So in the return of grain-drills the production does not seem to have kept pace with the increase of operative labor in the manufacture of agricultural implements, but a portion of the return is doubtless absorbed under the heads of grain-sowers and seed-sowers. A variety of machines (corn- and cotton-planters, grain-drills, pulverizers, and even harrows and hay-rakes) may be adapted for sowing seed and grain, and also guano, plaster, or other fertilizers. Such machines will usually be returned in accordance with the function considered most essential and important, but there is liability to duplication.

The third class of farm machinery liable to be reported ambiguously includes the following items: Harvesters, mowers, reapers and mowers, reapers. All of these are included under the title of harvesting machinery. The term harvester would not be applied to a mower, but might be applied to a reaper, or to a reaper and mower. Gavelers, droppers, hand-, chain-, self-, and sweep-rake reapers, as well as twine and wire self-binders, are liable to come under the caption of harvesters. The numbers of harvesters and reapers produced are given:

	1880.
Harvesters	25,537
Mowers	72,090
Reapers and mowers	54,884
Reapers	35,327

The movements in the manufacture of particular classes of farming machinery are of significance as exhibiting developments in methods of farming, no less than the mere transfer of the manufacture from one region to another, or its greater centralization or diffusion. The inadequacy of the returns as to the numbers of implements made in 1870 through enumerators prevents detailed comparison with that year, but the general relations of the two years are fairly evident. The manufacture of cane-mills in 1870 was confined to Kentucky and North Carolina, most of them being made in Kentucky. In 1880 their manufacture had become vastly increased, and was not only diffused through the sugar-cane growing states, but was also made an important item of manufacture in northern states. Thus, in round figures, about 27 per cent. of all the cane-mills were made in Missouri, 18 per cent. in Kentucky (but over four times as many as in 1870), 17 per cent. in New York, 11 per cent. in Indiana, 6 per cent. in Tennessee, 5 per cent. in Virginia, about 4 per cent. each in Georgia and Wisconsin, 3 per cent. in North Carolina, 2 per cent. in Arkansas, over 1 per cent. in Texas, and the residue in six other states.

In 1870 clover-hullers were manufactured in but three states, and nearly all in Pennsylvania. They are now manufactured in six states (38 per cent. being made in Indiana, 31 per cent. in Ohio, and 21 per cent. in Maryland), and the manufacture appears almost to have disappeared from Pennsylvania and to have diminished greatly, consequent upon changes in farm methods, much clover-hulling being now done by attachments to thrashers.

In 1870 corn-planters were made in seven states, chiefly in Illinois and in Missouri. They are now made in twenty-one states, 63 per cent. in Illinois, 21 per cent. in Ohio, and over 6 per cent. in Wisconsin.

In 1870 all of the cotton-planters were made in Georgia, but since that time the introduction of cotton-planting machinery has progressed greatly, and its manufacture is now increased nearly tenfold, and is pursued in fourteen states, but specially in Ohio, where two-thirds of all the cotton-planters are made, about 8 per cent. being made in Pennsylvania, and about 8 per cent. in Georgia.

In 1870 plows were made in thirty-three, harrows in twenty-three, and cultivators in twenty-four states and territories. In 1880 plows were made in thirty-six, harrows in thirty-four, and cultivators in thirty-three states and territories, the percentages of the entire numbers made in the states in which the manufacture was most largely pursued being, for plows: Illinois, 20 per cent.; Indiana, 13 per cent.; Kentucky, nearly 10 per cent.; New York, 7 per cent.; Pennsylvania, 6 per cent. For harrows, in 1880: Illinois, 29 per cent.; Michigan, 21 per cent.; Kentucky, 11 per cent.; New York, 8 per cent.; Wisconsin, 7 per cent. For cultivators, in 1880: Illinois, 42 per cent.; Georgia, 11 per cent.; Michigan, 9 per cent.; Kentucky, 7 per cent.; Ohio, 5 per cent.

The relative falling off in the number of plows manufactured indicates that their function is being performed to some extent by other implements. We may say that in 1870 one harrow appears to have been made to every ninety-four plows, and in 1880 one to every ten plows; and that in 1870 one cultivator was reported to every ten, and in 1880 one to every four plows. In the great agricultural state of Illinois the reduction of the ratios seems even more decided, viz: In 1870 one harrow to one hundred and twenty-five, and in 1880 one to seven plows; in 1870 one cultivator to five and a fraction, and in 1880 one to two plows.

The change has been going on during the decade in the use of cultivators, displacing plowing and hoeing, and of cultivators and harrows, saving much of the labor of plowing in the preparation of land for crops. In the English four-year rotation the cultivator has, it is estimated, saved half the labor of plowing; but upon prairie land in this country the use of harrows, cultivators, sulky-plows, and pulverizers has lessened labor to an extent variable with the conditions of crops and of seasons, but undoubtedly to a much greater extent than in England. As compared with approved methods of putting in and tending crops with plows, harrows, and cultivators, the screw pulverizer alone is claimed to save from one-third to one-half the labor of preparing land for corn and from one-third to one-half in the whole cost of cotton-raising up to the picking. A screw pulverizer is not adapted to a hilly or stony country, but on level, stoneless land will go over 20 acres a day, fitting land at the rate of 7 to 10 acres a day in thrice or twice going over. By it oats may sometimes be put in on stubble land after once going over, and it not only cuts stalks and seeds at the same time, but saves after-harrowing.

The manufacture, and, by inference, the use, of cultivators and harrows is also shown by the statistics to be more general in level states like Illinois than in states whose land is more hilly and stony.

The manufacture of fanning-mills was in 1870 conducted in eighteen states, 23 per cent. being made in New York, 15 per cent. in Iowa, and 12 per cent. in Michigan; and in 1880 in twenty-one states, 38 per cent. being made in Wisconsin, 27 per cent. in Michigan, and 6 per cent. in Ohio.

Grain-cradles were in 1870 made in twelve states; in 1880 in twenty-four states. Scythe-snaths were in 1870 made in three states; in 1880 in nineteen states. Of grain-cradles, in 1870, 38 per cent. were made in Indiana, 33 per cent. in New York, and 16 per cent. in Michigan; in 1880, 27 per cent. were made in Indiana, 23 per cent. in Michigan, and 22 per cent. in New York. Of scythe-snaths, in 1870, 74 per cent. were made in Vermont, 22 per cent. in Pennsylvania, and 4 per cent. in Maine; in 1880, 34 per cent. were made in Vermont, 14 per cent. in Iowa, and 13 per cent. in Michigan. Such manufactures are often predominant in well-wooded states, although it is obvious that with the transportation facilities for light freights this may easily become a secondary and obscured influence.

Hand-rakes were in 1870 made in fourteen states; in 1880 in twenty-five states. Hay-forks were in 1870 made in fourteen states; in 1880 in seventeen states. Of hand-rakes, in 1870, nearly 70 per cent. were made in Michigan alone; but in 1880 over 71 per cent. were made in New York alone, this including both hay- and garden-rakes. In 1870 hay-forks were most largely made in New York, Pennsylvania, Indiana, and Ohio; in 1880 most largely in Pennsylvania, Vermont, Ohio, and Michigan. Scythes and sickles were in 1870 made in nine states, most largely in Connecticut, New York, and Rhode Island; in 1880 they were made in thirteen states, scythes most largely in Maine, Connecticut, New Hampshire, and New York, and sickles principally in Ohio, Maine, and Connecticut.

Of grain-drills, seed-sowers, fertilizer distributers, and grain-sowers, in 1870 the manufacture was confined to fourteen states, and was most largely conducted in Ohio, Indiana, and New Hampshire. In 1880 these implements were manufactured in twenty-six states, and most largely in Ohio, Indiana, and Wisconsin.

In 1870 there were built, as reported, 24,062, and, in 1880, 19,527 thrashers and separators. This numerical decrease may be attributed to the greater use of combined thrashers and separators, so that while the aggregate number of both is decreased the function of the governing unit may in many cases be considered to be doubled. In 1870 the manufacture of these machines was conducted in twenty-two states, most largely in Missouri, Ohio, and Pennsylvania; and in 1880 they were manufactured in twenty-six states, most largely in New York, Ohio, and Wisconsin.

The great growth (eighteen-fold) in the manufacture of lawn-mowers simply bears evidence of the increasing custom of keeping lawns closely trimmed. In 1870 nearly all of them were made in New York, but they are now made in six states, notably in Pennsylvania, Ohio, New York, and Connecticut.

Hay- and fodder-cutters were in 1870 made in thirteen states, most largely in Massachusetts, Connecticut, and Ohio. They are now made in twenty-five states, and most largely in Massachusetts, New York, Kentucky, Michigan, Connecticut, Ohio, and Virginia.

Hoes in 1870 were made in twelve states, most largely in Massachusetts, Connecticut, and New York; and in 1880 in thirty states, most largely in Kentucky, New York, Ohio, Massachusetts, and Michigan.

Stump-pullers, whose manufacture is of course indicative of forest clearings, were in 1870 made only in Pennsylvania; but in 1880 the manufacture was extended into eleven states, most being made in Wisconsin, Michigan, and Indiana.

Of horse-powers in 1870 about 37 per cent. were made in Ohio, 19 per cent. in New York, and 12 per cent. in Michigan; in 1880, 17 per cent. were made in Ohio, 16 per cent. in Wisconsin, and 13 per cent. in Pennsylvania, the manufacture being more generally distributed.

Of sirup-evaporators 24 per cent. are made in Vermont, 21 per cent. in Missouri, and 16 per cent. in Kentucky.

The change in the numbers of operatives employed in the manufacture of agricultural implements in the several states is shown for the last four census years to be as follows, the states being grouped according to the tendencies in growth or decadence of the manufacture within their limits:

States.	1850.	1860.	1870.	1880.	States.	1850.	1860.	1870.	1880.
Continuous increase.					*Increase after* 1870.				
Ohio	765	2, 239	5, 124	7, 536	Virginia	374	418	267	530
Illinois	646	1, 790	3, 935	7, 300	Maryland	333	368	295	356
New York	923	2, 905	4, 953	6, 462	North Carolina	52	100	78	202
Pennsylvania	947	1, 465	2, 286	2, 617	Tennessee	143	110	110	178
Indiana	210	709	1, 268	2, 471	Texas	....	138	44	139
Wisconsin	178	666	1, 387	2, 067	Delaware	20	116	56	66
Michigan	35	666	969	2, 004	Mississippi	113	127	34	61
Minnesota	....	42	167	1, 197	Alabama	23	84	9	36
Kentucky	217	462	624	1, 033	Massachusetts	786	630	477	973
Iowa	15	208	552	809	South Carolina	53	30	....	88
Missouri	39	221	537	726	Vermont	178	155	372	464
California	....	12	68	295	Maine	325	189	219	448
Kansas	....	3	29	103	Georgia	205	37	59	274
West Virginia	....	....	55	63	Arkansas	14	10	16	24
Nebraska	....	....	9	54	*Decrease after* 1870.				
Oregon	....	7	10	18	Connecticut	297	498	593	565
					New Jersey	80	260	366	206
Continuous decrease.					New Hampshire	147	96	184	178
Louisiana	29	28	15	5	Rhode Island	70	10	81	16

From the growth of the West, and also from the change in farm methods, the facts cited relative to the manufacture of specified implements show that the manufacture has been greatly diffused; but apart from this growth the tendency is toward concentration into fewer establishments. The following table shows the number of operatives per establishment in the United States and in the several states for 1850, 1860, 1870, and 1880 in that order, fractions being discarded:

States.	1850.	1860.	1870.	1880.	States.	1850.	1860.	1870.	1880.
The United States	5	7	12	20	New Hampshire	5	3	7	10
					Texas	....	3	3	10
Ohio	4	12	23	48	Virginia	3	7	7	10
Minnesota	....	3	6	37	Maryland	4	10	8	9
Massachusetts	14	11	12	33	Missouri	4	5	14	9
Illinois	7	8	13	33	Kansas	....	3	9	7
Connecticut	8	10	15	26	Tennessee	2	7	4	5
Indiana	3	6	10	25	West Virginia	....	....	5	7
New York	6	8	14	24	Delaware	5	6	5	5
Wisconsin	5	8	16	19	Louisiana	2	2	15	5
Maine	6	4	6	16	Mississippi	3	3	3	5
Michigan	2	6	5	14	North Carolina	3	4	3	5
California	....	2	6	14	New Jersey	3	7	12	5
Georgia	7	2	5	13	Oregon	....	1	2	4
Vermont	5	4	8	13	Rhode Island	23	3	16	4
Iowa	3	4	10	13	Nebraska	....	....	4	4
Kentucky	4	7	14	12	Arkansas	3	1	16	2
South Carolina	4	2	....	12	Alabama	11	4	3	1
Pennsylvania	4	5	7	11					

While in the entire Union the number of operatives has steadily increased, the number of establishments has now begun to fall off. In six great agricultural states the number of establishments culminated in 1870, viz:

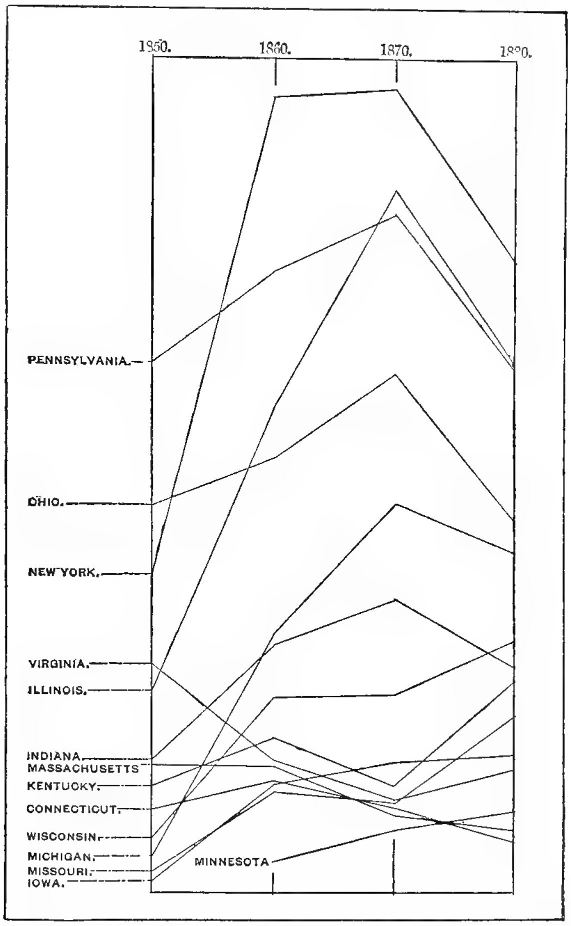
States.	1850.	1860.	1870.	1880.	States.	1850.	1860.	1870.	1880.
New York	135	333	337	265	Ohio	161	182	219	156
Illinois	84	201	294	220	Michigan	13	108	164	143
Pennsylvania	222	260	286	220	Indiana	58	103	124	96

That is, in 1870, or later, the growth generally ceased to consist in the making of new establishments, and was concentrated in the enlarging of established factories, some small establishments being absorbed.

In two states, Connecticut and New Hampshire, the growth in the number of establishments culminated in 1860, and in two other New England states, Maine and Massachusetts, the number of establishments has decreased since 1850.

In only six rapidly-growing states has there been a continuous increase in the number of establishments, viz., Wisconsin, Iowa, Minnesota, California, Kansas, and Nebraska. In Kentucky, Missouri, New Jersey, Delaware, and Oregon, and in all of the southern states except West Virginia, there was a falling off in the number of establishments in 1870, generally followed by an increase in 1880.

The progress of growth and concentration in the states in which an average of over 500 operatives is employed is shown graphically in a diagram of the relative numbers of establishments:



While the manufacture of agricultural implements is, of course, dependent upon agriculture, it is mainly dependent upon an agriculture revolutionized by agricultural machinery itself—a manufacture which may be said to have made itself necessary, and which has created its own demand. Already the influence of this industry has had a significance of which but few are fully cognizant. In other arts curious developments have been made and great progress has been achieved, but this progress and these developments have been accomplished mainly by the labor freed from the necessary tillage of the soil by the manufacture of agricultural implements. This manufacture, now pursued by only thirty or forty thousand operatives, has been the simple means of taking hundreds of thousands from farm work, of feeding them, clothing them, educating them, and establishing them in every species of manufacture, art, and profession, and this is one of the prime causes of the rapid development of this country.

It is in the immense applicability of these improvements that their great power lies, as they lessen the labor of millions of men engaged in raising food products. Their economic influence is greater than any other in the whole range of labor-saving invention, because it applies to the greatest class of workers and to the most fundamental species of work.

The processes of fifty years ago, plowing and turning under the hand-sown seed, weeding and stirring the soil with hand-hoes, mowing and raking hay and cradling grain and binding it by hand, required implements which made a comparatively small demand upon the manufacturer; and the flail for thrashing, and the shell-shaped, wicker-work hand-fans for winnowing the grain on the barn-floor, unknown to this generation, were implements of slight cost. Over two-thirds of the value of farm implements now in use is estimated to be in the improved machinery which distinguishes modern from primitive American farming.

The increased cost of farm implements and machinery appears very great when we consider the numbers of men employed with machinery of a given cost. There is one man to a plow, and one man to a sulky-plow or a pulverizer; but the latter may cost five to ten times as much as the former. There is one man to a hoe, and one man to a riding cultivator; but the cultivator may cost fifty times as much as the hoe. There is one man to a hand-rake, and one man to a horse-rake or a hay-tedder; but the latter may cost twenty to fifty times as much as the former. There is one man to a scythe or a grain-cradle, and one man to a mower or a reaper; but the latter may cost seventy to one hundred times as much as the former. We find one man to a flail, and a few men to a separator and engine; but the latter may cost a thousand-fold more than the former. When, therefore, knowing that machinery of high cost has gradually superseded inexpensive hand tools, we still find that since 1850 the value of farm implements and machinery, instead of increasing, has fallen off, relative to the value of farms for the entire Union, and most notably so in the heavier farming sections, it would appear that an estimate of double the amount of labor for the hand tools upon the same acreage would be an inadequate estimate, despite the increased value of farm land and the inclusion of wagons, harness, etc., among farm implements in either case. But if only half the labor has been saved, it is easy to estimate how great a body of men is relieved of the work of farm labor *pro rata* by every man engaged in the manufacture of agricultural implements. It is, in fact, estimated by careful men, thoroughly conversant with the changes that have taken place, that in the improvement made in agricultural tools the average farmer can, with sufficient horse-power, do with three men the work of fifteen men forty years ago, and do it better.

It is as a condition in the manufacture of agricultural implements that this saving in farm-work is here treated, and it explains the growth of great factories, the wholesale demand for their products, and the cheapness with which those products may be furnished to the farmer. But a comprehensive exhibit of this saving can only be made by reference to farm work, which is more or less desultory, the seasons of plowing and seeding in spring and fall, of cultivating growing crops, of hay-making and harvesting, creating imperative demands for the prompt exercise of much labor, other less exacting duties being made to fill in the time between these working seasons.

The first of these classes of work is naturally the preparation of the soil. The labor of plowing may be more distributed than that of harvesting. For stony soils less saving seems feasible in this duty than in any other. Harrows and scarifiers have long been in use, but their extensive employment for saving replowing is a modern practice, the advance of which is shown by the immense relative increase in their manufacture. In preparing land for turnips after wheat two scarifyings (including seeding) and one plowing displace four plowings and seedings, and as the draft of a scarifier may be estimated at from one-half to one-fourth that of a plow for the same speed and width of land passed, the horse-labor saved is about in the ratio of four to one and two-thirds, and for six-horse gangs of cultivators or harrows—compared with single-plow furrows, the width of land being about as 5 feet to 5 inches—it will be seen that the saving in men's labor will be even greater. For ordinary plowing the amount plowed will not exceed that of thirty or forty years ago, but the comfort and the rapidity of working have been increased by sulky- or riding-plows. In the east many side-hill or reversible plows are made in place of ordinary land-side plows, which leave a dead furrow, that may later interfere with the convenient operation of horse-mowers, tedders, and rakes. The form of point, share, and mold for the best results obviously differs for every condition of tenacity of the soil and depth of furrow, and to meet these conditions a great variety of forms is made. Thus a prairie-breaker or a road-plow has a longer, sharper share than a stubble-, a deep-soil-, a sod-, or a trench-plow, and the heavy clay soils of Indiana and of Ohio, the sugar-lands of Louisiana, and other sections have each their series specially adapted to their crops and soil, each manufacturer making a specialty of a number of such established series. For alluvial or black, sticky soils a plow that will scour well is necessary. This is secured by making the shares of cast-steel or of chilled or patent hard metal. Of the whole number of plows made per year in this country, probably about half a million are cast-steel plows for the alluvial soil of the Mississippi valley.

Some degree of interchangeability was practiced in making plows at an early period. For the same size and series the shares are made interchangeable, and the slip-share points and other plow parts are often made removable and interchangeable, so that a single plow stock may serve for a variety of attachments, while the change of slip-share points saves shares and keeps the plow in running order at a comparatively small expense. But in the manufacture of plows the advantages of uniformity as an administrative feature of the work are not to be rated above other benefits resulting from the most easy and natural methods. The same is true in the manufacture of many other agricultural implements, where the forms are given by casting and finished by grinding, and it is only in such wrought-iron work or in such fine cast-iron work as requires cutting or paring by machine tools that uniformity of work exhibits distinctive advantages in the division of labor and the system of working.

The usage of different sections in the employment of farm machinery may occasionally throw some light upon items enumerated as units, but at the same time having great differences among themselves. Thus the term plow covers all kinds, from a small and cheap stirring-plow to an expensive sulky-plow. Handled plows are used everywhere, but the sulky-plows principally in the western farming states, being manufactured by a comparatively few large factories in that section. A single style of sulky-plow is estimated to be in use on 60,000 farms.

Two-horse and riding cultivators are largely used in the West, and the screw pulverizer, which does such peculiar and effective service, was employed on over 35,000 acres of land in 1880. In New England the cultivator is mainly used with one horse for cultivating between rows of corn or of root crops. It also takes the place of the harrow in covering grain. Handled cultivators have wheels or runners to gauge the depth of working. The simplest form of cultivator is a V- or an A-frame with cast-iron duck feet. The cultivator may have pulverizing point teeth, or these may be replaced by hoes, scooters, bull-tongues, colters, hilling wings, etc. Tobacco- and cotton-ridgers are sometimes provided with marking wheels for making equidistant holes for seed. In the horse hoeing-machine the hoes are of an inclination adjustable by handles, so that the weeds may be neatly removed and the soil stirred about hills or rows of plants. It is but a moderate estimate to say that in corn a horse-hoe will do the work of five men, beside keeping the weeds under better. It also enables the farmer to finish hoeing before the haying season begins.

Of harrows there is a great variety, the simplest form being an A-frame, with teeth. In order more fully to pulverize and go over the soil harrows are commonly made in sections, hinged so that they will vibrate. Spring teeth are also employed as well as ingenious contrivances which rotate the teeth as they are drawn through the soil. In fallowing (or cross-plowing) a well-known form of disk-harrow, which operates by cutting the soil into thin slices and breaking these by the oblique setting of the disks, is claimed to do more and better work than six plows.

Seed-drills and fertilizer distributers are commonly also cultivators. The walking-drills have tongues, shovels, hoes, or brake-pin teeth, and the riding-drills have points pressed down by springs, the seed being automatically fed through ducts or so-called shoes or boots, the quantity being adjustable. Seed-drills sow from one to eight or more rows at a time, the spacing of the rows being sometimes variable. Cottonseed, with the fiber, is sowed after being prepared with a solution, to prevent the seed from sticking together. The first two-rowed cotton-planter was made in 1879, one-rowed planters being previously used. The seed is pressed by following-wheels. With the two-rowed planter it is claimed that one man and a mule will do the work formerly requiring six men and four mules. Combining as they do cultivating and seeding, seed-drills effect their saving doubly as compared with hand seeding and hand cultivating. A one-horse check-row corn-planter plants 8 or 10 acres a day; a two-horse eight-shoe planter plants 16 or 17 acres of rice a day.

In hay-making a good tedder will do the work of ten or fifteen men in spreading and turning hay, and self-dump riding-rakes enable a farmer's boy to do the hand work of about five men.

Of hand-reaping nearly a third of the labor is in binding into sheaves. The performance of this hand work by machinery was begun during the past decade in the introduction of self-binding harvesters, working with twine or with wire, and these machines involve a high degree of mechanical ingenuity in their design, as well as of efficiency in operation. Under ordinary conditions, reapers will go over 15 or 20 acres a day. A self-binder will cut and bind 15 acres a day, and one of these machines has been known to work at the rate of 30 sheaves a minute. It is considered that with the average of mowers, reapers, and harvesters one man and a pair of horses will do the work of eight men. Manual delivery reapers are used by the smaller farmholders in the East or elsewhere.

In thrashing, the capacity of machines varies with the size and the speed of cylinders. The efficiency of the means of separation also varies. On headers in California one 25 horse-power thrasher has thrashed over 6,000 bushels of wheat in a day, requiring ten headers (reapers that cut off the heads of the grain) and thirty-six header-wagons, and keeping four men busy filling and four sewing sacks. With ordinary thrashers perhaps ten bushels of wheat per horse-power per hour is a good average, although better showings are often obtained. Oats shell easily and thrash twice as rapidly as wheat. In the great wheat states large thrashers or separators are used with steam-power. If horse-power is used, the lever-powers are more common; but in New England and the East the tread-powers are preferred, being commonly used with one, two, or three horses. The so-called ground-hog thrashers (not mounted upon wheels) are somewhat used in Kentucky and Tennessee, and similar fixed machines are used in New England, the power being the lever in the former and the tread in the latter case. With a simple hand-thrasher used in New England, one man turning and one feeding, 10 bushels of oats per hour may be thrashed. The efficiency of the simple work of thrashing by machine and by flails may be estimated in contrast at twelve or fifteen to one for the human labor employed, without regard to the separating done by the machine, which, compared with hand winnowing, would probably show an equal saving.

Horse-power is recommended for thrashers requiring six horse-power or less and steam-power for thrashers requiring 8 horse-power or more, and it is said that a steam-engine will pay for itself on a farm of upward of 200 acres. In the more settled sections steam is cheaper than horse-power, and horses are necessary for many classes of work to which steam-power has not been adapted; but for heavy work in thrashing, steam-power is notably cheaper and more rapid than horse-power, and in some sections the power applied in thrashing during the harvesting season is at other times used for wood-sawing, cotton-ginning, milling, or light manufacturing.

Much of the labor saved by improvement in agricultural tools is not to be found in any financial equivalent, but it exists in the greater ease of farm life, the shortening of the day's labor and of seasons of heavy work, and in other comforts of living. In the matter of household furnishing, persons brought up in the enjoyment of many luxuries do not comprehend that they are the result of saved labor, because they have no realizing sense of the bare floors, the unplastered walls, the thatched roofs, and unpainted exteriors common to the ordinary conditions of farm life half a century ago—conditions as luxurious as a man could earn with the ox-plow, the hoe, the spade, the scythe,

the cradle, the hand-rake, the hay-fork, the flail, and the hand-fan; and to gain an idea of how many fold in the intrinsic results of labor present conditions are superior to those of the past we must contrast their cost with that of the barest necessities of living.

In former times, moreover, agricultural produce was not subject to so much freighting and mercantile handling. The mercantile handling of some products (notably fruits and hay) has had an immense growth within the past few years; but in former times a much larger population lived in the country upon the immediate products of farms, and a relatively smaller number in the manufacturing and commercial centers. Smaller money values, therefore, were used in moving and handling food, and a person whose mind naturally reverts to the most plenteous harvests whose produce was given away or destroyed, but who has come from the farm to a city or town life, in which every article of food must be bought with money, may have no realizing sense of the fact that food is obtainable in greater quantity and variety for a less expenditure of labor now than ever before. These considerations are stated, not digressively, but simply to show that the remarkable statements of labor saved from the use of agricultural machinery are not inconsistent with the present prices of farm produce or the present conditions of farm life.

Since the majority of farmers are already farm proprietors, employing an average of less than a laborer each, and since many conditions combine to forbid the enlargement of farms, it may be considered that the available labor-saving efficiency has been nearly reached.

Almost every comparison of agricultural statistics illustrates the influences of improvement in agricultural machinery. The relatively larger employment of horses in place of working-oxen, as evidenced by statistics, is chiefly due to improved machinery. The ox is not swift enough for labor-saving riding implements; and harrows, riding cultivators, sulky-plows, screw pulverizers, and the whole range of haying and harvesting implements, are drawn by horses, the ox being only employed for carting and heavy plowing and harrowing. Taking three states for example, we form the following table:

MASSACHUSETTS.

Year.	Horses.	Work-cattle.	Ratio of horses to work-cattle.
1850	42, 216	46, 611	0. 91
1860	47, 786	38, 221	1. 25
1870	41, 039	24, 430	1. 68

OHIO.

1850	463, 397	65, 381	7. 09
1860	625, 346	63, 078	9. 91
1870	609, 722	23, 606	25. 82

ILLINOIS.

1850	267, 653	76, 156	3. 51
1860	563, 736	90, 380	6. 23
1870	853, 738	19, 766	43. 19

These figures from former census years are very instructive in exhibiting the tendencies in the growth of the usage of improved agricultural tools. They also illustrate the difference in rapidity of working practicable on the prairies of the West, as compared with the stony and hilly land of New England, especially in the preparation of the soil.

While the value of agricultural implements manufactured per annum in the entire Union has increased nearly one-third since 1870, the production has generally fallen off in the New England and the middle states on account of the employment of the facilities for other manufacturing purposes. But in Maine, Massachusetts, and Vermont the development of large factories devoted to agricultural specialties has more than compensated for the general falling off, the production in Maine having nearly trebled, while in Vermont it has increased by over one-third and in Massachusetts by nearly two-thirds. In New York also, in which state the production has fallen off slightly, and in Pennsylvania, where it has barely held its own, the general falling off has been much greater, having been more or less compensated by the growth of a few centers of manufacture. The increased production in the southern states has been relatively considerable, but not great in itself, with the notable exception of Georgia, in which state the production has increased nearly eight-fold, a rate only exceeded in Minnesota. In Indiana the production has more than doubled, while in Michigan the rate of increase has been nearly in the same ratio, and in Illinois, Iowa, and Wisconsin it has increased by over one-half.

MATERIALS.

After a careful study of the statistics of the manufacture of agricultural implements, it can only be said that the variations in the implied ratios of product to material appear due to a confluence of causes, of which no assignable ones are sufficiently distinctive to establish very decided rules; but the high ratios of product to material will often be found in those sections where manufacturing is not pursued effectively, or in large factories, and the low ratios in the great centers of manufacture for agricultural implements. Where for a similar class of work the value of the material appears only doubled or less than doubled in large factories, in sections where the manufacture must be pursued on a small scale the value is sometimes increased four or five fold. The principal significance of this is that labor is applied with greater system and advantage in the large factory, and its value relative to the value of material is thereby diminished; but of course inefficient and desultory labor can only compete with highly-organized labor to an extent limited by local demand, transportation facilities, and other conditions of trade.

The influences due to organized system in manufacture in determining the ratio of product to material will be found more marked than the influences of the cost of materials in different sections of the country, or even than those due to the different kinds of implements manufactured. In the cost of the more essential materials the variation is more notable from time to time than from section to section. The sources of supply for pig-iron, wood, and coal are so widely diffused, and the means of transportation are so readily available, that the cost of wood and of iron at least will be found to vary only 12 or 15 per cent. for the more important manufacturing sections, while a few months may show a greater fluctuation in the market at New York. The cost of coal is not of sufficient importance to determine the location of factories in sections where it may be most cheaply obtained unless these sections are also great agricultural fields. In New York and in Illinois coal is higher than in West Virginia, Pennsylvania, Missouri, Kentucky, and Ohio; and in Wisconsin, Michigan, Minnesota, Iowa, Maine, Vermont, Massachusetts, Georgia, and other important manufacturing states it is very much higher, sometimes two or three times as high as in the five prominent coal states mentioned.

For the limited manufactures of less-settled sections a small quantity of material is often obtainable at a small cost, while the locality would be unable to continue the showing upon a larger scale. Thus, in a frontier state, where pig-iron rules high, an anomalous appearance might result from the purchase of a lot of scrap at lower than iron region prices. The statistics of manufactures are full of such special instances, which make exception to methodical ratios and caution us to rest our conclusions only upon a wide survey.

The more elaborate the product the less, of course, should be the relative value of materials, but the extremely variable conditions of labor and of demand in the different sections are sufficient to obscure the distinction.

More labor is also expended relative to the quantity and the value of material employed upon some hand tools than upon more complex constructions. Thus the same value of material put into shovels and into riding-harrows would acquire a considerably greater value in the former than in the latter case. Under similar conditions, and apart from occasional exceptions, the value of material relative to product is greatest in common drag-harrows, plows, and wood tools; next in horse-rakes, seed-drills, and cultivators; next in fanning-mills, thrashers, and separators; and least in mowers and reapers Plows, being made nearly everywhere, exhibit the widest range of ratios; but the manufacture of complex mechanism, such as that of harvesters and separators, is, with few exceptions, confined to those factories where the work is pursued effectively with a system of interchangeability and the division of labor which it entails, so that, despite the intrinsic work done, the value of the product is often less than double that of the material.

Given a well-organized system of manufacture, with a close division of labor, and complex products can be produced as cheaply as simple ones, and the added labor and expenses do not give a large increase to the value of the material. In sections whose facilities permit the manufacture of composite machines only in the old-time way, one man or a few men doing all the work upon a machine, the process is so slow as to be almost prohibitory when (by means of transportation) it is brought into competition with the results of modern and improved systems. But simple products, which involve little or no division of labor, can be made upon a small scale, perhaps not as advantageously as in large quantities, but still at a disadvantage so small as to be counterbalanced by nearness to a limited and local market.

Respecting the values of wood and of iron and steel used, the value of wood is usually the greater in fanning-mills, corn-shellers, grain-cradles, etc., and sometimes in thrashers and separators. In plows, cultivators, and harrows, and in mowers and reapers, the value of iron and steel is the greater, as it also commonly is in horse-powers, horse-rakes, and grain-drills. The classification in this respect is an obvious one, the wood tools and set machinery framed in wood being on one side, and the plows and riding machinery, largely composed of iron castings, on the other, the relative values of the materials being less distinctly emphasized in the lighter riding machinery. In every state plows and agricultural castings are manufactured so largely as to reduce the relative value of wood, which is usually less than 40 per cent., and in the majority of states less than 30 per cent. of the value of all materials. The manufacture of iron mowers and some forms of seed-drills requires a relatively smaller value of wood than for plows, and has its influence upon the aggregate ratios of such states as New York and Ohio, while in Vermont the manufacture of hay-rakes, etc., and in Minnesota and in California of thrashers and separators, may be instanced as producing a contrary effect. Of the values of metal and of wood used the following table gives the ratios by states:

States.	Percentage of wood.	Percentage of iron and steel.	States.	Percentage of wood.	Percentage of iron and steel.
Missouri	64	36	Illinois	28	72
California	52	48	Arkansas	29	71
Delaware	46	54	North Carolina	24	76
South Carolina	42	58	Virginia	25	75
Connecticut	38	62	Alabama	25	75
Vermont	38	62	Wisconsin	24	76
Oregon	38	62	Massachusetts	23	77
Minnesota	36	64	Mississippi	22	78
Rhode Island	33	67	New York	21	79
Nebraska	34	66	Indiana	21	79
Kansas	32	68	Louisiana	17	83
Michigan	30	70	Kentucky	16	84
Maryland	29	71	Georgia	16	84
New Jersey	29	71	New Hampshire	14	86
Pennsylvania	30	70	Ohio	14	86
Texas	28	72	West Virginia	14	86
Iowa	28	72	Utah	13	87
Tennessee	29	71	Maine	8	92

It happens that for the entire Union there is used in the manufacture of agricultural implements not far from a ton of iron and steel to every thousand feet of lumber. The percentage of value of unspecified material relative to all material ranges from 5 to 37 per cent., being commonly from one-fourth to one-fifth. A fuller return of mill supplies and material other than constituent may be expected from a large than from a small factory. That this is the fact is evidenced by the following table, showing the average number of operatives per establishment and the percentage (by value) of material returned as other than wood, iron, and steel for the several states:

States.	Operatives per establishment.	Per cent. of material unspecified to all material.	States.	Operatives per establishment.	Per cent. of material unspecified to all material.
Ohio	48	25	Texas	10	22
Minnesota	37	27	Virginia	10	14
Massachusetts	33	8	Maryland	9	13
Illinois	33	28	Missouri	9	6
Connecticut	26	17	Kansas	7	15
Indiana	25	25	Tennessee	5	19
New York	24	23	West Virginia	7	20
Wisconsin	19	27	Delaware	5	22
Maine	16	24	Louisiana	5	8
Michigan	14	37	Mississippi	5	14
California	14	21	North Carolina	5	22
Georgia	13	23	New Jersey	5	25
Vermont	13	30	Oregon	4	18
Iowa	13	22	Rhode Island	4	17
Kentucky	12	31	Nebraska	4	5
South Carolina	12	25	Arkansas	2	30
Pennsylvania	11	18	Alabama	1	22
New Hampshire	10	23			

Exceptions will, of course, be noted, but if we take the averages of over ten and under eleven operatives per establishment, as given by states, the value of material other than wood, iron, and steel will appear as 24 per cent. in the former against 17 per cent. in the latter case. Of the more notable exceptions, also, in Massachusetts and in Connecticut, the most important items of manufacture are shovels and hoes, which require but a small value in mill supplies, and in the case of Arkansas the peculiarity of the showing is due to one or two shops, whose product conveys no apparent justification for the disproportionate value of other material consumed.

For the three census years, 1860, 1870, and 1880, the values of material, product, and product less material per given number of operatives, compared with the showing of 1850 as a unit, appear as follows:

	1850.	1860.	1870.	1880.
Material	1	1.12	2.51	2.35
Product	1	1.24	2.17	1.83
Product less material	1	1.31	1.99	1.54

The ratio of product to material was, in 1850, 2.80; in 1860, 3.11; in 1870, 2.42; and in 1880, 2.18. In 1870 the prices of materials may be said to have been high, with a stubborn downward tendency; in 1880 much lower (we may say roundly one-sixth), but rising with great fluctuations. It is considered that 10 per cent. more material was actually handled per operative in the manufacture of agricultural implements in 1880 than in 1870. The falling off of the ratio of product to material, which has progressed since 1860, is doubtless due in part to the labor saved by more wholesale manufacture, but probably in some degree to the more direct influences of competition, and also to the fuller returns of mill supplies in the later census years.

There are required for 600 cast-iron plows of medium size, and having iron beams and wooden handles, $300 worth of ½-inch and ⅜-inch bolts, 600 pairs handles, worth $132; 600 cross-bars, worth $12; and about $30 worth of paint, beside 52½ tons of pig- or scrap-iron, at 3 cents per pound, amounting to $3,150; or we may say for a single plow, 50 cents' worth of bolts, a pair of handles at 22 cents, a cross-bar at 2 cents, 5 cents' worth of paint, and 175 pounds of pig-iron at 3 cents=$5 25, the material of the plow costing $6 04, of which about 86 per cent. is in cast- and 8 per cent. in wrought-iron. For a chilled plow of about the same value made in large lots we may reckon the value of iron and steel at $4, lumber at 26 cents, and other materials at 85 cents per plow. For another plow of similar weight, but with a wooden beam, the iron is rated at $4 25, wood at $1 75, and other materials at 15 cents per plow.

In making hoes there are used for a common size of garden-hoe 1⅓ pounds steel and iron, at about 5 cents per pound, amounting to about 7 cents; about 3 cents' worth of ash wood, about 2 cents' worth of grit (or grindstones), and for forge (anthracite) and power coal, about 1 cent's worth (four times as much for power as for forging). Thus for a hoe worth about 32 cents the constituent material costs about 10 and the other material about 3 cents. The total value given is therefore about two and one-half times that of the material. In like manner, for an ordinary shovel there may be required 4 or 5 pounds of iron or steel, a handle worth about 7 cents, and a few cents' worth of other material, the ratio of the value of product to that of the material being also about two and one-half.

The material in so complex an apparatus as a large separator is subject to great variation, in accordance with the different constructions of machines, in some of which two-thirds of the value of the material is in the wood work, in others not more than a half or a third. The wood employed is such as is used in wagon work and machine framing, mainly ash and hickory, beside elm, poplar, hard pine, and other woods. The iron work comprises the usual wheel-work fittings, the thrashing cylinder, axles and bearings for thrashers, beaters, fans, etc., the pulleys, coupling rods and riddles, beside nails, hinges, and many small fittings, aggregating considerable value. The cost of other materials—paint, varnish, belting, mill supplies, etc.—is also considerable. In fanning-mills, corn-shellers, fodder-cutters, etc., the structures are not subjected to the strain which comes upon a mounted machine, and not as much ash and fine wood is used in the framing, but the machines are stoutly framed in wood, the iron work being confined to a few working parts, so that the value of the wood work is often from 60 to 75 per cent. of the whole value of the constituent material.

In implements for drilling or planting seed or grain there is a wide range in character and cost of construction. Some of the simpler forms of cotton-planters are little more than wood barrows, fitted up with simple feed-wheels and smoothers; but of the more elaborate riding-drills, the chief cost of the material is in the metal work, of which the seeding rigs, with their steel springs, cultivator points, and seed boots, constitute no inconsiderable part. The value of material is increased two or three fold in the manufacture, and 80 or 90 per cent. of that value is in the metal work.

In building 1,500 mowing-machines of an ordinary type there are required about $2,000 worth of hard lumber, $27,000 worth of iron, and $6,000 worth of steel, every such mower having $18 worth of iron, $4 worth of steel, and $1 33 worth of hard lumber put into it. For 700 mowers and reapers there are required 140 tons of iron, 6 tons of steel, and 60 thousand feet of hard wood, or, for each mower and reaper:

400 pounds of iron, at 5 cents	$20 00
17 pounds of steel, at 10 cents	1 70
86 feet of wood, at $30 per thousand	2 58
	24 28

Iron and steel, 50 to 75 per cent.; wood, 20 to 10 per cent.; and other materials, 30 to 15 per cent., may be considered to cover the ordinary range in cost of material. Separate factories have been established for making mower and reaper knives, thus affording an opportunity to specify this part of the work separately. In making knives the value of constituent material is about 40 per cent. of that of the product. For every knife there are used 3½ pounds of sheet-steel and 3 pounds of malleable iron, each knife containing about seventeen sections. The coal used in the manufacture costs a little less than 3 cents per knife. In the manufacture of a style of lawn-mower, 75 per cent. of the cost of all material is in the iron and steel, 5 per cent. in the wood, and 20 per cent. in the auxiliary materials.

For 2,000 riding-harrows of the disk type there are required $4,000 worth of lumber, $7,000 worth of iron, and $14,000 worth of steel, or, per harrow, $2 worth of lumber, $3 50 worth of iron, and $7 worth of steel. The value of material in one such disk harrow is equal to that in nearly 150 hoes, but there would be in the hoes more steel, more wood, and much less iron.

CAPITAL.

The returns of capital employed in 1880 in the manufacture of agricultural implements are comparatively satisfactory. Capital is often invested with peculiar vagueness. Investments are maintained by continual and often ill-accounted expense, which may sometimes amount to more than the preservation of the former conditions, and thus become an additional investment. Most factories grow, not by one investment, nor even by a few well-defined investments, but by gradual accessions more or less merged with the necessary running expenses. But the returns in this instance are as definite as the conditions will admit, showing both diligence in the enumeration and integrity in making the returns.

The capital investment should include the value of land, buildings, and machinery, and the surplus funds necessary to provide for stock, wages, and other expenses. Some of these expenses, such as rental, might be consistently esteemed the interest of a larger principal really invested in the business. The capital investment returned seems full enough to cover the items which have been enumerated as essential to the manufacture, and to express what the manufacturers understand their investment to be. It is therefore consistent with itself.

The manufacture of agricultural implements may, as a whole, be classified into blacksmithing, foundery work, wood-working, machining, grinding, and fitting or assembling. These may be ranged in the order of the capital usually required:

1. Machining and assembling.
2. Wood-working and assembling.
3. Foundery work, machining, and assembling.
4. Foundery work and grinding.
5. Blacksmithing and grinding.

Under the first head we would naturally place the manufacture of the finer class of iron and steel machinery; for example, reapers and self-binders; but foundery work will, in connection, form an important item, and may bring the requirement below that of the second head, under which would come the manufacture of thrashers, separators, etc. Plows and agricultural castings would come mainly under the fourth, and shovels, hoes, and agricultural forgings under the fifth head. Any high degree of assembling requires considerable capital, as it implies an organized system of making interchangeable work and machinery for making tolerably exact cuts, and also requires large floor and storage space. Wood-working often requires large space, much power, and costly machinery, and foundery work requires a larger expense for real estate, fuel, flasks, etc., than is usually required for the blacksmith's forge, even when it is associated with a few trip-hammers and bending presses.

In this manufacture as a whole the capital per hundred operatives was, for the entire Union, in successive census years, as follows:

	Amount.	Ratio.
1850	$49,365	1.00
1860	77,476	1.57
1870	137,964	2.79
1880	156,921	3.17

being now about three times as great as in 1850 and twice as great as in 1860. These figures are believed to mark with great accuracy the progressive development of organized system in the manufacture.

LABOR.

For the principal fourteen counties the average of wages paid per operative per annum is $449; for the rest of the United States, $355; but if the labor is one-fourth more costly per man for the large factories, the value of material handled per man is as $1,055 to $657, or over 50 per cent. more, and the product per operative is as $2,178 to $1,494.

SYSTEM AND PROCESSES.

In the cases of locomotives, sewing-machines, guns, and other products the known conditions of manufacture are so far uniform that the numbers of a specified piece of mechanism that may be produced per operative per annum may be stated with some degree of approximation, showing progress in contrast with what it has been in the past. But the manufacture of agricultural implements, except in its cruder and simpler products, was not developed until after the era of improved machinery began, and at the same time the work is so largely pursued in all parts of the country that, while a great number of illustrations are readily obtainable, the conditions of manufacture, the character of the defined implement, and the efficiency of the labor are much more variable. Apart from other investigations, the statistical tables themselves afford scope for some curious comparisons, but not without a sufficiently definite understanding of the character of the products enumerated.

For some of the simpler implements the weight is a partial criterion of the expense of manufacture. By the pound, a plow costs about double the cost of a cultivator and about treble that of an ordinary harrow. A handled plow also costs more per pound than a riding-plow, the proper plow parts usually costing more for the same weight than the running-gear. The weight of a plow of a given style will increase very nearly in proportion to the width of cut, being about 50 pounds for an 8 and 100 pounds for a 16 inch cut; but foreign plows usually weigh vastly more for the same depth and width of furrow. A riding cultivator may weigh about 300 pounds, and a sulky-plow of the "Gilpin" type weighs 450 pounds, while large harrows, as commonly used, will weigh between 100 and 200 pounds each.

If we take an average plow of about 12 inches cut, weighing 75 pounds, we may estimate an average product per operative for large works at about 120 plows per annum; or, if we take a plow weighing as much as an ordinary family sewing-machine, it may cost the buyer about half as much as the sewing-machine, but the number made per annum per operative will be about the same as in making sewing-machines. In this comparison much must be allowed for the higher organization and effectiveness of sewing-machine manufacture, and in practice the productive efficiency in plow manufacture is often much less than stated. It is found that where 9 men make plows at the rate of 66 per annum each, 180 men make a similar plow at the rate of 110 per annum each, wholesale work nearly doubling the efficiency per man.

Whether we take the product in value or in numbers of implements, it will usually be, per operative, much smaller for small shops than for large factories; but occasionally in the statistical tables a large apparent product per man will be obtained in a very small shop, which is due to the fact that the labor of the proprietor assists, but is not reported with that of the one or two men employed.

In like manner we might estimate that, per operative per annum, the average thrasher and separator might be produced at the rate of 8 or 20, the average mower at the rate of 40 or 50, the average harvester at the rate of 15 or 20, the average horse-rake at 50 or 60, disk riding-harrows at about 125, shovels at the rate of 200 dozen, and hoes at the rate of 300 dozen—results accomplished by organized system and division of labor; but these figures are intended to convey an idea of average and not of the most effective production.

For this whole range of manufacture the foundery may be considered the most essential department. In this the principal source of improvement is in more convenient forms of flask, and, simple as the change may seem, if an improved hinged flask is capable of only slightly increasing the daily work of a molder the aggregate advantage for a large force is very great, often greater than may be derived from more pretentious labor-saving appliances. If we compare the practice in a large plow foundery with that in a large sewing-machine foundery, we find that per man less weight of metal is used and the castings for fewer plows than sewing-machines are made; but for the same floor space a greater weight of plow than of sewing-machine castings is made, and there are more men to the same floor space for the plow than for the sewing-machine parts. The difference in production may be in great measure attributed to the employment of molding machinery in the latter case. For large plow-castings molding machinery is not used, but it is employed to a limited extent in making the small agricultural machine castings to which bench molding is applicable.

Cast-steel plow parts are commonly forged from the cast-steel by hammers or rolls, but the cast steel is sometimes recast into plows. In plow-making, if the plows are chilled, hard metal, or recast steel plows, the foundery is the principal department, but if the plow parts are forged from cast-steel plates, the blacksmith-shop may be the largest department. In such a plow factory the percentages of total floor space are occupied as follows: Blacksmith-shop, 42 per cent.; grinding-shop, 21 per cent.; foundery, 16 per cent.; wood-shop, 13 per cent.; fitting-shop, 8 per cent.

In blacksmithing a great deal of hand work with forge and anvil has still to be done, but where the expense is warranted by the output the forms are given to the heated metal by the pressure of shapes actuated by power. Die-forging with drops is employed in making plows, and rolling dies are also used. In making hand-tools of steel, blacksmithing is the principal work, and the stock is drawn and shaped with rapidity and cheapness by the use of presses and rolls. Scythes, like axes, are of welded steel and iron. The steel is first welded to the iron under a hammer, after which follow rolling to length, shaping out with a hammer, back-turning or bending to a curve, and upsetting the back of the scythe, which is done in a press. The heel of the scythe is made uniform and interchangeable by the aid of gauges. The scythes are hammered to a point by hand, after which they are hardened and tempered, straightened, ground, and polished. In making shovels, presses are used for cutting up and trimming and for forming the blade and the socket, and the rolling out of the stock is also part of the process. Of the machinery used the dies constitute an expensive item, costing, for any considerable variety of blade, as much as or more than the drops and presses with which they are employed. Forks are made of steel by similar machinery, but do not necessitate so great an expense for dies. The first operation is cutting off stock; the second, forming the shank; the third, passing through a "splitting and turning out mill", which roughs out the fork, forming the tines. The splitting-mill saves half the hand labor for this part of the work. The tines are then drawn out by rolls or trip-hammers, and the forks are passed through bending and forming mills, the tines being pointed by rolls. The metal is, of course, worked hot, and tempering followed by polishing and fitting to handles completes the hay-fork. Hoes are forged under trip-hammers and cut out with presses, after which follow neck-bending in presses, grinding, and polishing. In making hoes in a small factory the labor is about evenly divided between the hammer work, the grinding, the polishing, and the press and other work. Two men are required to a trip-hammer. The hoe is forged down from the bar to a flat spread shape, and is then reheated and rehammered. It is then sometimes rolled to thickness, which saves labor in grinding and insures evenness of temper, and it is then cut out to size by a trimming press, and, after reheating, is shaped or concaved by drop-forging in dies, the burr at the shank is taken off by a rapidly-revolving iron wheel, and grinding, polishing, and fitting to handles complete the hoe. Socket-hoes have the sockets welded upon the shanks.

The metal-working machine plant constitutes a much less part of the capital in the manufacture of agricultural implements than in other manufactures of interchangeable mechanism. In general agricultural works it is often not more than one-fourth as much as the value of the real estate. In making a style of mower and reaper a machine plant for turning out about a thousand machines a year is composed as follows: For the metal-working tools, 5 lathes, 3 drill presses, 1 planer, and 1 bolt cutter; for the wood-working tools, 2 planers, 3 circular saws, 1 band- or jig-saw, 1 or 2 boring lathes and 1 shaper; for the abrasive work, 4 or 5 grindstones and emery frames. In a general agricultural implement manufactory, employing about 70 men, there are used 24 metal- and 24 wood-working machines and 6 or 8 grindstones and emery frames. In one shop there were, per operative, 25 pounds shafting and 3½ feet belting. In plow work metal tooling is included in the fitting department, but this is mainly bench and anvil work, chiseling, forging, and grinding. The use of emery has largely displaced filing. Holes are more commonly punched than drilled in fitting plows.

In making mower knives the machinery, inclusive of power machines, is of less than one-seventh the value of the whole capital required, the tools being mainly power shears, punches for sheet-steel, milling-machines, and grinding and polishing frames.

In a small factory making cast plows one grindstone pit is used per 200 plows per annum. One grinding-machine is used per 15,000 mower knives per annum, and one grindstone pit for 30,000 hoes per annum. Scythe backs are ground in a machine to secure uniformity; scythe blades are ground upon large stones (6 or 7 feet in diameter) running at about 200 revolutions per minute.

In wood working, cut-off and rip saws, shapers, planers, mortising-machines, boring-machines, tenoning-machines, and pattern-turning machines are the principal tools. All of these are applicable to a great range of work, and there are few special tools except in wheel working. The work, therefore, demands no extended specification. It is similar to that of car- and wagon-shops, although both lighter and less elaborate than the work in car-shops. The rough stock is first cut up by a cut-off saw, which has a traverse relative to the work, being mounted upon a swinging arm or upon a carriage, the arbor driven by a take-up pulley, or by pulleys on such parallel swinging frames as permit the traverse. The stock is more exactly cut to shape by rip-saws, which are table saws with fences and adjustments. The shaper is a table machine with cutters upon vertical spindles, and for many classes of work its importance is only second to that of the saw. Both traverse and cylinder planers are used. Vertical mortising- or slotting-machines are often mounted on the same frame with boring-machines for the convenient performance of two classes of work which have often to be done consecutively. Tenoning is done by cutters upon revolving heads. Bending machinery for fellies, plow-handles, etc., is more or less simple, the wood being bent upon formers. Tool-handles of irregular forms are turned as rapidly as a man can place and center them.

Wheel-and-axle work may be considered to constitute a distinct branch of the industry, as it is often conducted separately. A special felly-machine will, with unskilled attendance, cut 3,000 wagon fellies a day; an axle-tree lathe turning to pattern will turn 40 pairs of axle-trees in ten hours. There are also special machines for mortising hubs, driving and tenoning spokes, and a great variety of other operations, wheel-making, from its peculiar character and the large demands of the work, having perhaps more labor-saving machines of special application than any other wood-working process.

The consumption of power in agricultural implement works will usually range from three-fifths to one horse-power, unless much wood working is done, when more may be required, as the rapid action of wood-working machines requires much more power than ordinary metal-working machines. Grinding also consumes a great deal of power, sometimes one or two horse-power per hour to a grindstone pit. In one case the power required in manufacturing mowers was found to be at the rate of 60 horse-power per mower per hour; and in another case, for mowers and reapers, it was at the rate of 100 horse-power per reaper per hour. So, in making hoes, it was found to be at the rate of four-fifths horse-power per hoe per hour, and in making disk riding-harrows it was at the rate of 45 horse-power per harrow per hour, while in the manufacture of plows it was found to range in a number of examples from 20 to 50 horse-power per plow per hour.

The foregoing observations regarding processes in vogue may aid in forming correct ideas upon a subject in which there is not enough consistency to admit of exact treatment, and in which there is great variation in methods pursued, work covered, and system employed. In some factories the piece-work system has supplanted the day's-work system, with the result of greatly improved efficiency. In the large factories piece-work is the rule, but the two systems are usually more or less merged.

The system of interchangeability is of course involved in the extensive manufacture of agricultural as of other machines, and is a practical necessity for large works, securing an efficient division of labor, as well as facility in making repairs. Parts of machines are customarily kept in store to replace parts that may become broken or worn, and these fitting parts are usually made to gauges; but agricultural machines have, as a rule, comparatively few fitting points, partly because the action of these implements is not mainly between the parts of the implement itself, but upon the soil or crops, so that interchangeability is not as important a feature. This is really a prime distinction between agricultural implements and the other forms of interchangeable mechanism which have been previously treated. Watches, clocks, and fire-arms have practically no exterior action so far as the functions of the mechanical parts are concerned, such action in the locomotive being confined to a few rolling surfaces, and in the sewing-machine to the point of a needle. But in the plow, cultivator, seed-drill, mower, etc., the principal acting parts work against extraneous bodies, whether clods of soil or gavels of grain, with which fitting and interchangeability are out of the question. While interchangeability is so far limited, it has a wide scope in the parts to which it is applicable; but for the small shops the conditions of output may not permit any great development of the advantages of a uniform system; for, though the repairs may be made practically uniform, the administrative advantages of division of labor cannot exist without a sufficiency of labor to be properly divided.

The larger the factory, and the more fully it is devoted to the production of a single implement, the higher will be the results attained in productive efficiency. In many of the large factories there is much room for improvement, especially in concentrating facilities upon a single product or upon a few products, and so long as the main dependence is upon a local market, however considerable, the manufacture will to a great extent be of a miscellaneous character, but everything tending to enlarge the market and unify demand will also unify the manufacture. It is in this connection that the export trade has and will have a bearing upon the productive efficiency of factories of this class.

Most of the large works export their products, and, while the exported product is relatively small in contrast with that of home consumption, American mowers, reapers, grain-drills, horse-powers, etc., are sent to Spain, Egypt, Denmark, Turkey, New Zealand, and in fact to all parts of the civilized world. But this exportation is handicapped by commercial disadvantages, and manufacturers often report that they have made a few such shipments "without effort", the demand coming from parties personally familiar with the superiority of American machinery.

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REPORT

ON THE

MANUFACTURE OF HARDWARE, CUTLERY, AND EDGE-TOOLS;

ALSO,

SAWS AND FILES.

COMPILED, UNDER THE DIRECTION OF

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I.—THE MANUFACTURE OF HARDWARE.

As to products of which hardness is the only quality clearly specified great range may be expected in the conditions of manufacture. Under the head of hardware, all handicrafts come together, and the use of some of its miscellaneous forms is involved by nearly every material want. The classification of the industry is therefore attended with peculiar difficulty. In order to make the statistics of the manufacture convey as well-defined ideas as practicable effort is here made to use the most natural and easily recognizable division, forming these seven classes: 1. Builders' hardware; 2. Saddlery, carriage, and trunk hardware; 3. Light handicraft tools; 4. Heavy and coarse hardware; 5. Light and fine hardware; 6. Domestic and other miscellaneous hardware; 7. Machinists' supplies (hardware).

These captions require to be more exactly defined by the items which they cover, as returned by the manufacturers. Without due appreciation of the miscellaneous character of the products of factories, generally and singly, exceptions may easily be taken to the grouping of items. Here, for example, it may be said are items properly belonging with agricultural implements, or under other heads. These articles, however, are so manufactured together with hardware and other miscellaneous products that they can best be classified under the head of hardware. The classes of domestic and other miscellaneous hardware and of heavy hardware contain such items to a considerable extent. It must be borne in mind that items so stated are often the mere addenda of large industries elsewhere classified, and that they do not largely affect the statistics. Single factories, at which thousands of different articles are made, must be classed according to their principal products, but the inclusion of other products should not be ignored. It is to be specially noted that the machinists' supplies (hardware) class constitutes but a small fraction of the manufacture of the articles enumerated, most of them being made, to a much greater aggregate value, in large machine-shops, bolt-works, and other establishments. But builders' hardware, saddlery hardware, light and fine hardware, and light handicraft tools are classes in themselves reasonably complete and distinctive.

Under the head of builders' hardware are included the items of general hardware (of which the greater part is commonly hardware for building purposes), and also blind hinges, blind staples, barn-door hangers, door bolts, door springs, bright-wire goods, hooks and hasps, tacks, knob screws, locks, blind fasteners, locksmithing, metal screw-tops, mineral door knobs, wood screws, sash hardware, spiral-spring hinges, speaking-tube fixtures, vault locks, latches, and wrought-iron blinds.

In connection with saddlery, carriage, and trunk hardware are included items of car hardware, driving bits, curry cards and combs, harness trimmings and ornaments, hames, wood hames, nickel-plated fittings, snaps, and stirrups.

Under the head of light handicraft tools are included the following items: bakers' tools, broom tools, bit-braces, brickmakers' tools, canners' tools, carpenters' tools, wood-workers' tools, confectioners' tools, coopers' tools, engravers' tools, bookbinders' tools, glove tools, glove dies, glass-workers' tools, hardware tools, hatters' tools, joiners' tools, jewelers' tools, jewelers' hardware, light tools, metallic planes, mallets, molding tools, miscellaneous tools, printers' tools, peg-awls, brad-awls, shoe tools, planes, rules and levels, screw-drivers, rawhide mallets, curriers' tools, small steel tools, screw-wrenches, tinners' tools, weavers' reeds, and watchmakers' tools and dies. In connection with the above some small and light machines are made, such, for example, as tinners' rolls and jewelers' lathes; but the great bulk of the manufacture is of hand tools, generally exclusive of edge and point tools, although these—for example, glove dies, carpenters' planes, curriers' blades, and shoe awls—are sometimes included in connection with other tools.

Under the head of heavy hardware will be found anvils, vises, box-straps, blacksmiths' tools and bellows, contractors' tools, calking-irons and hooks, hammers, hog-ringers, marine and shipsmith hardware, gas tongs, pokers, steam-fitters' tools and tube expanders, and also occasional items of agricultural steels, steel springs, stove castings, hatchets, horseshoes and nails, calks, metal chains, plumbers' hardware, pump hardware, railroad supplies and track tools, stove findings, and other iron work.

Light and fine hardware includes cabinet hardware, cabinet locks, buckles, drop-handles and draw pulls, light specialties, novelties, and patent articles in hardware, iron toys, japanned goods, lever buckles, office hardware, ornamental and stationers' hardware, pocket-book locks and tape measures, pianoforte hardware, shelf hardware, fine time-locks, upholsterers' hardware, undertakers' hardware, and coffin plates.

Under the head of domestic and miscellaneous hardware are included items of butter-trays, bed-springs, crimping-machines, copying presses and tools, carbon plates, carpet-stretchers, cow-bells, fireboards, fluting-machines, forks and fork tines, garden tools, gun implements, gas-machines, housekeeping and garden hardware, metal spinning, oil stoves, patent cotton-pickers, rakes, skates, roller-skates, seal presses, scales and balances, stair-rods and carpet-fasteners, scythe rifles, ticket punches, tin, iron, and enameled ware, and water filters.

Finally, under the head of machinists' supplies (hardware) are included the following items: mill and machine supplies, twist drills, taps and dies, bolts, nuts, etc., chucks, stocks and dies, and steel tools.

In the manufacture of hand tools in Massachusetts the largest single item of manufacture is of screw-wrenches, employing an average of 105 operatives, wages $59,884, materials $65,393, products $159,413. This item might perhaps with equal propriety have been classified with machinists' supplies.

The items comprised under the head of handicraft tools are noted for the several states, as this manufacture often indicates the prevalence of particular industries in localities within these states.

CALIFORNIA.—Canners' tools principally; also, molding tools (San Francisco county).

CONNECTICUT.—Hatters' tools, tinners' tools, and bit-braces in Fairfield county; carpenters' tools, rules and levels, tinners' tools, and watchmakers' tools in Hartford county, beside miscellaneous tools in New Haven and Litchfield counties.

ILLINOIS.—Tools, hatters' tools, and weavers' reeds in Cook county; watchmakers' tools in Kane county.

IOWA.—Watchmakers' tools in Lee county.

KENTUCKY.—Joiners and carpenters' tools in Campbell and Jefferson counties.

MAINE.—Carpenters' tools in Cumberland county; screw-drivers in Kennebec county.

MARYLAND.—Miscellaneous tools in Baltimore county.

MASSACHUSETTS.—Shoe tools and peg- and brad-awls in New Bedford county; shoe tools in Essex county; small steel tools in Franklin county; watch tools and peg-awls in Hampden county; broom tools and planes in Hampshire county; shoe tools, curriers' tools, and watch tools in Middlesex county; awls and rawhide mallets in Norfolk county; shoe tools, awls, and needles in Plymouth county; and screw-wrenches, shoe tools, awls, and mallets, and watchmakers' tools in Worcester county.

MICHIGAN.—Miscellaneous tools in Wayne county.

MISSOURI.—Planes in Scott county, and printers' tools in Saint Louis county.

NEW HAMPSHIRE.—Shoe tools in Rockingham county.

NEW JERSEY.—Tools and light and miscellaneous tools in Burlington, Cumberland, Essex, and Hudson counties.

NEW YORK.—Planes in Cayuga county; bit-braces in Erie county; glove tools and dies in Fulton county; carpenters' tools in Monroe county; bakers', glass-workers', and confectioners' tools in Kings county; hardware tools in New York county; tools in Orange county, and coopers' tools in Wayne county.

OHIO.—Tools in Ashtabula and Columbiana counties; coopers' tools in Cuyahoga county, and tinners', engravers', and bookbinders' tools in Hamilton county.

PENNSYLVANIA.—Tools in Allegheny and Blair counties; wrenches in Erie county; cigar-makers' tools in Lancaster county, and tools, umbrella tools, confectioners' tools, planes and wood-working tools, brick-makers tools, tinners' tools, and shoe tools in Philadelphia county.

RHODE ISLAND.—Jewelers' tools in Providence and Bristol counties.

TEXAS.—Tools and models in Grayson county.

WISCONSIN.—Tools and coopers' tools in Milwaukee county.

MATERIAL.

The large value of material consumed per operative, while indicative of a high productive efficiency when combined with a large ratio of product to material, indicates principally the high value and partly finished state of the material when combined with a small ratio. These figures are principally indicative of the position of the industry upon a scale of completed work. In determining this position two influences are continually at work: every labor-saving improvement contracts, and every refinement of finish and execution expands, the range of work of the industry, while the same influences affect the value of the material. This is here considered without especial reference to market fluctuations, although their influence and that of other ulterior causes aid in determining both the position and the range of manufacture. The cost of materials relative to the value of product being less for finer workmanship, and also for inferior productive facilities, and greater for coarser products and for the higher productive efficiency, it will be seen that very different influences may be at work to produce similar statistical results.

Basing the figures upon average numbers of operatives, the relative positions of the seven specified classes of work and the cost of production may be seen from the following table:

Per operative.	Heavy and coarse hardware.	Domestic and miscellaneous hardware.	Handicraft tools.	Saddlery hardware.	Light and fine hardware.	Builders' hardware.	Machinists' supplies.
Product	$1,777	$1,490	$1,449	$1,416	$1,409	$1,247	$1,008
Added value	921	715	893	746	806	680	747
Material	856	775	556	670	603	567	261

The reader will see that, upon the presumption of similar wages and incomes derivable from labor, the economy of the methods of manufacture must be greatest in builders' hardware and least in heavy hardware and handicraft tools. Upon the presumption of a similar cost per pound of material, machinists' and builders' hardware will be most and heavy hardware least costly for the same weight of material. While these presumptions are by no means strictly correct, they are not so far from correct as to invalidate these inferences. The figures for the several classes are also sufficiently distinctive to warrant the reasonableness of the classification as being founded not only upon the kindred uses of the articles manufactured, but upon kindred conditions of manufacture.

Each class will, however, from a statistical standpoint, exhibit examples of very different conditions. Two small factories in the same place, of about the same size, and both returned as manufacturing builders' hardware, have respectively per operative the following capital investments, wages, value of material, value of products, and ratio of product to material:

	Capital.	Wages.	Value of material.	Value of products.	Ratio of product to material.
1	$5,000	$550	$45,000	$50,000	1.11
2	500	500	100	1,500	15.00

These are extreme cases, but they stand side by side, the former, in ratio of product to material, ranking with such industries as the manufacture of lead shot, sugar-refining, milling (flour), and the currying of leather, and the latter in that respect ranking with the mining and fishing industries. Builders' hardware may thus be said to compass both industrial extremes in these two examples. The former may not be inconsistent with the manufacture of sash weights, spikes, brads, and cheap forgings, and the latter with the manufacture of the finest ornamental work, die-cutting, and special articles of hardware.

While in the manufacture of builders' hardware the value of the product averages about two and two-tenths the cost of material, in the manufacture of locks, latches, door bolts, and spiral-spring hinges the value of material is commonly increased more than threefold by the process of manufacture; while, on the other hand, the value of material is only increased by about one-half in the manufacture of ordinary butts, hinges, and staples. Thus, locks and hinges, the two most important products in builders' hardware, stand on either side of the average, locks being the finer and costlier and hinges usually the cheaper product. In large factories the weight of constituent material handled per operative per annum commonly ranges between 6,000 and 10,000 pounds, being, under other equal conditions, greater for a coarse than for a fine, and greater for a uniform than for a varied product.

In a large factory producing a high grade of goods in builders' hardware it was found that the percentages by weight of constituent material used were as follows: 54 per cent. pig-iron, 3 per cent. wrought-iron, 24 per cent. iron wire, 7 per cent. copper, 4 per cent. wrought brass, 3 per cent. brass wire, 2 per cent. lead, 2 per cent. spelter, and one-half of 1 per cent. each of tin and antimony. Copper and brass and brass materials thus comprised nearly one-fifth of all by weight, and at this time pig-iron was rated at 1¼ cents, wrought-iron at 4 cents, iron wire at 5 cents, copper at 18½ cents, wrought brass at 22 cents, brass wire at 26 cents, lead at 5 cents, spelter at 6 cents, tin at 18 cents, and antimony at 25 cents per pound, so that the average cost was about 5 cents per pound.

In saddlery hardware the product is, upon the whole, not as fine as in builders' hardware, but some articles, such as stirrups, nickel-plated ware, and harness ornaments and trimmings, are finer than the average of locks, having a higher ratio of values of product to material. The coarser products are hames and common forged and cast trimmings.

In making hand tools the average ratio of product to material is 2.61, but for watch and jewelers' tools it is sometimes as high as 10 or 15, and nearly as high for some kinds of shoe tools. For molding, broom, glass-workers', joiners', canners', and confectioners' tools and weavers' reeds the ratio is considerably higher than the average. On the other hand, as generally tending to reduce the average, we may note tinners' and hatters' tools, with which some light machinery is inseparably included (tinners' tools being also made upon a large scale), and tools of such ordinary usage that they are manufactured upon a large scale under more economical conditions than the average as screw-wrenches, screw-drivers, and bit-braces.

So, for the other classes of hardware, the goods made in small quantities and under less favorable conditions of economy, and the lighter and finer goods, will have ratios above the average, while the heavier and coarser goods, and the goods which, however fine, may be cheaply made in large quantities, have ratios below the average.

In heavy hardware the average ratio is 2.07, those above the average being hog-ringers, pump hardware, plumbers' hardware, and small hammers and steel castings, and those below the average are anvils, blacksmiths' tools, chains, and marine hardware.

In light hardware the average ratio is 2.34. Above the average are pianoforte hardware, draw pulls, stationers' and ornamental hardware, and iron toys; below, are coffin plates and undertakers' hardware (in many cases), buckles, cabinet hardware, and japanned goods.

In domestic and miscellaneous hardware the average ratio is 1.92, betokening a low productive efficiency. Above the average are ticket-punches, scales and balances, stair-rods, skates (generally), apple-parers, and stock-bells; below the average, water-filters, tinware and enameled ware, gun implements, and the more common articles of household and garden hardware.

In machinists' supplies (hardware) the average ratio is 3.86, indicating finer and more exact work than the average of any other class. Above the average are chucks, which require specially fine workmanship, and below, though but slightly, are twist-drills, taps, dies, stocks, and other steel tools.

To the casual observer, in looking over the census tables, these ratios appear so variable for goods large and small, light and heavy, without obvious distinction, that he is apt to jump at the conclusion that there is somewhere an inconsistency, and that the returns are so burdened with serious variations that their accuracy may be easily questioned; but a more thorough analysis, bearing all the facts in mind, shows that the returns, although in the nature of things imperfect, are fairly made, are consistent with each other, and are worthy of a high degree of confidence. The apparent inconsistencies, when examined, are found to be the indices of actual conditions, and furnish strong internal evidence of the correctness of the work. This is more plainly apparent in the division of the subject into classes, when it may be seen that the general average can be compared to a fulcrum, upon which are doubly balanced fineness against coarseness or cheapness of product and inferior against superior facilities of manufacture, these attributes being often notably the separate conditions of different manufactures acting to produce a common tendency.

A continual readjustment of these conditions is in process. As inferior facilities become superior, there is a tendency to preserve the extent of range of the industry (which might thus be diminished) by making the coarse and cheap article finer and more costly.

We are thus led to a brief study of the real significance of the changes in aggregate statistical exhibits of materials used and ratios of products to materials in the successive censuses of 1850, 1860, 1870, and 1880.

The value of material per operative was, in 1850, for hardware (raw material), $429; in 1860, for hardware (materials), $411; in 1870, for hardware, $645; for saddlery hardware, $490; for hardware and saddlery hardware, $622; in 1880, for heavy hardware, $856; domestic and miscellaneous hardware, $775; saddlery hardware, $658; light hardware, $603; builders' hardware, $568; handicraft tools, $556; machinists' supplies (hardware), $261; all hardware, $609; all hardware excepting saddlery, $601.

Also, the ratio of values of product to material was, in 1850, for hardware, 2.31; in 1860, for hardware, 2.48; in 1870, for hardware, 2.42; for saddlery hardware, 2.56; for hardware and saddlery hardware, 2.44; in 1880, for heavy hardware, 2.07; domestic and miscellaneous hardware, 1.92; saddlery hardware, 1.97; light hardware, 2.34; builders' hardware, 2.20; handicraft tools, 2.61; machinists' supplies (hardware), 3.86; all hardware, 2.20; all hardware, excepting saddlery, 2.24.

For all classes of hardware the amount of wages paid per operative per annum was, in 1850, $281; in 1860, $321; in 1870, $471; in 1880, $398. Of the range of prices of materials the condition of the New York market furnishes some evidence. In 1849–1850 and in 1859–1860 the conditions were similar, a steady or slightly-falling market, with a similar range of prices. In 1870 prices were higher, but had been steadily declining. Between the 1st of May, 1869, and the 1st of May, 1870, Scotch pig had fallen from $41 50 to $35 and English bar from $85 to $75 per ton, and copper from 24 to 18¾ cents per pound. American pig and other materials also declined, but prices were still much higher than in 1859–1860, when Scotch pig ranged from $27 to $22 50, and English bar from $45 to $41 per ton. But in 1879–1880 the conditions were more peculiar, there being a great and a rapid rise in iron, copper, and other supplies, followed by a reaction and fall. American pig, for example, advanced from $17, in May, 1879, to $35, in January, 1880, and $40 in February, falling to $36 in March and $24 in May, 1880; and, in view of these great changes, the degree of uniformity exhibited in the returns of the cost of materials is much greater than might have been expected, although the diminution in the ratio of values of product to material in 1880, as compared with 1870, is doubtless principally due to this violent fluctuation.

But with the conditions thus fairly outlined we may consider that in 1860, as compared with 1850—

a. The fineness of product was slightly increased.

b. The cost of materials was not notably changed.

c. The economy of manufacture was increased, notwithstanding the small change in the size of establishments (from an average of 21 to an average of 24 operatives each) and despite the increased wages paid. This was a period of notable mechanical development, and the introduction of sewing-machine manufacture and the more general and wholesale production of manufacturers' supplies stimulated better organization and better facilities in the manufacture of hardware.

In 1870, as compared with 1860—

a. The fineness of product was considerably increased, the large fortunes resulting from the development of the country and the disturbance of values by war having led to more luxurious conditions of living, which demanded a finer class of hardware.

b. The cost of material was greatly and abnormally increased.

c. The economy of manufacture was probably diminished; wages were much higher, factories averaged no larger, and management was probably on the whole less close and careful, while investments obtained a larger income. Such improvements as were made in the details of processes could not compensate for these influences.

In 1880, as compared with 1870—

a. The fineness of product was still further increased. The artistic element in hardware products had become more prominent, and more exact methods were employed and better goods produced in nearly all classes of hardware.

b. The cost of material was diminished, but violent fluctuations in the market have given it a higher statistical showing than would have occurred under more equable conditions.

c. The economy of manufacture has been greatly increased. Wages are lower, relative to the value of the product, but labor is more steadily employed, and the diminution in expenses and incomes has been relatively greater than that of the cost of labor. Factories are larger, the average having increased from 23 to 35 operatives per establishment, and improved facilities in light molding, grinding, and forging have contributed to reduce the cost of manufacture. The growth in economy has more than compensated for the improved quality of the product.

In fuel there is a tendency to the more extensive use of coal, both as displacing wood and as consequent upon the larger proportion of steam-power used. In a large (steam-power) factory the cost of fuel is ratable at about 8 or 10 per cent. of the cost of all materials, about seven-tenths of it being for power. Mill supplies, such as coal, grit, glue, emery, belting, files, and oil, in a large builders' hardware factory may be estimated as costing from one-third to one-half as much as the constituent materials (or those which go into the product).

SYSTEM.

The manufacture of hardware involves many large and complete factory organizations, some of these factories manufacturing thousands of different kinds of articles, but the whole is not generally unified by an assembling department. There is no combination of these parts into machines, and each article might be made the basis of a distinct manufacture. It will thus be seen that the organic system in these large works may be described as a more artificial one than in any other class of manufacture. Multiplicity of details, and details not absorbed in a comprehensive scheme, require detailed management, which can best be secured by the subcontract and piece-work systems.

In a factory making a great variety of articles it is obvious that the division of labor must be based upon the kinds of work to be done upon them, and not upon the articles themselves. The former division is comparatively simple. The work to be done is brass and iron founding, press work, milling, drilling, wire-working, butt-riveting, grinding, polishing, japanning, and so on, but many articles of hardware are subjected to only two or three of this limited number of kinds of work, and the system is so far simplified.

The operation of a strict subcontract system is about as follows: It is proposed often by inventors or outside parties to manufacture a new lock, shade spring, hinge, tool, ornament, or other article in hardware. The superintendent of the factory knows to what contractor or piece-man it may be desirable to intrust all or portions of the work in question, and estimates with him for the performance of the work. Piece-work of any ordinary kind has its rate of labor pretty closely established, and where subcontractors are largely employed their time and the time of their men upon various jobs of work is carefully kept and made the basis of future contracts. In some cases a subcontractor will employ a considerable number of men, but a more common practice is to have the piece-men subordinated to salaried foremen. In large factories there is usually one foreman or subcontractor to from 20 to 50 operatives.

A large hardware factory is conducted upon the same administrative principles and with the same division of labor as in the manufacture of interchangeable mechanism, but actual uniformity follows as a consequence of labor-saving methods rather than as an end deliberately sought. Uniformity in systems of gauging is a great desideratum, especially in wire-working. Wire-gauge numbers are empirical, and refer to a variety of different standards, generally irregular in their divisions, differing among themselves both in design and in make, and all subject to irremediable variations, due to wear. It is therefore desirable to have gauges which may be adjusted to take up wear, and to have these periodically tested with reference to standards so infrequently used that their wear will be inappreciably small. It is obvious that for numbered sizes of holes and slots, subject to different usage and different degrees of wear, there is no practicable method of adjustment. Such adjustment is only practicable for gauges based upon uniform scales of measurement, such as the micrometer gauges.

The confusion of standard gauges, often involving misunderstanding and loss, is a subject of complaint from nearly all wire workers and makers, and the legal responsibility is often a matter at issue. Of two guage holes numbered alike, but worn to different dimensions, it may be hard to make a specification that will hold: but a specified measure upon a standard scale does not admit of this controversy.

The manufacture of the articles classified as machinists' supplies (hardware) is a fine class of machine work, and is done by the highest skilled class of machinists, technically known as tool-makers. The nicety and accuracy required in this kind of work is great and is slowly done, and the productive efficiency is small.

Hand tools are to a large extent made by small job-work. This reduces the productive efficiency, as the statistics plainly indicate, and the average number of operatives per establishment is the smallest in any class, viz, 12.

The highly-organized factories, with large forces of operatives, are mainly engaged in the manufacture of builders', light, and saddlery hardware.

CAPITAL.

As a rule, in the growth of manufacturing facilities the larger the size of the factory the greater is the relative amount of capital required for each operative. It might be supposed, upon a general theory of wholesale supply, that 1,000 men could be provided with shop-room and facilities together at a cheaper individual rate than one man working by himself; but while one man or a few men may work in a dwelling-house or in a cheap shanty upon cheap land, the thousand men require costly factories, fitted with costly tools and appliances, and often located upon expensive city land. It is their efficiency in working together that compensates for these conditions, but they cannot make shift with poor tools and cheap buildings; they require a city to dwell in, and their presence makes capital out of the very land on which they tread, and makes it taxable for their public benefit.

The returns of capital have been more full in the later census years, but the continuous increase in capital investment per operative from 1850 to 1880 in the manufacture of hardware is principally due to the growth of factories and facilities. Under ordinary conditions, the real capital investment per operative for a large factory can scarcely fall below $1,000, and is often much greater; but probably no man would think of erecting and equipping a large factory and establishing the manufacture on an estimated investment of less than $1,000 per operative.

The cost of machinery is not usually as much as one-third of the capital investment for builders' hardware, as the machinery is light and not generally costly, and a large proportion of the operatives are not machine tenders. In a number of cases the value of power machinery, exclusive of steam-engines and boilers, was found to range from $125 to $200 per operative employed.

LABOR.

Primarily, demand is the true gauge of productive efficiency. If we refer back to the examples of articles in the seven specified classes whose average ratio of values of product to material is below the average of the class, we will find that, as a rule, they are the articles in most common demand. But in the benefits of manufacturing facilities warranted by a large demand articles for which the demand is much smaller become the sharers, since, as has been before remarked, the division of labor is not usually respective of the articles, but of the kinds of work upon them.

In the larger and better-organized establishments there have been some important labor-saving developments within the past decade. From one-third to one-fourth of the operatives are often engaged in bench molding, and machinery introduced since 1870 has increased the productive efficiency from 20 to over 50 per cent. in many cases, but its introduction is somewhat retarded by the prejudice of operatives, so that in general usage much of the advantage remains to be utilized.

In one factory the improvement in productiveness per operative since 1870 is exactly known from piece-work records to be as high as 80 per cent. in specific instances, and is on the average 50 per cent. greater, 25 per cent. of which may be rated to be due to better machine methods and 25 per cent. to more thorough system. In another case it is stated that 200 men do the work which required 300 men in 1870, the advantage being mainly due to grinding with emery in place of filing, dip instead of brush japanning, and machine instead of hand molding. In one item of work, milling-machines superseding filing enabled an unskilled man at $1 50 a day to do three times the previous work of a skilled man at $3 a day. Such examples are by no means infrequent, but since, in the competition of business, they are used to cheapen the product, the general public soon reaps the advantage, and but a slight impression is made upon statistics.

The advantages derived may be classified as temporary and permanent, the latter embodying new practices so generally applicable that, once introduced, they permanently replace less effective methods. Of this character is much of the advantage gained within the past decade. But some advantages are temporary; efficient managers pass away and their systems are not maintained; and factories run down in management, and are again brought to better efficiency without regard to the general practice. So an improved machine method may be applied in the fabrication of a special product. The demand for the product passes away, its manufacture ceases, and the method is dropped, but is presently revived and found applicable to the manufacture of another article. It will thus be seen that some examples of improvement may always be found by which the general practice is not necessarily advanced.

Labor-saving methods show some very striking results in their effect upon the division of labor, the labor saved being applied to other work, or to less efficiently performed duties in the same manufacture, and disappearing from its former sphere, the number of operatives upon unimproved portions of the work becoming relatively enlarged. In a single case of an improved machine process the proportionment of the whole number of operatives employed on the various kinds of work in the manufacture involved is as follows:

	Per cent.
Forging	9
Grinding	10
Metal working by machine	25
Packing and other work	56

With the hand labor displaced, the estimated division of labor would have been:

	Per cent.
Forging	5
Grinding	6
Metal working by hand	57
Packing and other work	32

In another manufacture (wire-working) the division of labor is:

	Per cent.
Wire-working by machine	23
Japanning, tempering, etc	23
Packing	54

To have done the same work by the hand methods displaced and still in vogue in foreign countries the division of labor would have been (as estimated):

	Per cent.
Wire-working by hand	79
Japanning, tempering, etc	5
Packing	16

These are extreme but actual cases. Of course the relative advantage of machine over hand work cannot be drawn directly from the percentages shown. In the former case the advantage of machine over hand work is fourfold, and in the latter it may be modestly estimated at fifteen-fold.

But while these influences have been emphasized by exceptional illustrations, in the ordinary run of hardware manufacture they are at work to a less marked degree. Thus, if a third of the operatives of a factory are bench-molders, and a third of the labor of bench molding is saved (some practical founderymen claim a much higher saving) by the use of presses, the relative number of operatives required for bench molding is reduced from 33⅓ per cent. to 25 per cent. The numerical inferences to be drawn are, for the same number of operatives, nearly 11 per cent. greater productiveness; for the same productiveness, 8⅓ per cent. fewer operatives; and for the same number of men in the foundery, 33⅓ per cent. more operatives in other departments. Human activity must find employment, and the satisfaction of one want only makes way for another; and thus it is that labor-saving devices make more labor than they save, and a factory in the above case would be more likely to employ thirty additional operatives than to discharge eight. But the alteration in the conditions of labor is more than numerical. Skilled labor is often displaced and unskilled labor substituted.

This substitution of unskilled for skilled labor is the burden of the claim of nearly every labor-saving invention, but, despite the fact that the past thirty years have witnessed an almost incessant introduction of devices for diminishing the cost of labor, we find that the wages paid per operative per annum have relatively and intrinsically been continuously on the increase. The multiplication of wants and of the manufactures to supply them gives the operative a greater range of choice and more freedom of movement. Intelligence is more in demand, and although the line between skilled and unskilled labor may now be less clearly defined than formerly great numbers of so-called unskilled workmen get higher wages than the journeymen craftsmen of former times.

It is believed that workmen of every grade will average higher skill and intelligence now than ever before in this country, and these workmen are producing the finest character of work with a rapidity which the world has never before seen equaled. In the lower grades of work the operatives are intelligent and adaptable; they work well together and require comparatively little oversight. Of the higher class of skilled artisans we can scarcely speak with too much respect. They have not only built up great organizations of industry and managed them with consummate skill, but they have encouraged the liberal and scientific education upon which their maintenance depends. Great managers and representative men have, however, existed in all countries and ages; and the elevation of the intelligence of the common laborer, so important in the industrial system, is more peculiar to this age and to this country.

The economy of large manufacture and uniform methods is largely due to the fact that so little labor is wasted. A small shop, with a local market or custom, often has to wait for work, and the craftsman labors leisurely, under the impression that he is working himself out of a job. In a large shop, with a continuous supply of work, all this wasted time is utilized, and at once the product is cheapened and the aggregate amount of wages paid per operative is increased. It is believed that the methods of uniform manufacture have taken such a hold upon American practice that American workmen are accustomed and disposed to work more uniformly and steadily and to crave fewer holidays and dissipations than are common to the cheaper labor of foreign countries.

In the manufacture of hardware skilled laborers are usually paid between $2 and $3 and unskilled laborers between $1 and $1 50 a day; but the great variation that exists in the rates paid is evidence that the line between the skilled and the unskilled laborer is very difficult to draw, and that respect is paid to different variations of usefulness. The prevalence of piece-work is also an important influence.

The employment of women and children in the manufacture of hardware is shown in the following tabulations. Of the numbers comprised under the head of children and youths, very few are small children, their employments being generally at variance with the sentiment of communities, if not prohibited by their educational laws. The lowest rates of unskilled wages (50 to 75 cents a day) will usually be found to be paid to children and youths.

Women are employed chiefly in packing the lighter articles of hardware, sometimes also in tending light machinery, and as clerks in offices.

Taking the seven specified classes of hardware, the following are the percentages of men, women, children, and youths, and women, children, and youths employed:

Class.	1880.			
	Men.	Women, children, and youths.	Women.	Children and youths.
Saddlery hardware	77.0	23.0	11.4	11.6
Light hardware	81.6	18.4	10.7	7.7
Builders' hardware	86.2	13.8	4.1	9.7
Machinists' hardware	88.1	11.9	6.9	5.0
Domestic hardware, etc	89.8	10.2	2.3	7.9
Hand tools	92.7	7.3	2.5	4.8
Heavy hardware	93.6	6.4	1.2	5.2
All hardware	84.9	15.1	5.8	9.3

In contrast with this the percentages in 1870 were 82.4 per cent. men, 17.6 per cent. women and youths, 8.1 per cent. women, and 9.5 per cent. youths. In 1850 and 1860 the numbers only of male and female operatives were given, the percentages being: 1860, male, 88.2; female, 11.8; 1850, male, 87.5; female, 12.5.

To explain the diminution in the proportion of women, children, and youths employed, and especially of women, we have merely to say that the development of resources due to labor-saving methods permits the support of a greater number of dependents, and points for extreme contrast to those foreign countries in which there has been little labor-saving development, while the family sustenance of certain classes is eked out by the labor of women in field-farming, shoveling, and other heavy work.

Examples of the change in the employment of women and youth in hardware manufacture are also given for several states:

CONNECTICUT.

Year.	PERCENTAGE.		
	Women and youths.	Women.	Youths.
1870	22.6	13.2	9.4
1880	15.1	8.8	6.3

MASSACHUSETTS.

1870	5.0	3.2	1.8
1880	7.0	3.1	3.9

NEW YORK.

1870	15.1	3.1	12.0
1880	15.7	3.0	12.7

OHIO.

1870	7.1	1.4	5.7
1880	9.2	1.5	7.7

PENNSYLVANIA.

1870	22.1	5.7	16.4
1880	16.0	2.3	13.7

ILLINOIS.

1870	10.7	1.4	9.3
1880	14.9	0.5	14.4

MISSOURI.

1870	3.0	....	3.0
1880	0.9	....	0.9

It will thus be seen that the diminution in the relative number of women employed is not a mere adventitious circumstance, but occurs, almost without exception, in every state.

In the manufacture of saddlery hardware in Connecticut the percentages of men, women, and youths employed were: In 1870, 69.7 per cent. men, 23.6 per cent. women, and 6.7 per cent. youths; in 1880, 56.3 per cent. men, 38.1 per cent. women, and 5.6 per cent. youths.

PROCESSES.

In previous reports allusion has been made to most of the processes employed in the manufacture of hardware. The distinctive kinds of work may not be numerous, but their applications are infinite. Within understood limits material of the same kind is usually submitted to a similar character and course of processes.

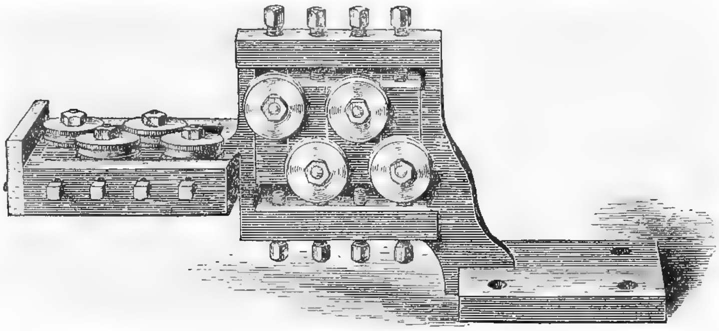

FIG. 1.

Brass and gray- and malleable-iron castings, after tumbling and filing, are usually more or less finished by milling, drilling, and grinding. Merchant-iron and steel are die-forged from the heated rods into small articles, usually by means of drops or pony hammers, and are finished by the usual machine processes. Small iron and wire are coiled into springs, or forged, turned, threaded, and pointed for screws, pins, rivets, nails, studs, and the like, mostly by special machinery. Steel plates are rolled, straightened, sheared, or punched to shape, and are milled, ground, hardened, and tempered. Press work is employed in punching, bitting keys, and shaping brass ornaments, nail heads, and other articles. The most ordinary divisions of a hardware factory are the founderies, the grinding-shop, the press-room, the machine-shop, and the japanning-room, and in some work such light assembling is required as the riveting of butts and the fitting of lock parts. Butts are often riveted by machinery, but sometimes by hand. The fitting and riveting of lock parts is commonly bench work.

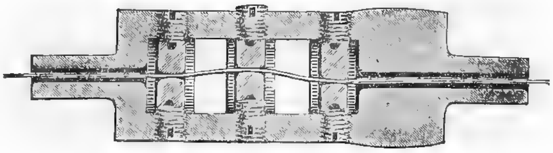

FIG. 2.

For the general run of hardware manufacture we may estimate that about two-thirds of a horse-power per operative per hour is employed, but the power used ranges from 0 to 2 or more horse-power, and in several of the largest factories, manufacturing a fine class of goods, the power employed was found to be about one-third of a horse-power per operative per hour.

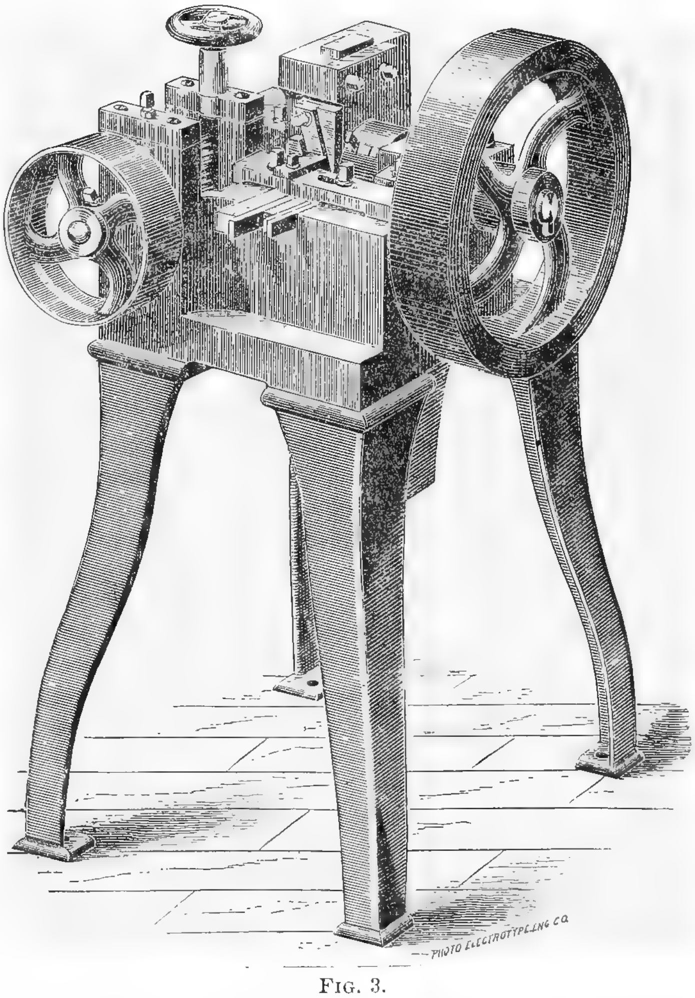

FIG. 3.

In making pottery knobs, which is accessory to the manufacture of builders' hardware, the processes are: Mixing and grinding clay, wire-cutting, biscuiting, baking, pressing, trimming, glazing, and rebaking. Biscuiting is the rough-shaping of the clay for the knob, leaving it in appearance like a biscuit. Pressing in a form after the first baking brings it to the true rounded shape. The baking is done in great furnace kilns, bound with iron, in one case three heats a month being usual, and one furnace having a capacity of 60,000 knobs or biscuits.

The operations of wire-working require especial mention, as this has been during the past ten or fifteen years one of the most fruitful fields for the introduction of labor-saving machinery. In this connection reference may be made to such manufactures as wood-screws, staples, fish-hooks, spiral springs, and horse nails, in some of which the efficiency of production has been advanced many fold over hand methods.

In wire-working, the straightening of the wire (which is drawn from coils) is the first essential operation. Old Connecticut clock-makers will recollect the time when it was customary to straighten wire by running it through between three nails driven in a board. Straighteners now used are of two styles, roll straighteners and rotary straighteners. An example of a roll straightener is shown in Fig. 1, the rolls being adjustable for wires of different sizes and stiffness. In Fig. 2 a section is shown of a rotary wire straightener with wire passing through the center. This is adjustable by setting the dies with a screw-driver. If the middle die is not set enough out of line, the curve is not taken out of the wire; but if it be set out too much, it runs out the wire with kinks or crooks. The adjustment is made by trial. The number of dies is not always limited to three.

Of staple machinery an example is illustrated in Fig. 3. This class of machinery is often of more complicated design. It generally operates by bending the wire upon a series of forming dies, after which it may be cut off square or pointed or barbed by an automatic tool. In this way staples, buckles, fence-barbs, coffin-handle wires, and a vast variety of other small articles are made; for example, the curved rims of padlocks are shaped by bending upon a die. The machine illustrated has not a very wide range of work, but it is automatic, taking wire from the coil and cutting off, forming, and pointing shear-point staples at the rate of 500 a minute. An automatic machine for making buckles, rings, and many other small articles from the coiled wire turns them out at the rate of from 75 to 175 a minute. Barbed blind staples are in a similar manner produced at the rate of 250 a minute.

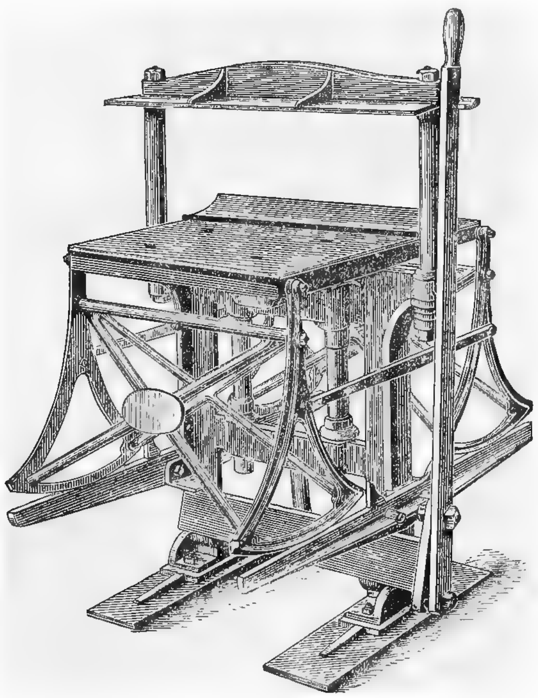

FIG. 4.

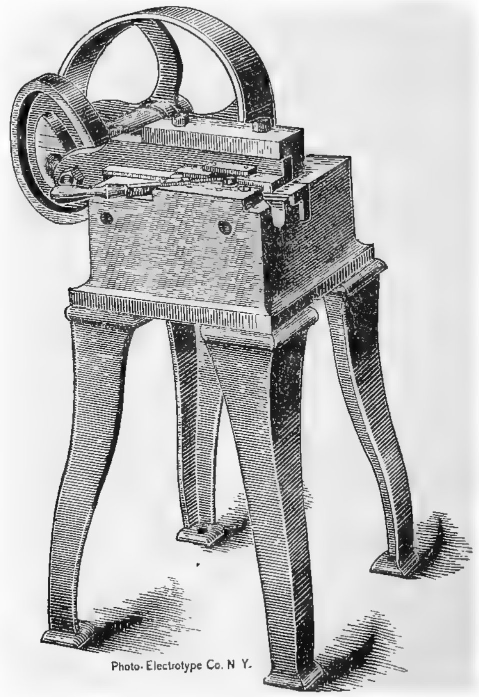

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FIG. 5.

Cold-roll pointing machines are useful in pointing bright articles which would otherwise have to be pointed by a blacksmith and rebrightened. Such a machine is stated to effect a saving of from two-thirds to five-sixths in the expense of this work.

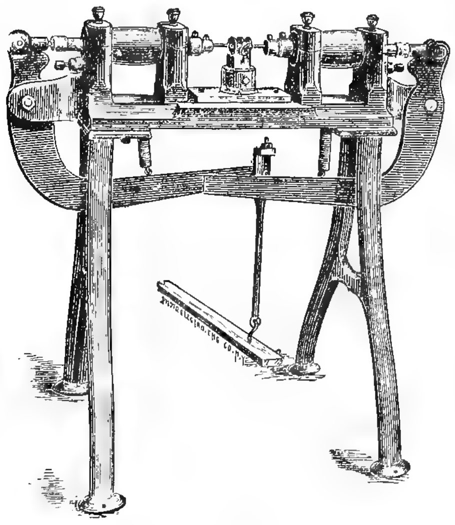

FIG. 6.

The manufacture of barbed fencing is an example of what may be done in special machinery, if only the incentive of a large demand is offered. Some of the machines for making fencing not only cut, bend, and sharpen the staples, but tie them in knots upon the strands of fence-wire, which is run off in measured reels, ready for the market, at the great rapidity of 100 knots of barbs a minute, 5 inches apart, and sometimes in excess of this rate. Reeling is a matter of special difficulty, the barbs piling upon each other unmanageably if they are not placed and wound with great precision. Galvanizing is also done with great rapidity, the wire running continuously through furnaces, zinc baths, coolers, and brushes, and the galvanizing being perfect.

But for these rapid and ingenious methods of manufacture it is questioned whether barbed-wire fencing, which already has so wide a field of usefulness in agriculture and stock-raising, might not have remained too costly for farm purposes.

Of the saving due to the use of molding presses much has been said. A saving of from 10 to 75 per cent. is claimed in special cases, probably from one-fifth to one-third in the ordinary run of bench molding. This improvement originated in and is due to sewing-machine manufacture, under which head many specific advantages of its efficiency are given. The original rocker press, or Broadmeadow & Eames machine, is shown in Fig. 4, and began to be introduced about 1873, Mr. Eames being foreman of the Wheeler & Wilson Company's foundery at Bridgeport, Connecticut, and having been previously mentioned as identified with improvements in the manufacture of fire-arms. Ordinary snap-flasks are used with the machines, the Eames machine taking a 26-by-20 inch flask. The Reynolds and Hammer machines are designed for lighter work and smaller flasks. In these, instead of the lower plate being brought up, as in the rocker machine, the upper plate is movable, being carried by a pair of pivoted arms or rods.

Wood screws are made by automatic machinery: cutting-off and heading, shaving and slotting, and chasing or screw-cutting machines. One person attends two heading, or four shaving and slotting, or three chasing machines, the average attendance for wood-screw machines being one person to nearly three and a half machines. The screws are produced with great rapidity, varying with the size of screw, heading being the most and chasing the least rapid operation.

But rapid as is the production of screws by machine cutting, they may be even more cheaply produced by rolling, and, thus made, are of a quality suitable for many purposes. In Fig. 5 is given an illustration of a thread-rolling machine, the thread being produced by compression between a pair of dies, one of which is stationary, while the other has a sliding movement.

The operations of drilling furnish a fertile field for labor-saving improvements. Fig. 6 is an illustration of a double-head drilling- and milling-machine for operating upon two sides of the work at once. This is applicable to a great number of articles, and doubles the rapidity of output for such work. Fig. 7 is an illustration of a special machine for drilling butts, in which the work, fastened upon a vertical carriage, is run down upon the drill by a feed-screw at the back of the machine, the reverse movement being by a slide upon the opening of a split nut. One boy will tend eight or ten of these machines.

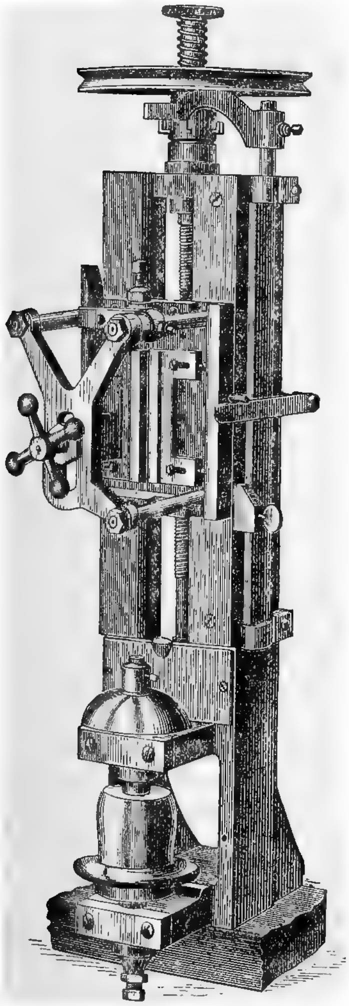
Fig. 7.

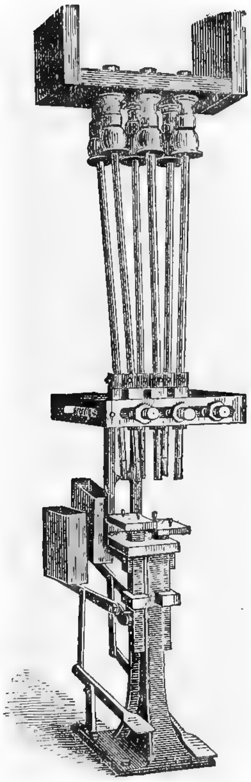
Fig. 8.

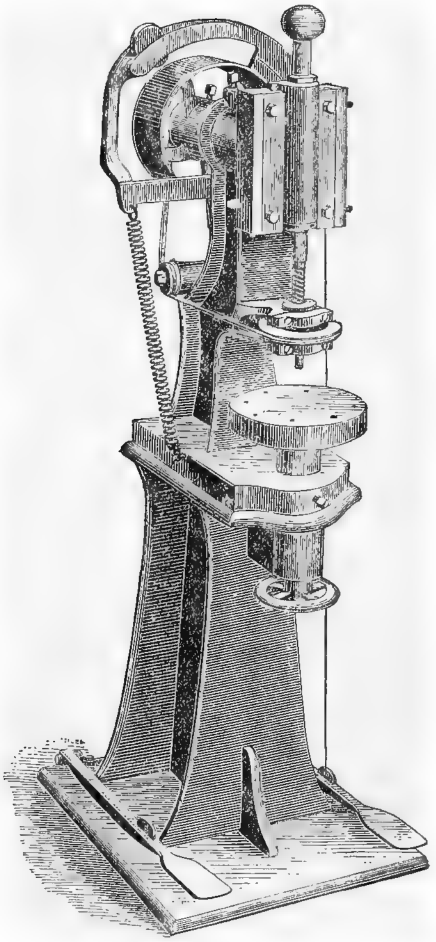
Fig. 9.

In Fig. 8 is illustrated the Adt special drilling-machine, invented by Mr. John Adt, of New Haven, Connecticut, from whose designs many of our examples have been drawn. The ingenious machine in question is for drilling holes simultaneously and at variable distances apart, the spacing being adjustable and the spaces regular or irregular. It is shown arranged for drilling the screw holes of hinges, for which it is specially adaptable, the holes in hinges being out of line.

Riveting is an important work in hardware, having to be performed not only on butts and hinges of all kinds, but upon locks, castors, curtain fixtures, and many other articles.

In Fig. 9 is an illustration of an elastic blow-riveting machine, which strikes from 800 to 1,000 blows a minute, doing the work more than twice as cheaply as hand riveting, and making unskilled labor available. The hammer rotates while the blows are being given, and may be instantly stopped by a self-acting device.

Special brass butt machinery is sometimes employed doing the bending, grinding, countersinking, and wire-driving with great economy of labor. Six machines will turn out 3,600 pairs of butts a day, and enable the operatives to do five or six times the previous hand work.

These examples will be understood to be merely items of the many special devices applied in the manufacture of hardware, but some of the most general of the many kinds of work have at least been touched upon. Manufacturers using machines of their own special design are often very reasonably unwilling to have publicity given to their labor-saving features. This, however, is unnecessary, for while the examples and descriptions of labor-saving machines might be indefinitely extended, enough has been given (without trenching upon private specialties) to indicate the general character and direction of the work.

The improvement in polishing and grinding has not been inconsiderable, this having been principally due to the more extensive use of emery, whether glued upon leather-covered wheels, or made up into solid wheels, or wheel-rims of tanite, vulcanite, or celluloid.

In consequence of improvements in the mechanical part of the work the work of packing becomes relatively more important, not infrequently requiring 15 or 20 per cent. of the whole number of hands.

II.—THE MANUFACTURE OF CUTLERY AND EDGE-TOOLS.

The caption "cutlery and edge-tools" is made to include some articles which might, perhaps, be more properly called "point tools", but whose association in their nature and in their manufacture makes the heading used a convenience. In separating fine cutlery, shears and scissors, axes and picks, stone tools and drills, and augers, from the general residuum of cutlery and edge-tools, the object is chiefly to exhibit the conditions of the manufacture of these articles. The manufactures specified under "other cutlery and edge-tools" doubtless include the production of many articles which, if more definitely returned, might go to increase the volume of the preceding classes. The manufacture of fine cutlery is taken to include table and pocket cutlery, razors and swords, where these articles are specified. Picks, drills, and needles are often manufactured in connection with axes, especially in the mining regions. Well-augers are commonly manufactured in connection with drills and stone tools, and mill picks, ice tools, and oil tools are included in the same class. The class "augers" applies principally to wood-boring augers.

The value of material consumed per operative for the several classes is in the following order: Axes and picks, stone tools and drills, fine cutlery, scissors and shears, and augers, there being often double the work upon the same weight of fine cutlery as compared with axes. The ratios of product to material are in nearly the inverse order: augers, scissors, and shears, fine cutlery, axes and picks, and stone tools and drills. For axes the value of material is little more than doubled, and for augers and scissors more than trebled, in the process of manufacture.

The material for ax-polls (bar-iron) fluctuated greatly during the year, the maximum value being in the state of New York about $100 per ton, and the minimum much less than half that value. Under the same conditions, a large factory will consume more material per operative than a small shop, and will have a lower ratio of product to material; but as identical conditions rarely exist, comparisons have to be taken in the rough. The principal difference is due to the weight of the individual articles produced, it being obvious that a small shop turning out mining picks and needles will handle a greater weight and value of material per operative than the largest factory making scissors or penknives. So also in the cost of labor and materials the value of net incomes and the economy of methods of manufacture vary so much that it is necessary to eliminate many of these conditions before we can judge with assurance of the law governing any one of them. Of course, mathematically, no rigid elimination may be feasible, but a knowledge of facts and of laws may afford such logical equations as will permit reasonable solutions of such questions.

In making axes the value of accessory materials (forge coal, grit, emery wheels, glue, tools, and other materials) is often nearly as great as that of the constituent materials, ax-steel and bar-iron. In making bits and augers for boring wood bar-steel is the constituent material, and coal, emery, grit, and glue are the principal accessory materials. Of the cost of iron and steel in axes a number of examples of factory products shows the percentage of steel to be from 18 to 37½ per cent. by weight and from 45 to 87½ per cent. by cost. For a small ax, the iron poll is relatively smaller and the steel bit relatively larger. The iron and steel in a dozen axes of a light grade sometimes cost as little as 90 cents, but for the heavier sizes they cost considerably more. The average ax may be considered to weigh from 4½ to 5½ pounds. Axes are commonly sold in dozens of assorted sizes, the materials for a dozen assorted between 4½ and 5½ pounds being about 62 pounds bar-iron and 10 pounds ax-steel. About 20 pounds of forge coal, one-third of a pound of borax, 1 pound of grit (grindstones), and a few cents' worth of vermilion are also consumed, beside the emery used in polishing, which is a considerable item of expense. In working under the hammer, grinding, and polishing, the weight of raw material is reduced about one-sixth. Boxing material costs about 25 cents per dozen axes. In a large factory every item of cost (which for a small product might seem trivial) mounts up to a great sum per annum, and by its importance stimulates the more careful provision for minor details of the work.

The manufacture of swords and razors is classed with "fine cutlery", and although these manufactures may be considered of a finer grade than those of pocket and table cutlery, they are scarcely extensive enough to warrant the formation of a separate class. Before 1831, the world over, sword-blades were made of double-shear or laminated steel (so called from being piled twice, single shear, a poorer quality, being piled only once), but in that year the use of cast-steel for swords was introduced by the Ames Manufacturing Company, of Chicopee, Massachusetts, and soon became the criterion of excellence. For a 23-inch long saber blade 29½ ounces steel are required, and 35 per cent. of the material is lost in the process of manufacture. A 5-foot (diameter) grindstone is consumed in the grinding of between one and two thousand sword blades.

A large proportion of the capital employed in the manufacture of heavy cutlery and edge-tools is required by the carrying of material. This is the most important distinction in reference to the capital requirement. Taking the census returns for axes and picks, stone tools and drills, augers, scissors and shears, and fine cutlery, we have in round numbers:

	PER OPERATIVE.	
	Capital.	Materials.
Axes and picks	$1,188	$615
Stone tools and drills	918	457
Augers	718	298
Fine cutlery	641	331
Scissors and shears	361	325

The exception with reference to wood-boring augers may be ascribed to the fact that this manufacture involves special machinery and facilities quite different from those of the other classes. For cutlery and edge-tools not otherwise specified the capital is $1,057, and the materials cost $439 per operative, the plant required being obviously much more expensive than that employed in the manufacture of stone tools and drills.

That the cost of carrying stocks of material is the chief factor of the capital investment also appears from comparison with the statistics of past census years, the growth of factories in size having less influence than the consumption of materials. A large element of machinery in this work is not rated as machine plant, but as materials. The grindstones wear away rapidly, and are kept in stock as grit, the same being true of the emery wheels and belts. The principal expense of machine plant is thus confined to the forging machinery and the machinery for the generation and transmission of power. It is notable that the expense of power is relatively much greater in the employment of small engines and boilers. This is partly due to economy of coal and in attendance (a heavy item for small shops), and partly to the greater first cost of small engines per rated horse-power. In a large factory in full operation less power also runs to waste.

These industries, in point of capital investment, are not comparable with the manufacture of sewing-machines, of agricultural implements, or even of files. No such difference exists in the agencies employed between the large and the small shops, as all but the smallest jobbing and tool-sharpening shops must have trip-hammers and grindstones run by power. These industries also, being less highly organized than the manufactures of interchangeable mechanism, will be found, as a rule, in less thickly-settled localities.

Ordinary trip-hammers, such as are used in ax factories, will average a cost of about $800, ranging from $600 to $1,000, according to weight, but the special rolls and forging-presses employed in some of the large works are much more costly. Of emery wheels a stock of from six to twenty is kept for each frame, and when used in polishing axes, well mounted upon axles, cost about $15 each. The expense of duplicating machinery is greatly diminished for the large works. We may compare the actual number of machines used by 150 operatives in an ax factory with the number used by 6 operatives in another factory multiplied by 25:

For 150 operatives in one factory.	For 6 operatives in one factory.	For 150 operatives in 25 factories, 6 operatives each.
3 pairs shears.	1 pair shears.	25 pairs shears.
20 trip-hammers.	4 trip-hammers.	100 trip-hammers.
37 grindstone pits.	2 grindstones.	50 grindstones.
30 polishing frames.	2 polishing stands.	50 polishing stands.
90 machines.	9 machines.	225 machines.

This is a very instructive exhibit of the waste of doing things in a small way. Not only is there a much greater relative expense in the first cost of machines, but the machinery in the small shop, as compared in usage with that of the large shop, appears to stand idle over half the time. It is not, however, always within commercial practicability to manufacture a given product on the largest scale, and even large factories often pass from one specialty to another, until there is accumulated a large plant of special machinery, much of which is not in active or continuous use. In practice about two-thirds of the operatives are machine tenders or work with power machines.

The manufacture of fine cutlery requires less heavy machinery, less power, less consumption of material, and a much smaller ground-plant per operative employed, than that for axes. The capital requirement is therefore much smaller, although the average factory enrolls a much greater number of operatives. The average number of operatives per factory is: For fine cutlery, 65; for axes and picks, 49; for scissors and shears, 28; for augers, 19; and for stone tools and drills, 9; while for cutlery and edge-tools not specified it is 18, and the general average for all cutlery and edge-tools is 25. In previous census years the averages were: Cutlery and edge-tools, in 1850, 17; cutlery, in 1860, 26; edge-tools and axes, in 1860, 17; axes, in 1870, 36; cutlery, in 1870, 26; other edge-tools, in 1870, 23. The average number of operatives per establishment for all classes appears to have diminished since 1870, but the total number of factories has been greatly increased

For the labor upon 5 and 6 pound (assorted) axes the cost of job-work in the various departments of labor is estimated as follows, the whole labor of manufacturing being taken as a unit:

Turning polls	0.053	
Welding polls	0.064	
Drawing bits	0.171	
Hammering heads	0.210	
Forging		0.498
Edging	0.029	
Pressing	0.037	
Grinding after tempering	0.159	
Grinding		0.225
Tempering		0.054
Polishing		0.192
Packing		0.031
		1.000

Or, omitting the packing, we may say, roundly, one-half for forging, one-fourth for grinding, one-fifth for polishing, and one-twentieth for tempering.

By piece-work a grinder can at best make $3 a day, a head-hammerer $2 50, and a bit-maker about $2.

The amount of supervision required may be surmised from the fact that in the large factories there is usually one foreman to every 20 to 40 operatives. In this respect there is no very notable contrast with factories making interchangeable mechanism. In both cases, as a rule, the larger the factory the greater may be the number of men to one foreman, but since the apportionment of work as orders come in is one of the foreman's most exacting duties the source and permanence of the market demand are an important factor in determining the amount of superintendence necessary.

Each trip-hammer requires two attendants, some of the trips being employed in working stock; but of those employed in turning out axes it is estimated that one trip-hammer will turn out about 48 broad-axes (in 1828 one man forged and tempered 8 broad-axes per day), 150 common axes, or 250 hatchets in a day.

In making augers we may estimate one-tenth of the work as forging and one-twentieth as filing, and although the special machines (none of which are automatic) require some hands, by far the greatest proportion of the operatives are grinders and polishers. Since 1870 it is claimed that a general improvement of about 25 per cent. has been made in the productive efficiency of the work, due to better helve and pony hammers and the introduction of solid emery wheels and improved heading and other machinery.

In making swords about one-third of the labor is in grinding, one-fourth in polishing, one-sixth in forging, one-eighth in milling, and one-eighth in tempering, not including some common labor and work of inspection. The product per operative employed is 12 or 15 blades a day.

In making table cutlery, grinding, polishing, and handling are the portions of the work requiring most operatives. The blades and hafts were first forged by hand. The employment of the trip-hammer in forging these small blades was an American innovation, and when the practice of striking up the bolsters for the handles by means of trip-hammers was introduced, superseding hand-swaging, it raised the daily product of two men (then a smith and a striker, now a hammer-man and a helper) for this process from 150 to 3,000 blades a day. The cutting out and plating or shaping off the blades is done by power presses.

In recent years a greater amount of labor has been saved in the manufacture of light than in that of heavy cutlery. It is some evidence of this that while the value of material handled per operative in 1880, as compared with 1870, is less for axes (on account of the lower price of materials), it is notably greater for the average of other cutlery, despite the diminution in the cost of materials, indicating a greater value of materials handled per operative. The change in ratios of product to material bears out the same indication.

An attempt has been made to make an estimate of the proportions of skilled and unskilled labor upon the basis of the times, rates, and wages paid, reported by the several establishments. Theoretically, N being the total number of operatives in a factory, if we deduct the unskilled wage from the skilled wage and from the average wage, and divide N times the latter remainder by the former, we have the number of skilled workmen. The fact that time of work, stated wages, and wages paid are often incommensurate, mainly on account of the influence of variable or piece-work wages, has obliged many modifications of this rule; but it would appear from the calculation that in the two large classes of fine cutlery and cutlery and edge-tools not otherwise specified much the greater proportion of labor paid at the stated skilled wages was in the smaller factories. Thus the percentage of skilled labor for three classes arranged according to size of factory would appear as follows:

Factories, with number of operatives.	Fine cutlery.	Cutlery and edge-tools (not otherwise specified).
	Per cent.	*Per cent.*
Under 10	42	39
Between 10 and 50	35	31
Over 50	15	12

For the other classes the same rule generally prevailed when the number of establishments in the specified classes was large enough for a fair general average. The proportion of skilled labor appears greatest in the manufacture of stone tools and drills (in which there are no very large factories); next in the manufacture of augers, scissors, and shears; next in the manufacture of axes; and least in the large factories for the manufacture of fine and general cutlery. The employment of labor has been most steady in the manufacture of axes and least steady in the manufacture of fine cutlery and scissors and shears. The statistics relative to the employment of women and youths are considered to involve no contradiction of the inferences drawn from similar statistics in the manufacture of hardware, for, considering the relative growth of the lighter manufactures of cutlery, the employment of women and youths, insignificant at the most, is probably not as great as in 1870 for the same grade of work.

The power required in the manufacture of axes and heavy edge-tools is nearly twice as much per operative as is required for the lighter grades of cutlery. The horse-power per ax is found in several factories to range from 2 to 8 horse-power per hour. Thus at 4 horse-power per hour, a factory using 20 horse-power would turn out 50 axes, and one using 200 horse-power would turn out 500 axes per day of ten hours. Per operative, the horse-power is usually between 1 and 2 for axes and heavy cutlery and less than 1 for light cutlery. In ax manufacture 3 or 4 horse-power per machine (including trip-hammers) is usual. The grindstones consume a great part of this, and everything depends upon the heaviness of the work. The labor of grinding down the bit has in some cases been reduced by milling.

The processes in some of these manufactures may be briefly enumerated. For axes the stock is first cut up by power shears and worked under the steam- or trip-hammer. The poll or wrought-iron part is formed under the hammer, or in some cases by special ax-trips or in poll-rolls, which are roll presses, in which the ax-poll is shaped between two heavy rolls. The steel part or bit is then tongued into the poll and welded to it, is then drawn to a point, and the head is finished by hammering. The first operation of grinding is called pressing. The operative commonly sits upon a teetering saddle, upon a spring, and brings his weight to bear in pressing the ax against the stone. After this follow operations of grinding and edging, the grinding in some cases not being completed until after the tempering. The consumption of grindstones varies with the hardness of the metal. In grinding axes several pounds of steel are usually ground off with every pound of stone, and in making swords a greater weight of stone than of steel is ground off or consumed. Much of the stone is not ground off in the actual work, but is taken off in the truing of the stone. Formerly every workman trued his own stone, a disagreeable as well as a wasteful operation. In this duty grinders were often careless about how much they hacked off, especially if prejudiced against a stone; but now in large shops the truing is intrusted to particular men, who use a milling device which trues the stone more evenly and economically.

Tempering requires much technical judgment, and the production of finer grades of edge-tools in this country is mainly due to a better and more scientific knowledge of its requirements. It is generally stated that in order to temper a tool properly the temper must be drawn to a certain color, thus, brownish yellow (490° F.) for cold-chisels, purple (530° F.) for scissors and table cutlery, and pale blue (550° F.) for swords; but the color requisite for the best temper depends in some degree upon the metal used, and there is great room for judgment. The color for axes may be a pigeon-blue and it may be a brownish color mottled with purple, and is subject to variations not easy to describe nor uniform with all brands of steel. In the hardening and drawing of the temper of axes and other edge-tools there has been a notable mechanical improvement in the employment of revolving apparatus, by which more uniform results are obtained. After the tempering, polishing upon emery wheels and such finishing operations as bronzing, painting, and packing make the ax-head ready for the market.

In making augers the operations are shearing, drawing stock under the hammer, heading lip, twisting, crimping, grinding, burring, cone-screwing, milling, hardening, polishing, and filing. The heading or upsetting of the lip is an operation in which special machinery is employed with great advantage. Twisting is done by hand machines and crimping by both hand and power machines, and the peculiar form of the product affords scope for several forms of special grinding- and polishing-machines, but even then the work has to be completed by filing.

In the manufacture of pocket-knives and other fine cutlery the work of making and putting on handles involves many operations. Most of this is bench work, and where the cutlery is of a fine or ornamental character a large proportion of the operatives is employed upon it. It was in connection with the ornamental work upon the hilts and scabbards of swords that the practice of electroplating was first introduced into this country.

In the manufacture of sword blades, after the proper working of the stock, the shank is drawn out under a hammer and forged to shape under a drop, and the blades are drawn out by rolls in a manner similar to that employed in forming bayonets. In these rolls the back is first formed, then in two operations the face, and then the two side-grooves and the point, requiring an operation each. The blades are then bent to form, straightened, tempered, and ground, and the shanks are milled. The loss in tempering does not exceed 5 per cent. The rapidity of the second grinding is six times as great as that of the first.

III.—THE MANUFACTURE OF SAWS AND FILES.

In classifying the industries of saw- and file-making the division is made: Files, saws, and saws and files, it being understood that the manufacture of saws and files together is limited to a few establishments, in which the manufacture of saws is the more important element. The industries are kindred in many respects; both involve niceties of process in tempering and hardening; and, despite the use of files in nearly every mechanic art, the great proportion of them are used for filing saws.

Reference has been made to the displacement of hand filing by planing and milling in machine-shop work. It is not, however, to be presumed that this change caused a diminution in the manufacture of files, especially in this country, where their manufacture had been scarcely begun when planers and milling-machines were introduced, reliance having previously been placed upon importations of files from England.

Planing and milling metal, like wood planing and sawing, occupy a sphere which could never have been filled by hand filing, but machine tooling has changed the character of file-making, superseding rough files, which once constituted the greater part of all made. At the same time there remains an increasing demand for the finer classes of files, in both wood and metal finishing, and a great demand for saw-files. Thus the manufacture of files progresses with other industrial developments, but relatively falls behind many of them.

In the census tables of 1850 and 1860 file-making does not appear as a distinct industrial item, not having become of sufficient importance. Files were made by hand prior to 1850, and in connection with gun work in this country probably much earlier. The number of large factories has not increased since 1870, although many of these factories have increased greatly in size; but the number of small factories or shops (with less than 10 operatives each) has nearly doubled, and these small shops will average fewer operatives each than in 1870. This merely shows the widening of the distinction between file manufacturing and custom file-making. Between the two influences the average size of factory is only slightly increased.

In machine file-making we may reckon the value of constituent material (refined cast-steel) at 18 or 20 per cent. of the product value, the accessory material costing about half as much more.

For hand work the value of material handled per operative is usually from 60 to 75 per cent. as great as in the machine file-making works; but the figures do not fully represent the intrinsic difference in the quantity of materials handled per operative, as the larger works have better facilities for procuring their supplies at low rates. The ratio of material to product is also less in the small shops. But in the face of the market fluctuations just prior to the taking of the last census we must expect exceptions to general rules, since when the price of iron doubles within six months, only to fall to its former level in three, it is obvious that a few speculative ventures on the part of heavy concerns might greatly change the relative aspects of the returns.

Subject also to these exceptions we may note that, in saw manufacture, the largest works often show the smallest value of material per operative. This will be found mainly due to variations in the range of work. Thus, if to a saw factory employing 60 hands there be added a steel works of 40 hands, the actual cost of constituent material is not only greatly reduced in itself, but, per operative, experiences an additional reduction, so that we find ratios nearly as four to one in the value of material handled per operative. For the smallest file- and saw-shops the relative value of material, as well as of product per operative, is increased by the labor of proprietors not enumerated as operatives.

The value of saw material is from 40 to 50 per cent. of that of the product, and the cost of constituent material may be rated at 35 to 40, and of coal at 2 to 4 per cent. of the value of the product. Until after the civil war saw plates for the better quality of saws were imported from England, but since that time great advances have been made in steel manufacture in this country, and both saw steels and saws of the finest quality are now made on a large scale.

A much greater value of capital per operative is required in saw- than in file-making, the material employed per operative being of much greater value, and the plant of machinery and buildings is in every way more costly. But these differences are less strongly marked in comparing saw manufacture with machine than with hand file-making. There is also less difference now than in 1870.

In studying industrial conditions easy inferences from an inadequate knowledge of the facts are often contradicted by the statistical exhibit which may indicate unpremised conditions that really exist. It may be said in the abstract that an industry pursued in a given way attains a maximum efficiency when of a given size, but the limitation is more commonly due to the market than to the methods of manufacture. Yet in these methods, when division of labor ceases, the increase of efficiency also ceases. It then becomes a mere question of least common multiples. Thus, when files are made by hand, a few operatives may equably cover the whole work; but with the introduction of machine work the efficiency of a file-cutter is, we may say, quadrupled, and not only must the relative number of operatives working with him be also quadrupled, but new divisions of labor and administration may be introduced whose highest efficiency may remain to be satisfied with a higher multiple. So factories grow, but works greater in aggregation than in organism may be maintained by reputation of the locality and by the facilities of invested capital not easily convertible to other uses. It has been remarked that, as a rule, the largest factories have the largest capital per operative, but this rule has its general limitations, as well as its special exceptions. Where an investment already exists and must be utilized or sacrificed, capital may become cheap. Cheap capital is identical with small capital, and presupposes the existence of special conditions of intrinsic worth not rated as productive investment, such, for example, as natural water-powers and the relative advantage of location upon cheap land or the economy in the use of large over small steam powers or nearness to coal or iron mines. Such conditions often exist in small shops, and account for their small capital per operative; but in the case of a large established factory, aside from these primary influences, a temporary relapse in industrial activity may sink the rating of productive investment, so that a large portion of the worth derived from human labor may cease to be rated, being offset against the more favorable location or facilities of newer factories, whose investments are fully rated. When such capital is forced into a position parallel with that of natural advantages requiring no investment of labor, sooner or later a portion of the capital ceases to be considered as productive investment and becomes part of the ground upon which profitable investment is based. This declension is real, and though its appraisal may be at irregular intervals, especially upon check of growth or change of ownership, and therefore without consistency of estimate, a large factory may have a smaller investment per operative than a smaller works whose more recent investment has never been discounted from its original cost.

In industries in which large investments are bolstered up by great changes of method involving great relative advantage the second phase of this change has not been reached, and there is an almost regular increasing gradation of investment per operative from the smallest to the largest works; but when the relative advantage is consumed and a more stable condition is reached, this discrepancy is not maintained, and there is a relative declension of capital per operative for the larger factories. Such a declension is apparent in both saw and file manufacture, but is more marked in the former. There has been a fall in values since 1870, which appears to have had a greater influence on large than upon small investments, and a greater influence upon saw than upon file manufacture. Thus the larger file-works still, as a rule, exhibit the greater capital per operative, but for saw factories the opposite rule appears to prevail in the returns.

In both saw- and file-making the proportion of skilled operatives is usually large, and relatively greater in the small than in the large factories. Often all or nearly all of the operatives are skilled. The employment of women and boys is slight, and is principally confined to large works, in which packing and other simple duties have to be performed on a large scale. For the large factories the amount of desultory labor is exceedingly small.

In file-making the power employed ranges from one-half to 1 horse-power per operative, much of it being consumed in the forging; but in the manufacture of saws the power employed is usually as much as 1 horse-power per operative; sometimes, when the manufacture of steel is included, over 2 horse-power.

In making saws the rolled plate is first cut and trimmed, the teeth are then punched in toothing-machines and afterward are filed, and the saws are tempered in oil by aid of special apparatus. The tempering is completed by blazing off oil upon the surface of the plate, and, after hammering, the blade or plate is ground to a graded thickness, either by bedding the plate and pressing one side at a time against a grindstone, or by special grinding-machines, in which both sides of the saw are ground at one operation. It is then hammered and glazed or polished in several operations, after which the teeth are set and sharpened.

In making files the first process is the forging of the blank, at which a smith and striker will turn out over 200 blanks a day for an ordinary size. These blanks are annealed, straightened, ground, and (in some cases) filed level, after which follows the cutting. The cuts are produced by hand at the rate of about one a second, a short chisel being used, and parallelism of the cuts is secured by guiding upon the ridge thrown up by the preceding cut Hardening, straightening, scouring, and proving complete the file. The introduction of machine file-cutting has somewhat changed the character of the work. Large factories have been established in consequence, and these produce files of standard forms with more uniform teeth and more effective in operation than those made by hand, but hand-cutting remains necessary for custom and special work. In sharpening and resharpening files the sand-blast has in recent years been employed with a decided saving of labor.

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STATISTICS

OF THE

IRON AND STEEL PRODUCTION

OF THE

UNITED STATES.

COMPILED BY

JAMES M. SWANK,
SECRETARY OF THE AMERICAN IRON AND STEEL ASSOCIATION,
SPECIAL AGENT.

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LETTER OF TRANSMITTAL.

PHILADELPHIA, *June* 1, 1881.

HON. FRANCIS A. WALKER,
Superintendent of Census.

SIR: I have the honor to submit herewith my final report upon the iron and steel industries of the United States in the census year 1880. This report embraces complete statistics for that year of (1) blast furnaces and their products, (2) rolling mills and their products, (3) steel works and their products, and (4) forges and bloomaries and their products, accompanied by such comments and such statistical and historical summaries as have seemed to be proper and necessary.

The products of the blast furnaces embrace pig iron and a few furnace castings; the products of the rolling mills embrace all rolled iron, and such other finished iron articles, whether rolled or hammered, as a few of the mills make a specialty of producing; the products of the steel works embrace steel of every description in its crude state, and finished steel in various forms, whether rolled or hammered; the products of the forges embrace blooms made from pig and scrap iron; and the products of the bloomaries embrace blooms and hammered bar iron made directly from the ore.

The branches of the American iron and steel industries which are here enumerated may for convenience be termed the *productive* branches of those industries, in contradistinction to such *reproductive* branches as foundries, machine shops, anchor works, chain works, pipe and tube works, nut and bolt works, wire works, tack factories, etc., the collection of the statistics of which branches has been made directly by the Census Office. The productive branches above mentioned include all which produce iron and steel from raw materials, and, with the exception of iron foundries, all which produce iron and steel by what may be termed secondary operations. Iron foundries could not be embraced in the scope of this report because of their close association with machine shops and other reproductive branches, which are so extensive and varied and so infinitely ramified that no statistical machinery other than that of the Census Office itself could justly deal with them.

Some assurance may be desired by the public that the statistics which relate to the blast furnaces, rolling mills, steel works, and forges and bloomaries have been faithfully collected. An explanation of the manner in which these statistics have been obtained will probably satisfy this natural desire.

The American Iron and Steel Association has for years compiled at stated intervals a complete directory to all the iron and steel works above mentioned, embodying a detailed description of each establishment, the character of its product, the name and post-office address of its owners, its exact geographical location, etc. Through the co-operation of the Association with the plans of the Census Office a carefully revised edition of this directory was prepared and published a few weeks previous to the beginning of the census year. Special efforts were made after the publication of this edition to ascertain any changes or additions that might have taken place while it was passing through the press, and this supplementary work was continued until exact information concerning the location, ownership, and character of every establishment existing at the beginning of the census year is believed to have been obtained.

With a complete list in my possession of all the iron and steel works in the country whose statistics I had been requested to collect, the next step was to send, on the 1st day of June, 1880, to each company, or firm, or individual owning or controlling these works a schedule of interrogatories which had been prepared by the Census Office, accompanied by a circular letter over my signature requesting prompt answers, and explaining the nature and importance of the inquiry which the Census Office had authorized to be made. Special stress was placed in this letter upon the provision in the law authorizing the Tenth Census which specified that any information contained in the schedules returned to the officers of the census should not be disclosed, except to superior officers. The result has been very gratifying. A large majority of the schedules were filled up and returned with reasonable promptness. Others were delayed from various causes, so that a second circular letter and protracted correspondence and personal visits became necessary. In extreme cases the aid of the telegraph was called into requisition. In only one case were coercive measures resorted to, and in only one other case was desired information withheld. That full answers to all interrogatories were not insisted upon in this latter case is due solely to lack of time, the final refusal to furnish information having been made too late to admit of further delay in closing the statistical tables for the country. With this single exception full replies to all interrogatories were made by the owners, lessees, or trustees of all the iron and steel works covered by the schedules, and the results were summarized and presented to the country in my preliminary report, dated April 1, 1881, exactly ten months after the inquiry was undertaken.

In the final report which is herewith submitted the statistics which have been obtained are arranged by states, by counties, by processes, and by products. The tables have been made as compact as was consistent with clearness, comprehensiveness, the gratification of the natural pride of locality, and the object of all true statistical research, which is the accumulation of useful information. To assist those who have not the time or the inclination to study the complete tables, the leading facts established by them have been presented a second time in condensed tables, and in connection with explanatory comments.

After presenting the results of the census of 1880 I have deemed it best, after careful deliberation, and with your approval, to supplement them with a brief historical sketch of the manufacture of iron and steel in all ages, and with a more elaborate sketch of the growth of the iron and steel industries of our own country from the earliest settlements to the present time. A knowledge of the world's iron history must be regarded as forming part of a useful education in an age like this, which is so proverbially identified with a liberal use of iron and steel; while a knowledge of our own iron history is essential to a full understanding of the causes of our national development. To know what the iron and steel industries have accomplished for our own country is a patriotic duty; to know something of their small beginnings and of the humble circumstances which surrounded the pioneers who planted them and their sons who struggled to sustain and extend them is a matter of patriotic pride. The greatness and the prominence of our country to-day in the production of iron and steel in large quantities and by scientific methods could in no other way be so satisfactorily exhibited as by affording the opportunity for a comparison of these magnificent results with the primitive methods and the meager results which characterized these industries in "good old colony times," or even a few years ago.

The historical chapters relating to the development of the iron and steel industries of our own country have been regarded as essential to the completeness of this report for another reason. They show that the manufacture of iron and steel has always been a favorite pursuit of the people of this country, and that primarily in every colony and afterwards in every state and territory their manufacture has been undertaken wherever the necessary raw materials have been found to exist. The manufacture of these products in our country dates from the earliest settlements upon the Atlantic coast, and it grew and expanded as rapidly as population increased and the repressive measures of the mother country would permit. After the Revolution it was extended into new states and territories as fast as a demand for iron and steel was created. With the exception of agriculture no American industry has been more widely diffused from the beginning of our history than the manufacture of iron and steel, and none has more generally enlisted the energy and progressive spirit of our people.

The historical survey embodied in this report may not be free from errors, but the utmost care has been taken to prevent errors and to guard against important omissions. The facts of history, especially of the world's industrial history, do not grow on trees, to be plucked by every passer-by, but are hid away in corners, where they can be found only by those who diligently search for them. The search for the leading facts in the world's iron history and in our own iron and steel history has been diligently made, and pains have been taken to verify the facts when found.

In the preparation of the historical chapters relating to the older countries of the world, I have relied for information mainly upon fragmentary statements in works of standard authority. All of these works that it was deemed necessary to mention specifically are referred to in connection with the information derived from them.

A small portion of the data for these chapters was obtained from current European technical publications, and by correspondence with gentlemen whose names are mentioned. In the preparation of the chapters relating to our own country less dependence has been placed upon statements already published, and more upon the results of original research, including a large correspondence with gentlemen in all parts of the country. All the sources of information of special importance are duly acknowledged in the text, except where details have been gathered from many sources. I desire, however, to express my great indebtedness to the *History of American Manufactures* prior to 1860 by Dr. J. Leander Bishop, one of the most industrious, accurate, and deserving of American historians; to *The Iron Manufacturer's Guide*, by Professor J. P. Lesley, published in 1859; and to the unvarying courtesy and sympathetic suggestions of the officers of the Historical Society of Pennsylvania, through whom I have had access to many rare books, pamphlets, and manuscripts relating to our colonial history.

In the collection and compilation of the statistics of 1880 I have had the intelligent assistance of Mr. George W. Cope and other gentlemen, which is thankfully acknowledged. To Mr. Cope my thanks are especially due.

I am, sir, very respectfully, your obedient servant,

JAMES M. SWANK,
Special Agent.

PART I.—STATISTICS.

SUMMARY OF IRON AND STEEL STATISTICS FOR 1880.

The complete statistical results of the census of the blast furnaces, rolling mills, steel works, forges, and bloomaries in the United States in the census year 1880 will be found in the accompanying tables. These results are here summarized, and as far as possible compared with results established by the census of 1870. The net ton of 2,000 pounds is invariably used in the tables and summary.

GRAND SUMMARY.

In the following table is presented a summary of the more important results established by the census of 1880, compared with similar results established by the census of 1870.

United States.	Number of establishments.	Amount of capital (real and personal) invested.	Value of all materials used.	Value of all products made.	Weight of all products (tons).	Total hands employed.	Total amount paid in wages.
Total in 1880	1, 005	$230, 971, 884	$191, 271, 150	$296, 557, 685	7, 265, 140	140, 978	$55, 476, 785
Total in 1870	808	$121, 772, 074	$135, 526, 132	$207, 208, 696	3, 655, 215	77, 555	$40, 514, 981
Percentage of increase in 1880	24. 38	89. 68	41. 13	43. 12	98. 76	81. 78	36. 93

ESTABLISHMENTS.

The whole number of establishments that were engaged in the manufacture of iron and steel in 1880, or were built or partly built to engage in their manufacture, was 1,005. In 1870 it was 808. The increase in the ten years was 24.38 per cent. By the term "establishment" is meant a single manufacturing enterprise, or an aggregation of enterprises of like character under one management. Thus one establishment may embrace two rolling mills, and another may embrace four blast furnaces. If, however, a firm or company operates two or more enterprises of different character, each of these enterprises is classed as a separate establishment. A comparison of the number of the various establishments in 1870 and 1880 is given below.

	1870.	1880.
Blast furnace establishments	386	490
Rolling mill establishments	310	324
Steel works	30	73
Forges and bloomaries	82	118
Total	808	1, 005

The size and capacity of the establishments were much greater in 1880 than in 1870. As the capacity of blast furnaces only was given in 1870, no complete data are available for a comparison of the capacity of all the works in the two periods. The daily capacity of the blast furnaces in 1870 was 8,357 tons of pig iron, and in 1880 it was 19,248 tons, an increase of 130.32 per cent. The number of blast furnaces in 1870 was 574, and in 1880 it was 681, an increase of 18.64 per cent.

The following exhibit shows the number and capacity of the blast furnaces, rolling mills, steel works, forges, and bloomaries at the close of the census year 1880:

Blast furnace establishments	490
Completed blast furnaces	681
Rolling mill establishments	324
Puddling furnaces, each double furnace counting as two furnaces	4, 319
Rotary puddling furnace (Sellers)	1
Danks puddling furnaces	19
Hammers in iron rolling mills	239
Heating furnaces	2, 105
Trains of rolls in iron rolling mills	1, 206
Nail machines	3, 775

Steel works	73
Bessemer steel converters	24
Open-hearth steel furnaces	37
Pot holes for crucible steel	2, 691
Trains of rolls in steel works	136
Hammers in steel works	219
Forges and bloomaries	118
Forge and bloomary fires	495
Siemens rotator	1
Hammers in forges and bloomaries	141
Daily capacity of blast furnaces, in tons	19, 248
Daily capacity of iron rolling mills, in tons	16, 430
Daily capacity of Bessemer steel converters, in tons	4, 467
Daily capacity of open-hearth steel furnaces, in tons	827
Daily capacity of Bessemer and open-hearth steel rolling mills, in tons	5, 223
Daily capacity of crucible steel works, in tons	445
Daily capacity of forges and bloomaries, in tons	520

CAPITAL.

The whole amount of capital invested in 1880 in the iron and steel industries of the United States which are embraced in this report was $230,971,884; in 1870 it was $121,772,074: increase, $109,199,810, or 89.68 per cent. Of the whole amount invested in 1880, Pennsylvania's share was 46 per cent.; that of Ohio was 11 per cent.; that of New York was 9 per cent.; and that of Missouri and New Jersey was each 4 per cent. No one of the other states shows an investment greater than three per cent.

TOTAL PRODUCTION.

The total production of the iron and steel works of the United States in 1880 was 7,265,140 tons; in 1870 it was 3,655,215 tons: increase, 3,609,925 tons, or 98.76 per cent. The phrase "total production" includes the products of all the various processes or operations, although in ascertaining most of these products there is a necessary duplication of the tonnage of raw or comparatively raw materials already stated. Thus rolled iron is mainly produced from pig iron. As the method of stating the production of 1880 is the same that was observed in 1870, a comparison of the results for both periods can not be open to objection.

PRODUCTION IN DETAIL.

The following table shows the production of each branch of our iron and steel industries in 1870 and 1880, with the percentage of increase or decrease in the latter year:

Iron and steel products.	Census year 1870.	Census year 1880.	Percentage of increase in 1880.	Percentage of decrease in 1880.	Iron and steel products.	Census year 1870.	Census year 1880.	Percentage of increase in 1880.	Percentage of decrease in 1880.
	Tons.	*Tons.*				*Tons.*	*Tons.*		
Pig iron and castings from furnace	2, 052, 821	3, 781, 021	84	....	Crucible steel finished products	28, 069	70, 319	151	....
All products of iron rolling mills	1, 441, 829	2, 353, 248	63	....	Blister and other steel	2, 285	4, 956	117	....
Bessemer steel finished products	19, 403	889, 896	4, 486	....	Products of forges and bloomaries	110, 808	72, 557	....	35
Open-hearth steel finished products	....	93, 143	....	....	Total	3, 655, 215	7, 265, 140	98. 76	....

Of the pig iron produced in the census year 1880, there were produced with charcoal and cold blast, 79,613 tons; with charcoal and hot-blast, 355,405 tons; with anthracite, 1,112,735 tons; with bituminous coal and coke, 1,515,107 tons; and with mixed anthracite and coke, 713,932 tons. The furnace castings amounted to only 4,229 tons. The total production was 3,781,021 tons, of which 12,875 tons were spiegeleisen.

In the following table is presented a comparative statement of iron rolling mill products in 1870 and 1880:

Iron rolling mill products.	1870.	1880.	Iron rolling mill products.	1870.	1880.
	Tons.	*Tons.*		*Tons.*	*Tons.*
Bar iron	488, 834	663, 211	Structural iron	....	96, 810
Rod iron	26, 087	145, 626	Rolled iron axles	....	2, 630
Nail-plate iron converted into cut nails	230, 225	252, 830	Hoop iron	....	96, 843
Boiler-plate iron	54, 477	89, 560	Fish-plates and miscellaneous forms of rolled iron	....	48, 345
All other plate iron		94, 749	Railroad spikes, horseshoes, etc., made by iron rolling mills from rolled iron not included above	....	82, 358
Sheet iron	74, 753	94, 992	Hammered axles	....	21, 884
Iron rails	531, 605	466, 917	Forgings	....	3, 703
Skelp iron	2, 217	128, 321	Total	1, 441, 829	2, 353, 248
Muck bar made for sale to other works	33, 631	64, 469			

The item of muck bar is an unavoidable duplication, as it reappears as finished iron to be counted a second time.

In the Bessemer and open-hearth steel works of the country the following finished products were produced in 1880:

Finished steel products.	Bessemer steel.	Open-hearth steel.
	Tons.	*Tons.*
Rails	741, 475	9, 105
Bars	76, 710	43, 296
Rods	49, 064	1, 134
Shapes	557	80
Sheets	......	1, 700
Plates	1, 475	11, 034
Other forms	20, 615	26, 794
Total finished products	889, 896	93, 143

In the census year 1870 the production of Bessemer steel finished products was only 19,403 tons. No open-hearth steel products are reported for that year. The quantity of Bessemer steel ingots produced in the census year 1880 was 985,208 tons, and the quantity of open-hearth steel ingots was 84,302 tons. No statistics of ingots produced in 1870 are available for comparison. It will be observed that a larger quantity of finished open-hearth steel products was produced in 1880 than of ingots, which is probably due to the carrying over of ingots from the preceding year and to importations during the census year. The Bessemer steel ingots produced in 1880 are in excess of the finished products.

The increase in the production of crucible steel finished products in the decade between 1870 and 1880 was from 28,069 tons to 70,319 tons, or 151 per cent. The production of crucible steel ingots in 1880 was 76,201 tons. The production of blister steel and of steel made by other minor processes was only 2,285 tons in 1870 and 4,956 tons in 1880, and it is not likely to increase in the future.

There was a decrease of 35 per cent. in the production of the forges and bloomaries from 1870 to 1880, or from 110,808 tons to 72,557 tons. This decrease is due to the general substitution of improved processes for the forges and bloomaries of our earlier iron history, and it would have been much greater in the decade mentioned if the improved American bloomary, so largely used in northern New York, had not contributed its large product to swell the production of 1880.

RAW MATERIALS.

The following table presents the quantities of mineral products used by the iron and steel works in 1880:

Works.	Iron ore.	Limestone.	Anthracite coal.	Bituminous coal.	Coke.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Blast furnaces	7, 256, 684	3, 169, 149	2, 615, 182	1, 051, 753	2, 128, 255
Rolling mills	363, 959	....	526, 126	3, 915, 377	14, 834
Bessemer and open-hearth steel works	7, 327	....	140, 458	465, 655	104, 980
Crucible steel works	2, 128	....	40, 392	224, 657	22, 791
Forges and bloomaries	79, 610	....	340	1, 613	6, 695
Total	7, 709, 708	3, 169, 149	3, 322, 498	5, 659, 055	2, 277, 555

Of the iron ore and limestone given in the table, at least one-half was purchased from independent producers; of the anthracite coal, nearly all was so purchased; and of the bituminous coal and coke, fully two-thirds was so purchased.

The following table shows the quantities of all other leading raw materials used in 1880 in the manufacture of iron and steel:

Works.	Charcoal.	Mill cinder.	Pig iron.	Old iron rails.	Scrap iron.	Ore blooms.	Pig or scrap blooms.	Muck bar purchased.	Spiegeleisen.	Old steel rails and crop ends.	Bessemer steel ingots and blooms purchased.	Open-hearth ingots and blooms purchased.	Scrap steel.	Swedish billets and bars.	Other billets and bars.	Oil used as fuel.
	Bushels.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Bbls.*
Blast furnaces	53, 909, 828	354, 048	....	....	....	......	......	......	......	......	......	......	......	......	......	....
Rolling mills	2, 569, 756	....	1, 574, 693	708, 534	422, 282	14, 147	46, 861	53, 754	......	......	......	......	......	......	......	....
Bessemer and open-hearth steel works	37, 552	....	966, 603	....	13, 911	16, 053	250	......	86, 138	85, 653	42, 939	17, 713	90, 645	......	......	....
Crucible steel works	60, 594	....	17, 226	....	1, 952	13, 211	2, 400	......	......	......	......	......	19, 726	10, 410	16, 496	....
Forges and bloomaries	13, 014, 361	....	38, 113	....	8, 933	......	......	......	......	......	......	......	......	......	......	853
Total	69, 592, 091	354, 048	2, 596, 635	708, 534	447, 078	43, 411	49, 511	53, 754	86, 138	85, 653	42, 939	17, 713	110, 371	10, 410	16, 496	853

The large consumption of old iron rails and scrap iron in the rolling mills in 1880 was abnormal, and was the result mainly of the great scarcity of pig iron which followed the sudden revival of a demand for iron and steel products in the summer of 1879.

RELATIVE RANK IN PRODUCTION OF THE STATES.

The relative rank in production of all the states and territories which produced iron or iron and steel in 1870 and in 1880 is given in the following table.

States.	Production, 1880.	Rank.	States.	Production, 1870.	Rank.
	Tons.			*Tons.*	
Pennsylvania	3, 616, 668	1	Pennsylvania	1, 836, 808	1
Ohio	930, 141	2	Ohio	449, 768	2
New York	598, 300	3	New York	448, 257	3
Illinois	417, 967	4	New Jersey	115, 262	4
New Jersey	243, 860	5	Maryland	95, 424	5
Wisconsin	178, 935	6	Missouri	94, 890	6
West Virginia	147, 487	7	Kentucky	86, 732	7
Michigan	142, 716	8	Michigan	86, 679	[illegible]
Massachusetts	141, 321	9	Massachusetts	86, 146	9
Missouri	125, 758	10	West Virginia	72, 337	10
Kentucky	123, 751	11	Indiana	64, 148	11
Maryland	110, 934	12	Wisconsin	42, 234	12
Indiana	96, 117	13	Virginia	37, 836	13
Tennessee	77, 100	14	Tennessee	34, 305	14
Alabama	62, 986	15	Illinois	25, 761	15
Virginia	55, 722	16	Connecticut	25, 305	16
Connecticut	38, 061	17	Maine	17, 138	17
Georgia	35, 152	18	Georgia	9, 634	18
Delaware	33, 918	19	Delaware	8, 307	19
Kansas	19, 055	20	Alabama	7, 060	20
California	14, 000	21	Rhode Island	4, 415	21
Maine	10, 866	22	California	3, 000	22
Wyoming Territory	9, 790	23	North Carolina	1, 801	23
Rhode Island	8, 134	24	Vermont	1, 525	24
New Hampshire	7, 978	25	South Carolina	443	25
Vermont	6, 620	26	Kansas		
Colorado	4, 500	27	Wyoming Territory		
Oregon	3, 200	28	New Hampshire		
Nebraska	2, 000	29	Colorado		
Texas	1, 400	30	Oregon		
North Carolina	439	31	Nebraska		
District of Columbia	264	32	Texas		
South Carolina			District of Columbia		
Total	7, 265, 140		Total	3, 655, 215	

Twelve states made over 100,000 tons each in 1880. Pennsylvania, which for more than a hundred years has been the leading iron-producing state in the Union, made in 1870 a fraction over 50 per cent. of the total product, and in 1880 it made a fraction under 50 per cent. At both periods its prominence in the production of iron and steel was virtually the same. From 1870 to 1880 it increased its production 97 per cent., or from 1,836,808 tons to 3,616,668 tons. Ohio was the second state in prominence in 1870, and it held the same rank in 1880. In the former year it produced 449,768 tons, and in 1880 it produced 930,141 tons, an increase of 107 per cent. The third state in prominence in 1870 was New York, and it maintained this rank in 1880, but its growth fell far below that of its two sister states above mentioned. In 1870 it produced 448,257 tons, and in 1880 it produced 598,300 tons, an increase of 33 per cent. New Jersey was fourth in rank in 1870, producing 115,262 tons, but it was fifth in 1880, although in that year it produced 243,860 tons, an increase of 112 per cent. The fourth place in 1880 was taken by Illinois, which produced in 1870 only 25,761 tons, while in 1880 it produced 417,967 tons, an increase of 1,522 per cent.—the most marvelous in the history of the country. Maryland ranked fifth in 1870, producing 95,424 tons in that year, while in 1880 it produced only 110,934 tons, an increase of 16 per cent., causing it to drop to the twelfth place. The sixth state in rank in 1870 was Missouri, with a production of 94,890 tons, which was increased to 125,758 tons in 1880, or 33 per cent., giving it the tenth place in that year. The seventh state in rank in 1870 was Kentucky, but it fell to the eleventh place in 1880, increasing its production from 86,732 tons to 123,751 tons, or 43 per cent. Michigan ranked eighth in 1870, and in 1880 its rank was the same, its production increasing in the ten years from 86,679 tons to 142,716 tons, or 65 per cent. Massachusetts was ninth in rank in 1870, and it held the same rank in 1880, increasing its production from 86,146 tons to 141,321 tons, or 64 per cent. Of the New England states, Massachusetts shows the greatest actual growth in the ten years. West Virginia was tenth in the list in 1870 and seventh in 1880, increasing its production from 72,337 tons to 147,487 tons, or 104 per cent. Wisconsin was twelfth in rank in 1870, but passed to the sixth place in 1880, increasing its production from 42,234 tons to 178,935 tons, or 324 per cent. This state ranks next to Illinois among the western states.

Of the states which made less than 100,000 tons in 1880, several gave promise in that year that they would soon reach an annual production of at least this quantity. Indiana narrowly escaped accomplishing this result, increasing its production from 64,148 tons in 1870 to 96,117 tons in 1880, or 50 per cent. In the ten years from 1870 to 1880 Alabama increased from 7,060 tons to 62,986 tons, or 792 per cent. Georgia increased from 9,634 tons to 35,152 tons, or 265 per cent. Tennessee increased from 34,305 tons to 77,100 tons, or 125 per cent. Delaware increased from 8,307 tons to 33,918 tons, or 308 per cent. Virginia increased from 37,836 tons to 55,722 tons, or 47 per cent.

All the states which made iron or steel in 1870 increased their production in 1880, except Maine, North Carolina, and South Carolina. The greatest percentage of increase in the decade was in the western states, beginning with Ohio, and in the southern states, beginning with Delaware, but the greatest actual increase was in Pennsylvania.

GEOGRAPHICAL DISTRIBUTION OF ALL PRODUCTS.

The whole territory of the United States may be regarded as comprising four grand divisions—the eastern states, the southern states, the western states and territories, and the Pacific states and territories. Assuming that the eastern states comprise all of the states lying north of Delaware and east of Ohio, that the southern states comprise all of the late slaveholding states except Missouri, and that the other divisions require no explanation, we present the following comparative statement of the development of our iron and steel industries in each of the grand divisions in the census year 1880.

Grand divisions.	Number of establishments.	Capital invested.	Hands employed.	Wages paid.	Tons produced.	Value of all products.
Eastern states	556	$149, 507, 461	82, 842	$34, 361, 660	4, 671, 808	$192, 696, 010
Southern states	218	29, 145, 830	20, 595	6, 261, 344	649, 153	25, 353, 251
Western states and territories	224	50, 755, 990	36, 663	14, 542, 587	1, 912, 689	76, 933, 686
Pacific states and territories	7	1, 562, 603	878	311, 194	31, 490	1, 574, 738
Total United States	1, 005	$230, 971, 884	140, 978	$55, 476, 785	7, 265, 140	$296, 557, 685

In the decade between 1870 and 1880 the iron industry was extended into many new states and territories. Twenty-five states were engaged in the manufacture of iron or iron and steel in 1870. Thirty states, the District of Columbia, and Wyoming Territory made iron in 1880, and about the half of these also made steel. South Carolina made iron in 1870, but does not appear in the statistics for 1880. Its total production in 1870 did not, however, aggregate 500 tons. The iron industry in this state has been practically abandoned. Between 1870 and 1880 three states for the first time engaged in the manufacture of iron, namely, Colorado, Kansas, and Nebraska; also two territories, namely, Utah and Wyoming. Utah did not, however, make any iron in 1880. It made a small quantity in each of the years 1874, 1875, and 1876, and it will make a larger quantity in the near future. (Since the close of the census year 1880 Washington Territory has commenced to manufacture pig iron, as have also California and Minnesota. California had previously, since 1868, rolled iron at San Francisco.) Minnesota appears in 1880 among iron-manufacturing states, but its statistics relate only to the preparations that had been made to embark in the business. New Hampshire made iron many years ago, but it does not appear in the statistics for 1870; it reappears in the tables for 1880. Oregon and Texas each built a blast furnace in the decade preceding the census year 1870, but they did not make any iron in that year; they appear, however, in the statistics of production for 1880. The District of Columbia once had a blast furnace in operation, but in 1870 it had no iron industry whatever; in 1880 the United States government owned and operated a small rolling mill at the Washington navy yard.

The percentage of total production in 1880 was distributed as follows: Pennsylvania, 50 per cent.; Ohio, 13; New York, 8; Illinois, 6; New Jersey, 3; Wisconsin and West Virginia, each over 2 per cent.; Michigan and Massachusetts, each nearly 2 per cent.; Missouri, Kentucky, and Maryland, each over 1½ per cent.; Indiana, over 1 per cent.; Tennessee, about 1 per cent.; and all other states and territories, an aggregate of about 4 per cent.

CENTERS OF PRODUCTION.

In the following table is presented a view of the principal centers of production of the iron and steel industries of the United States in the census year 1880. These centers are divided into two classes—the first comprising fifteen counties which produced over 100,000 tons of pig iron, blooms, and finished products, and the second comprising seventeen counties which produced over 60,000 and less than 100,000 tons. Six states are represented in the first class, and eight states in the second class.

COUNTIES OF THE FIRST CLASS, PRODUCING OVER 100,000 TONS.		COUNTIES OF THE SECOND CLASS, PRODUCING BETWEEN 60,000 AND 100,000 TONS.	
Counties.	Tons.	Counties.	Tons.
1. Allegheny county, Pa	848, 146	1. Lawrence county, Pa	88, 443
2. Lehigh county, Pa	324, 875	2. Lancaster county, Pa	87, 019
3. Northampton county, Pa	322, 882	3. Ohio county, W. Va	84, 767
4. Cambria county, Pa	260, 140	4. Will county, Ill	84, 094
5. Cook county, Ill	248, 479	5. Montour county, Pa	79, 789
6. Dauphin county, Pa	223, 676	6. Chester county, Pa	78, 363
7. Mahoning county, Ohio	219, 957	7. Warren county, N. J	76, 622
8. Berks county, Pa	213, 580	8. Trumbull county, Ohio	73, 369
9. Cuyahoga county, Ohio	210, 354	9. Lebanon county, Pa	73, 149
10. Mercer county, Pa	182, 881	10. Lawrence county, Ohio	70, 794
11. Rensselaer county, N. Y	177, 967	11. Schuylkill county, Pa	70, 609
12. Montgomery county, Pa	168, 628	12. Baltimore county, Md	69, 944
13. Lackawanna county, Pa	151, 273	13. Blair county, Pa	68, 039
14. Milwaukee county, Wis	128, 191	14. Essex county, N. Y	66, 725
15. St. Louis county, Mo	102, 644	15. Philadelphia county, Pa	65, 983
		16. Wayne county, Mich	63, 548
		17. Dutchess county, N. Y	61, 637
Total (15 counties)	3, 783, 673	Total (17 counties)	1, 262, 894

THE CENTER OF TOTAL PRODUCTION.

The geographical center of total production of the iron and steel industries of the United States is the point at which equilibrium would be established were the country taken as a plane surface, itself without weight but capable of sustaining weight, and loaded with its production of iron and steel, each ton exerting pressure on the pivotal point directly proportioned to its distance therefrom.

The center of production of iron and steel in the United States in the census year 1880 is found to be at 40° 43′ north latitude and 79° 20′ longitude west from Greenwich. This point is in Pennsylvania, on the boundary line between Armstrong and Indiana counties, and about 12 miles northeast of Apollo and 12 miles west of Indiana—Laufman & Co.'s rolling mill at Apollo being the nearest iron works. At the center of production thus ascertained iron has never been manufactured in any form.

VALUES.

There is a striking disproportion between the values of raw materials and of all products in 1870 and 1880 upon the one hand and the weight of all products in these periods upon the other. The percentage of increase in the values of raw materials and of all products in 1880 over 1870 was 41.13 and 43.12 respectively, while the weight of all products increased 98.76 per cent. The explanation is simple, and is twofold. First, the census year 1870 was a year of high prices, caused partly by an average gold premium throughout the year of about 15 per cent., and partly by other well-known causes. Second, the census year 1880 was not only a year of lower average prices than 1870, but it may be said to have closed a decade of wonderful mechanical and scientific development in the American iron and steel industries, through which the production of large masses of both crude and finished products was rendered possible.

GEOGRAPHICAL DISTRIBUTION OF SPECIAL PRODUCTS.

The various branches of our iron and steel industries have not been equally domesticated in each of the four grand geographical divisions that have been mentioned, and much less can it be said that they are equally at home in any one of the iron-making states or territories. While this statement may embody only a self-evident truth, the full significance of the fact stated is deserving of some consideration. A glance at the statistics for 1880 shows that New England now makes but little pig iron, and that the South makes considerable pig iron and scarcely any rolled iron; that the West has embarked largely in the manufacture of steel by the Bessemer process, while New England can not boast a single Bessemer establishment, but has preferred the open-hearth process; that New York makes most of the blooms that are made from ore, and Pennsylvania most of the blooms that are made from pig and scrap iron; that Michigan is the leading producer of charcoal pig iron, and now makes no other kind; that West Virginia has developed a remarkably active interest in the manufacture of cut nails; that only five states make Bessemer steel, and two states, Pennsylvania and New Jersey, make nearly all of our crucible steel; and that Pennsylvania has made a greater effort than any other state to manufacture all kinds of iron and steel. A glance, however, at leading geographical characteristics is not sufficient to illustrate the wide diversity of the influences which have affected the local development of our iron and steel industries, and the following details are therefore added.

PIG IRON.

Of 3,781,021 tons of pig iron and direct castings produced in 1880 in 22 states, Pennsylvania made 1,930,311 tons, or 51 per cent.; Ohio, 548,712 tons, or 15 per cent.; New York, 313,368 tons, or 8 per cent.; New Jersey, 157,414 tons, or 4 per cent.; Michigan, 119,586 tons, and Wisconsin, 118,282 tons—each over 3 per cent.; Illinois, 95,468 tons, and Missouri, 95,050 tons—each nearly 3 per cent.; West Virginia, 80,050 tons, or over 2 per cent.; Alabama, 62,336 tons, Maryland, 59,664 tons, and Kentucky, 58,108 tons—each over 1½ per cent.; Tennessee, 47,873 tons, or over 1 per cent.; and all other states and territories, each less than 1 per cent.

Anthracite pig iron was produced in Pennsylvania, New York, New Jersey, Massachusetts, and Maryland—the last two states producing but little. Pig iron produced with a mixture of anthracite and coke was made in Pennsylvania, New York, Wisconsin, Illinois, New Jersey, and Maryland. Pig iron produced with bituminous coal and coke was made in Pennsylvania, Ohio, West Virginia, Missouri, Tennessee, Kentucky, Indiana, Illinois, Alabama, Georgia, Virginia, and Maryland. Charcoal pig iron was made in all of the states that made pig iron in 1880, with the exception of Illinois and New Jersey, which used mineral fuel exclusively.

ROLLED IRON.

Of 2,353,248 tons of rolled iron of all kinds produced in 29 states and territories in 1880, Pennsylvania made 1,071,098 tons, or 46 per cent.; Ohio, 272,094 tons, or 12 per cent.; New York, 163,538 tons, or 7 per cent.; Illinois, 117,051 tons, and Massachusetts, 109,252 tons—each 5 per cent.; Indiana, 77,880 tons, or over 3 per cent.; West Virginia, 67,437 tons, New Jersey, 66,030 tons, Kentucky, 65,293 tons, and Wisconsin, 60,653 tons—each a little less than 3 per cent.; Maryland, 47,609 tons, or 2 per cent.; Virginia, 35,176 tons, and Delaware, 33,918 tons—each about 1½ per cent.; Tennessee, 25,381 tons, or 1 per cent.; and all other states and territories, each less than 1 per cent.

Of 466,917 tons of iron rails produced in 1880, Pennsylvania made 34 per cent.; Illinois, 16 per cent.; Ohio, 9 per cent.; Indiana, 8 per cent.; New York, 7 per cent.; Wisconsin, 6 per cent.; Kentucky, 4 per cent.; Kansas and Tennessee, each nearly 3 per cent.; Wyoming Territory, Maryland, and Georgia, each about 2 per cent.; California and Massachusetts, each 1 per cent.; and Colorado, West Virginia, and Vermont, each less than 1 per cent.

Of the cut nails produced in 1880, Pennsylvania made 30 per cent.; West Virginia, 21 per cent.; Ohio, 14 per cent.; Massachusetts, 10 per cent.; New Jersey and Indiana, each 6 per cent.; Illinois and Kentucky, each 4 per cent.; and Tennessee and Virginia, each 2 per cent. New York, Nebraska, and Maine each produced less than 1 per cent., but Nebraska made more nails than New York. The whole number of kegs of cut nails made in the United States in 1880 was 5,056,600, each keg weighing 100 pounds.

STEEL INGOTS.

The following table shows the states which produced Bessemer, open-hearth, and crucible steel ingots in 1880.

States.	Bessemer steel ingots.	Open-hearth steel ingots.	Crucible steel ingots.
	Tons.	*Tons.*	*Tons.*
Connecticut			2, 116
Illinois	253, 514	925	130
Kentucky		275	75
Massachusetts		9, 475	140
Missouri	8, 409		
New Hampshire		4, 521	
New Jersey		450	10, 492
New York	84, 160		2, 585
Ohio	82, 811	24, 712	360
Pennsylvania	556, 314	36, 944	60, 303
Tennessee		4, 000	
Vermont		3, 000	
Total	985, 208	84, 302	76, 201

BESSEMER STEEL.

Of the production of 985,208 tons of Bessemer steel ingots in 1880, Pennsylvania made 56 per cent.; Illinois, 26 per cent.; New York, 9 per cent.; Ohio, 8 per cent.; and Missouri, less than 1 per cent. Of the production of Bessemer steel rails, Pennsylvania made 55 per cent.; Illinois, 27 per cent.; Ohio, 9 per cent.; New York, 8 per cent.; and Missouri and Vermont, each less than 1 per cent. The last-named state had, however, no works for the production of Bessemer steel ingots. At the close of the census year there were 24 Bessemer converters in the United States, of which 6 were in Illinois, 2 were in Missouri, 2 were in New York, 2 were in Ohio, and 12 were in Pennsylvania.

OPEN-HEARTH STEEL.

Of the production of 84,302 tons of open-hearth steel ingots in 1880, Pennsylvania made 44 per cent.; Ohio, 29 per cent.; Massachusetts, 11 per cent.; New Hampshire and Tennessee, each 5 per cent.; Vermont, 4 per cent.; and Illinois, New Jersey, and Kentucky, each less than 1 per cent. Of the open-hearth steel ingots produced in 1880, only a small quantity was converted into rails, the weight of these being 9,105 tons. At the close of the census year 1880 there were 37 open-hearth furnaces in the United States, of which 2 were in Illinois, 1 was in Kentucky, 4 were in Massachusetts, 1 was in New Hampshire, 1 was in New Jersey, 10 were in Ohio, 14 were in Pennsylvania, 1 was in Rhode Island, 2 were in Tennessee, and 1 was in Vermont.

CRUCIBLE STEEL.

Of the production of 76,201 tons of crucible steel ingots in 1880, Pennsylvania made 60,303 tons, or 79 per cent.; New Jersey, 10,492 tons, or 14 per cent.; New York, 2,585 tons, or over 3 per cent.; Connecticut, 2,116 tons, or under 3 per cent.; and Ohio, Massachusetts, Illinois, and Kentucky, an aggregate of less than 1 per cent. Pennsylvania, New Jersey, and Connecticut also unitedly produced 4,956 tons of blister steel and miscellaneous steel products, of which Pennsylvania produced 78 per cent.; New Jersey, 20 per cent.; and Connecticut, 2 per cent.

BLOOMS AND BAR IRON FROM ORE.

The total production of these products in 1880, nearly all of which, however, was in the form of blooms, was 37,633 tons, of which New York produced 84 per cent.; Missouri, 11 per cent.; Tennessee, 2 per cent.; New Jersey and North Carolina, each over 1 per cent.; and Pennsylvania, Georgia, and Virginia, an aggregate of less than 1 per cent. Pennsylvania's product was made in a Siemens rotator; that of North Carolina, Georgia, Virginia, and Tennessee by the old-fashioned Catalan process; that of Missouri by the Peckham process; while the more considerable product of New York was almost wholly made in American bloomaries—an improvement on the Catalan forge. The very small quantity of bar iron made from ore in 1880 was all made in Virginia, North Carolina, Georgia, and Tennessee bloomaries. It aggregated but little over 1,000 tons.

BLOOMS FROM PIG AND SCRAP IRON.

Of 34,924 tons of blooms of this character made in 1880, Pennsylvania produced 70 per cent.; Maryland and New Jersey, each 10 per cent.; Virginia, 7 per cent.; Georgia, over 1 per cent.; Tennessee, about 1 per cent.; and New York and Massachusetts together, less than 1 per cent.

ALL KINDS OF RAILS.

The production of rails of all kinds in 1880 is given in the following table in connection with the states which produced them. The tonnage of rails produced in 1880 was greater than that of any other rolled product, and was about one-third that of pig iron.

States.	Iron rails.	Bessemer steel rails.	Open-hearth steel rails.	Total production of all kinds of rails.
	Tons.	*Tons.*	*Tons.*	*Tons.*
California	6,000			6,000
Colorado	4,500			4,500
Georgia	8,673			8,673
Illinois	72,802	201,186		273,988
Indiana	38,600			38,600
Kansas	13,500			13,500
Kentucky	18,000			18,000
Maryland	9,280			9,280
Massachusetts	5,600			5,600
Missouri		5,100		5,100
New York	34,305	57,870		92,175
Ohio	41,838	66,480		108,318
Pennsylvania	157,213	409,339	3,360	569,912
Tennessee	12,800		2,745	15,545
Vermont	1,500	1,500	3,000	6,000
West Virginia	3,333			3,333
Wisconsin	29,552			29,552
Wyoming Territory	9,421			9,421
Total	466,917	741,475	9,105	1,217,497

Pennsylvania made 47 per cent. of the total production of rails; Illinois, 23 per cent.; Ohio, 9 per cent.; New York, 8 per cent.; Indiana, 3 per cent.; Wisconsin, 2 per cent.; Kentucky, Tennessee, and Kansas, each 1 per cent.; and all other states and Wyoming Territory, each less than 1 per cent.

LABOR.

In the following table is presented a summary of the hands employed, hours of labor required, and wages paid in the iron and steel industries of the United States in 1880, compared as far as possible with like statistics for 1870.

United States.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Total hands employed.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages.
Grand total in 1880	133, 203	7, 709	45	21	140, 978	65	$2 59	$1 24	$55, 476, 785
Grand total in 1870	75, 037	2, 436	82		77, 555				$40, 514, 981
Percentage of increase in 1880	77. 52	216. 46			81. 78				36. 93
Percentage of decrease in 1880			45. 12						

HANDS EMPLOYED AND WAGES PAID.

The total number of hands employed in 1880 was 140,978. Of the whole number, 133,203 were men above 16 years old, and 45 were women above 15 years old; 7,709 were boys below 16 years old, and 21 were girls below 15 years old. The remarkably small number of 66 women and girls employed in the manufacture of iron and steel in 1880 will not escape notice, and is exceedingly creditable to our American civilization. The comparatively small number of boys employed is also worthy of notice.

The 140,978 persons who were employed in 1880 were paid $55,476,785 as wages, or an average of $393 51 for the year for each person. The average daily wages of skilled labor were $2 59; of unskilled labor, $1 24. The highest average daily wages of skilled labor were paid in Rhode Island, Colorado, and Wyoming Territory—$4; the lowest in North Carolina—$1 25. The highest average daily wages of unskilled labor were paid in Wyoming Territory—$2; the next highest in Colorado and California—$1 75; the lowest in North Carolina—54 cents. It may be remarked of North Carolina that its iron industry in 1880 was wholly confined to the use of the primitive ore bloomary, and that the labor employed was largely that of colored men. The average wages paid in the four grand divisions were as follows: Eastern states—skilled, $2 70; unskilled, $1 21: southern states—skilled, $2 09; unskilled, $1 03: western states—skilled, $2 70; unskilled, $1 31: Pacific states and territories—skilled, $3 50; unskilled, $1 75.

It is necessary to explain that the figures of "hands employed" and "wages paid" refer to the labor directly employed at the various iron and steel works of the country, and in the mining and other operations conducted in direct connection with these works. They do not include the labor employed in independent and often remote mining operations which supply our iron and steel industries with ore and coal and other raw materials. (The statistics of these operations are being compiled by other hands.) Nor do they include any considerable part of the labor employed in the transportation of raw materials from the sources of production to the places of consumption. If the "hands employed" and "wages paid" in these various contributory channels were added to the figures given in our tables, the total number of persons directly supported by our iron and steel industries in 1880, and the total amount of wages paid to them, would be largely increased and probably doubled.

HOURS OF LABOR.

The average number of hours of labor required per week in the iron and steel works of the United States in 1880 was 65. This gives a little less than 11 hours for each working day of the week. The average is high, in consequence of the general although not universal practice of operating blast furnaces seven days in the week, and in consequence also of the usual practice at blast furnaces, rolling mills, and steel works of working twelve-hour turns or shifts, which practice may require the presence of the workmen for that length of time, although they may not be, and generally are not, so long actually employed. The state which presents the highest average is Vermont—75 hours, while the lowest average in any of the states is found in Delaware and Kansas—56 hours. A still lower average is found in the District of Columbia—54 hours.

A YEAR OF PROSPERITY.

The census year 1880, which it may here be stated extended from the 1st of June, 1879, to the 31st of May, 1880, was a year of exceptional prosperity for the iron and steel industries of this country. The coincidence is notable that it exactly covered the period which has been designated as "the boom," during which all iron and steel products were in such great demand by American consumers that the iron and steel works of the country were unable to meet it. The home supply was supplemented by large importations, and even these could not be made with sufficient rapidity to meet the urgent wants of consumers. Prices were high throughout the whole year, but fluctuated violently. Labor was in demand, wages were promptly paid, and disputes between workingmen and their employers were rare and unimportant. The census year 1880 will long be memorable as a year of general prosperity for our iron and steel industries, and as one which witnessed the beginning and the end of a most exciting epoch in their history.

TABLE I.—THE BLAST FURNACES

	STATES AND TERRITORIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.				WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Number of completed stacks.	Total daily capacity, in tons of melted metal.
				Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.			
	Total	490	$105, 151, 176	41, 875	40, 683	1, 183	9	72	$1 90	$1 17	$12, 680, 703	8	681	19, 248
1	Alabama	12	3, 106, 196	1, 566	1, 531	35	......	76	2 34	98	553, 713	10	15	339
2	Connecticut	8	1, 297, 000	139	139	......	......	78	1 48	1 17	65, 974	8	8	91
3	Georgia	9	819, 100	754	742	12	......	65	1 76	93	77, 415	7	10	144
4	Illinois	7	1, 515, 000	498	497	1	......	72	2 17	1 33	185, 054	8	10	603
5	Indiana	3	455, 000	308	293	15	......	80	2 00	1 17	54, 840	8	4	73
6	Kentucky	19	2, 681, 035	1, 890	1, 810	80	......	77	1 88	1 07	429, 988	10	22	392
7	Maine	1	150, 000	300	300	......	......	75	1 50	1 25	44, 950	7	1	18
8	Maryland	16	2, 707, 125	1, 443	1, 401	42	......	78	1 40	96	339, 978	7	22	281
9	Massachusetts	4	682, 000	390	390	......	......	69	1 88	1 33	176, 000	7	6	81
10	Michigan	20	3, 504, 386	2, 164	2, 136	28	......	71	1 86	1 25	561, 870	9	27	844
11	Minnesota	1	150, 000	180	180	......	......	60	2 00	1 50	25, 275	(*)	1	40
12	Missouri	12	5, 053, 872	1, 185	1, 160	25	......	74	2 32	1 29	227, 111	9	17	749
13	New Jersey	13	3, 694, 500	1, 174	1, 150	24	......	71	1 75	1 20	365, 639	10	20	691
14	New York	39	10, 128, 221	2, 518	2, 481	37	......	76	1 77	1 14	902, 929	9	57	1, 654
15	North Carolina†	5	470, 000	......	......	......	......	......	......	......	......	......	7	39
16	Ohio	82	14, 606, 919	8, 944	8, 548	396	......	74	1 84	1 25	2, 725, 157	9	103	3, 201
17	Oregon	1	100, 000	250	247	3	......	72	3 00	1 50	46, 822	9	1	12
18	Pennsylvania	167	44, 596, 853	13, 460	13, 164	296	......	75	1 64	1 09	4, 752, 838	9	269	8, 490
19	Tennessee	18	2, 204, 326	1, 579	1, 464	108	7	70	1 50	89	261, 897	8	21	388
20	Texas	1	40, 000	140	140	......	......	60	2 00	1 00	27, 720	6	1	10
21	Vermont	1	20, 000	26	25	1	......	78	2 75	1 40	2, 035	2	1	11
22	Virginia	29	3, 413, 000	1, 221	1, 153	66	2	65	1 50	82	255, 986	10	31	287
23	West Virginia	12	1, 523, 425	893	879	14	......	70	1 55	1 09	240, 158	8	11	319
24	Wisconsin	8	2, 143, 218	853	853	......	......	76	1 91	1 19	357, 354	10	14	473
25	Utah Territory†	2	90, 000	......	......	......	......	......	......	......	......	......	2	18

*Repairing.

† The furnaces in North Carolina and Utah were not in operation in the census year.

OF THE UNITED STATES.

MATERIALS.										
Tons of iron ore.	Value.	Tons of fluxing material.	Value.	Bushels of charcoal.	Value.	Tons of anthracite coal.	Value.	Tons of raw bituminous coal.	Value.	
7, 256, 684	$33, 205, 278	3, 169, 149	$2, 547, 336	53, 909, 828	$3, 679, 120	2, 615, 182	$8, 012, 755	1, 051, 753	$2, 095, 887	
142, 286	138, 646	29, 902	27, 087	4, 349, 338	244, 989	....	....	7, 000	10, 500	1
46, 147	242, 548	7, 573	3, 927	2, 134, 162	222, 992	....	....	....	....	2
61, 194	97, 997	5, 863	4, 211	764, 340	33, 838	....	....	1, 000	2, 000	3
150, 540	924, 750	58, 725	61, 900	....	....	11, 205	65, 249	27, 715	86, 220	4
31, 744	218, 458	14, 600	13, 205	68, 000	450	....	....	54, 100	93, 450	5
102, 667	373, 474	40, 194	36, 553	3, 058, 200	141, 472	....	....	58, 215	90, 499	6
4, 258	6, 387	591	3, 546	211, 665	12, 700	....	....	....	....	7
136, 796	465, 911	51, 670	30, 933	3, 793, 420	242, 356	32, 600	139, 000	....	....	8
21, 564	88, 326	4, 340	3, 460	540, 000	54, 000	5, 900	23, 240	....	....	9
201, 179	1, 162, 961	9, 263	15, 231	11, 876, 221	912, 882	....	....	....	....	10
....	....	....	....	....	....	....	....	....	....	11
169, 982	772, 012	42, 519	24, 764	2, 160, 500	150, 000	1, 050	6, 150	21, 576	59, 028	12
314, 199	1, 511, 942	115, 592	88, 774	....	....	225, 713	779, 676	....	....	13
609, 642	2, 315, 439	185, 950	157, 092	2, 702, 667	256, 467	396, 864	1, 252, 009	120	720	14
....	....	....	....	....	....	....	....	....	....	15
953, 008	5, 147, 695	446, 811	450, 987	7, 879, 959	484, 947	2, 210	11, 710	638, 711	1, 170, 089	16
7, 846	8, 788	518	2, 766	371, 009	21, 519	....	....	....	....	17
3, 838, 455	17, 720, 502	1, 970, 931	1, 460, 928	4, 993, 919	324, 757	1, 921, 588	5, 631, 922	215, 729	519, 768	18
102, 656	212, 780	35, 412	20, 940	1, 084, 749	62, 229	....	....	9, 000	11, 250	19
3, 240	6, 480	540	2, 700	240, 000	14, 400	....	....	....	....	20
1, 050	8, 100	100	100	70, 000	5, 600	....	....	....	....	21
40, 759	81, 204	6, 827	4, 248	1, 457, 390	74, 143	....	....	....	....	22
134, 538	626, 758	89, 156	81, 442	214, 500	11, 415	....	....	4, 047	4, 907	23
182, 934	1, 074, 120	52, 072	52, 542	5, 939, 789	407, 964	18, 052	103, 799	14, 540	47, 456	24
....	....	....	....	....	....	....	....	....	....	25

TABLE I.—THE BLAST FURNACES

	STATES AND TERRITORIES.	MATERIALS—Continued.						PRODUCTS.			
		Tons of coke.	Value.	Tons of other material.*	Value.	Value of all other materials.	Total value of all materials.	Tons of cold-blast charcoal pig iron.	Value.	Tons of hot-blast charcoal pig iron.	Value.
	Total	2, 128, 255	$8, 129, 240	354, 048	$910, 667	$39, 459	$58, 619, 742	79, 613	$2, 393, 175	355, 405	$10, 080, 581
1	Alabama	42, 035	154, 451	....	....	....	575, 673	21, 057	521, 608	14, 067	329, 386
2	Connecticut	....	....	80	2, 000	....	471, 467	684	32, 148	18, 095	612, 763
3	Georgia	33, 650	103, 750	....	....	....	241, 796	6, 799	146, 340	....	....
4	Illinois	101, 440	624, 490	....	....	....	1, 762, 609	....	....	....	....
5	Indiana	1, 418	6, 143	2, 000	3, 900	....	335, 606	....	....	500	10, 000
6	Kentucky	37, 275	121, 690	29, 594	37, 722	....	801, 410	899	27, 952	17, 876	422, 600
7	Maine	....	....	52	936	....	23, 569	2, 015	50, 375	....	....
8	Maryland	17, 600	78, 081	150	525	....	956, 806	1, 250	53, 500	26, 304	875, 914
9	Massachusetts	....	....	....	....	....	169, 026	....	....	5, 140	168, 750
10	Michigan	....	....	....	....	150	2, 091, 224	....	....	119, 500	3, 119, 835
11	Minnesota	....	....	....	....	....	....	....	....	....	....
12	Missouri	110, 730	673, 170	....	....	....	1, 685, 124	....	....	19, 114	510, 000
13	New Jersey	17, 000	108, 278	....	....	....	2, 488, 670	....	....	....	....
14	New York	34, 237	182, 694	194	2, 026	175	4, 166, 622	4, 470	203, 500	17, 007	599, 344
15	North Carolina	....	....	....	....	....	....	....	....	....	....
16	Ohio	418, 624	1, 601, 300	99, 669	282, 258	634	9, 149, 620	11, 816	345, 753	41, 158	1, 033, 561
17	Oregon	....	....	....	....	....	33, 073	....	....	3, 200	78, 393
18	Pennsylvania	1, 054, 452	3, 563, 566	156, 223	415, 132	38, 500	29, 675, 075	21, 941	760, 099	12, 204	418, 685
19	Tennessee	74, 408	182, 241	....	....	....	489, 440	1, 825	53, 075	4, 650	134, 100
20	Texas	....	....	....	....	....	23, 580	200	6, 000	1, 200	30, 000
21	Vermont	....	....	....	....	....	13, 800	....	....	620	24, 800
22	Virginia	8, 753	45, 953	....	....	....	205, 548	6, 541	187, 025	2, 918	72, 950
23	West Virginia	120, 737	348, 047	30, 389	86, 042	....	1, 158, 611	116	5, 800	1, 200	38, 400
24	Wisconsin	55, 896	335, 386	35, 697	80, 126	....	2, 101, 393	....	....	50, 652	601, 100
25	Utah Territory	....	....	....	....	....	....	....	....	....	....

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* This is principally mill cinder.

OF THE UNITED STATES—Continued.

PRODUCTS—Continued.											
Tons of anthracite pig iron.	Value.	Tons of bituminous coal and coke pig iron.	Value.	Tons of mixed anthracite and coke pig iron.	Value.	Tons of castings direct from furnace.	Value.	Value of other products (including jobbing and repairing).	Total tons of all products.	Total value of all products.	
1,112,735	$23,545,002	1,515,107	$35,431,031	713,932	$16,607,985	4,229	$146,236	$1,111,559	3,781,021	$89,315,569	
		27,212	551,162					3,200	62,336	1,405,356	1
									18,779	644,911	2
		16,300	311,150					9,400	23,099	466,890	3
		38,618	965,450	56,850	1,426,400				95,468	2,391,850	4
		17,737	450,000					535	18,237	460,535	5
		39,240	784,800			93	4,800	8,500	58,108	1,248,652	6
								10,000	2,015	60,375	7
2,500	64,500	3,490	83,250	26,100	590,000	20	1,000	32,175	59,664	1,700,339	8
4,403	132,060							12,000	9,543	312,810	9
						86	3,410	21,817	119,586	3,145,062	10
											11
		75,936	1,686,780					78,237	95,050	2,275,017	12
*116,443	2,443,544			40,891	964,719	80	2,400	18,084	157,414	3,428,747	13
172,980	3,243,192			118,849	2,649,453	62	1,860	118,892	313,368	6,816,241	14
											15
		494,727	11,496,297			1,011	32,675	129,907	548,712	13,038,193	16
									3,200	78,393	17
816,409	17,661,706	†673,836	16,735,001	‡403,704	9,288,958	2,217	75,579	633,722	1,930,311	45,573,750	18
		41,258	631,757			140	6,000	15,090	47,873	840,022	19
									1,400	36,000	20
									620	24,800	21
		8,326	166,520			121	3,200	11,000	17,906	440,695	22
		78,427	1,568,864			307	11,232	6,800	80,050	1,631,096	23
				67,538	1,688,455	92	4,080	2,200	118,282	3,295,835	24
											25

*Includes 3,392 tons of spiegeleisen.

†Includes 7,000 tons of spiegeleisen.

‡Includes 2,483 tons of spiegeleisen.

TABLE II.—THE IRON ROLLING

	STATES AND TERRITORIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.
				Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	
	Total	324	$89, 783, 199	80, 133	74, 422	5, 659	31	21	59	$3 30	$1 29	$34, 004, 799	9
1	Alabama	2	203, 000	60	50	10	....	....	60	2 25	1 00	18, 000	8
2	California	1	1, 000, 000	319	284	35	....	....	60	3 00	1 75	177, 722	12
3	Colorado	1	100, 000	125	125	....	....	....	60	4 00	1 75	7, 000	4
4	Connecticut	8	885, 000	451	433	18	....	....	63	3 02	1 25	210, 463	9
5	Delaware	9	1, 431, 469	867	818	49	....	....	56	2 49	1 17	344, 476	11
6	Georgia	2	305, 000	500	475	25	....	....	60	2 50	85	102, 239	12
7	Illinois	8	2, 350, 620	2, 468	2, 197	271	....	....	61	3 67	1 25	1, 090, 028	9
8	Indiana	9	1, 828, 000	1, 740	1, 590	150	....	....	59	3 95	1 27	810, 081	11
9	Kansas	2	450, 000	630	570	60	....	....	56	3 00	1 25	166, 500	5
10	Kentucky	8	2, 765, 000	2, 170	1, 988	182	....	....	55	4 65	1 34	906, 912	10
11	Maine	2	300, 000	400	383	17	....	....	60	2 95	1 11	96, 544	7
12	Maryland	5	2, 145, 000	1, 253	1, 189	64	....	....	58	3 56	1 14	546, 974	11
13	Massachusetts	22	5, 751, 408	5, 985	5, 839	125	21	....	58	2 70	1 21	2, 343, 391	10
14	Michigan	2	671, 000	925	918	7	....	....	60	3 25	1 25	360, 727	12
15	Missouri	6	1, 670, 000	855	794	61	....	....	60	5 16	1 54	389, 846	10
16	Nebraska	1	100, 000	100	90	10	....	....	60	3 00	1 50	50, 000	10
17	New Hampshire	1	400, 000	250	250	....	....	....	60	2 25	1 13	100, 000	12
18	New Jersey	14	4, 000, 550	2, 820	2, 763	57	....	....	57	2 78	1 22	1, 086, 375	9
19	New York	23	6, 086, 000	5, 532	4, 995	537	....	....	59	2 93	1 22	1, 937, 319	8
20	Ohio	44	9, 210, 270	10, 266	9, 572	679	....	15	59	3 87	1 32	5, 030, 552	9
21	Pennsylvania	131	42, 089, 488	34, 998	32, 392	2, 590	10	6	59	3 03	1 17	15, 372, 943	10
22	Rhode Island	2	550, 000	275	200	75	....	....	60	4 00	1 17	130, 969	10
23	Tennessee	4	1, 201, 000	1, 280	1, 095	185	....	....	61	3 24	99	336, 786	10
24	Vermont*	....	....	....	....	....	....	....	....	....	....	....	....
25	Virginia	5	838, 000	1, 134	1, 084	50	....	....	59	2 45	1 13	352, 539	8
26	West Virginia	8	2, 390, 191	3, 228	2, 901	327	....	....	56	4 62	1 30	1, 301, 658	6
27	Wisconsin	1	700, 000	1, 300	1, 235	65	....	....	66	3 65	1 25	647, 577	9
28	District of Columbia	1	89, 600	18	18	....	....	....	54	2 50	1 62	7, 528	6
29	Utah Territory	1	60, 000	....	....	....	....	....	....	....	....	....	....
30	Wyoming Territory	1	212, 603	184	174	10	....	....	60	4 00	2 00	79, 650	9

* The rolling mill in Vermont is properly an open-hearth steel works, and its statistics are included in the statistics of open-hearth steel works. It made a quantity of iron rails in the census year, however, which must be classed here.

MILLS OF THE UNITED STATES.

MACHINES.							MATERIALS.										
Number of charcoal forge fires.	Number of single puddling furnaces.	Number of heating furnaces.	Number of hammers.	Number of trains of rolls.	Number of nail machines.	Total daily capacity, in tons of rolled iron.	Tons of iron ore.	Value.	Tons of pig iron.	Value.	Tons of old iron rails.	Value.	Tons of other old or scrap iron.	Value.	Tons of hammered iron ore blooms.	Value.	
309	*4, 319	2, 105	239	1, 206	3, 775	16, 430	363, 959	$2, 700, 167	1, 574, 693	$35, 898, 506	708, 534	$20, 701, 099	422, 282	$11, 180, 028	14, 147	$757, 704	
......	4	2	......	3	....	6	150	600	600	15, 000	....	....	200	5, 000	....	....	1
......	3	18	5	4	....	100	....	....	....	....	10, 000	250, 000	6, 300	157, 000	....	....	2
......	....	5	......	2	....	40	....	....	....	....	5, 000	110, 000	100	1, 700	....	....	3
5	17	25	3	18	....	94	332	2, 690	118	3, 540	756	22, 680	18, 669	469, 412	....	....	4
5	†35	33	8	28	....	141	3, 235	20, 090	12, 948	299, 795	9, 500	285, 000	11, 432	301, 322	1, 986	84, 240	5
......	18	13	1	8	22	114	780	2, 837	2, 963	63, 787	9, 128	217, 943	1, 355	31, 346	....	....	6
......	96	45	2	25	164	701	13, 105	63, 470	41, 414	946, 667	95, 869	3, 011, 040	6, 930	169, 840	....	....	7
......	122	55	1	27	165	471	5, 532	57, 227	28, 251	599, 950	49, 221	1, 672, 398	12, 900	324, 050	....	....	8
......	....	17	2	4	....	255	....	....	....	....	20, 700	633, 000	1, 000	28, 000	....	....	9
25	115	57	7	38	80	446	6, 970	51, 671	26, 635	553, 076	20, 800	589, 400	24, 155	685, 067	1, 000	65, 000	10
......	26	15	......	7	30	67	1, 097	8, 973	3, 227	86, 763	4, 592	127, 150	2, 739	72, 656	....	....	11
......	96	52	5	25	....	285	3, 825	22, 930	26, 755	650, 536	10, 350	360, 350	12, 855	277, 845	250	15, 000	12
40	161	189	24	88	705	800	18, 035	125, 131	48, 623	1, 099, 950	24, 855	690, 584	44, 649	1, 177, 617	687	38, 700	13
16	13	28	7	10	....	180	3, 000	15, 000	8, 960	204, 000	9, 119	309, 165	15, 507	517, 745	....	....	14
9	35	28	11	16	....	176	873	9, 900	2, 775	59, 870	1, 200	49, 200	15, 935	454, 260	....	....	15
......	....	2	......	1	22	15	....	....	....	....	400	18, 000	2, 400	84, 000	....	....	16
7	....	19	12	3	....	20	....	....	....	....	3, 800	133, 000	2, 100	58, 800	....	....	17
24	125	63	11	44	337	511	15, 455	89, 843	43, 446	922, 561	17, 389	480, 905	21, 696	596, 150	....	....	18
14	242	141	15	81	45	950	43, 962	160, 248	102, 494	1, 980, 665	49, 899	1, 374, 338	21, 581	525, 304	1, 550	75, 000	19
26	‡659	281	32	183	420	2, 493	50, 791	460, 208	237, 231	6, 043, 085	85, 713	2, 450, 640	48, 002	1, 109, 884	167	9, 029	20
132	§2, 224	870	84	515	1, 259	7, 189	178, 074	1, 469, 246	881, 008	19, 818, 759	182, 229	5, 213, 258	128, 404	3, 464, 705	8, 507	470, 735	21
......	11	32	......	9	66	56	....	....	....	....	....	....	9, 405	308, 195	....	....	22
......	49	18	2	12	74	170	3, 820	8, 750	13, 100	273, 500	11, 960	303, 526	1, 700	41, 974	....	....	23
......	4	....	......	....	....	....	....	....	....	....	2, 500	75, 000	....	....	....	....	24
6	55	28	3	19	81	249	1, 690	11, 671	11, 485	261, 031	27, 541	738, 146	3, 075	84, 431	....	....	25
......	179	31	......	26	305	382	13, 233	119, 682	64, 740	1, 657, 571	9, 124	265, 128	1, 030	37, 475	....	....	26
......	30	26	1	7	....	450	....	....	17, 920	358, 400	35, 840	967, 680	7, 850	196, 250	....	....	27
......	....	2	2	1	....	4	....	....	....	....	....	....	‖313	....	....	....	28
......	....	....	......	....	....	....	....	....	....	....	....	....	....	....	....	....	29
......	....	10	1	2	....	65	....	....	....	....	11, 049	353, 568	....	....	....	....	30

*Excluding puddling machines, and counting each double puddling furnace as two furnaces.

†And 1 Sellers rotary puddling machine.

‡And 9 Danks puddling machines.

§And 10 Danks puddling machines.

‖ No value attached.

TABLE II.—THE IRON ROLLING MILLS

	STATES AND TERRITORIES.	MATERIALS—Continued.									
		Tons of hammered pig or scrap blooms.	Value.	Tons of purchased muck bar.	Value.	Bushels of charcoal.	Value.	Tons of anthracite coal.	Value.	Tons of bituminous coal.	Value.
	Total	46, 861	$2, 382, 329	53, 754	$2, 369, 544	2, 569, 756	$225, 306	526, 126	$1, 358, 077	3, 915, 377	$9, 047, 054
1	Alabama	......	......	......	......	......	......	......	......	3, 000	4, 800
2	California	......	......	1, 000	45, 000	......	......	500	5, 000	10, 500	78, 500
3	Colorado	......	......	......	......	......	......	......	......	5, 000	20, 000
4	Connecticut	......	......	387	13, 545	90, 000	9, 000	......	......	18, 477	88, 085
5	Delaware	416	14, 523	908	45, 543	65, 139	5, 957	4, 829	18, 195	35, 058	116, 530
6	Georgia	......	......	......	......	......	......	......	......	17, 032	55, 358
7	Illinois	......	......	......	......	......	......	......	......	177, 260	431, 402
8	Indiana	......	......	......	......	......	......	......	......	150, 097	270, 890
9	Kansas	......	......	60	2, 200	300	45	......	......	21, 000	69, 750
10	Kentucky	2, 665	142, 375	......	......	155, 000	13, 683	......	......	104, 848	238, 216
11	Maine	40	1, 520	......	......	......	......	275	1, 450	11, 173	55, 865
12	Maryland	6, 686	283, 960	169	6, 203	......	......	2, 630	13, 600	75, 860	183, 378
13	Massachusetts	2, 186	87, 490	3, 500	250, 000	581, 736	40, 903	35, 450	157, 357	141, 215	662, 177
14	Michigan	......	......	......	......	50, 000	3, 750	167	857	45, 214	137, 091
15	Missouri	......	......	200	8, 000	81, 000	8, 505	......	......	55, 402	137, 531
16	Nebraska	......	......	......	......	......	......	......	......	2, 500	12, 500
17	New Hampshire	......	......	......	......	......	......	......	......	11, 300	73, 450
18	New Jersey	......	......	2, 800	112, 000	439, 650	40, 692	76, 560	269, 614	55, 370	241, 024
19	New York	5, 192	301, 921	191	6, 306	59, 000	4, 800	11, 917	32, 374	224, 722	677, 189
20	Ohio	831	21, 802	3, 530	153, 600	220, 000	20, 350	......	......	613, 105	1, 125, 322
21	Pennsylvania	28, 845	1, 528, 738	40, 218	1, 703, 691	827, 431	77, 571	393, 348	856, 980	1, 807, 267	3, 726, 505
22	Rhode Island	......	......	761	22, 256	......	......	......	......	10, 800	44, 896
23	Tennessee	......	......	30	1, 200	......	......	......	......	53, 730	94, 265
24	Vermont	......	......	......	......	......	......	......	......	......	......
25	Virginia	......	......	......	......	......	......	450	2, 650	29, 292	90, 704
26	West Virginia	......	......	......	......	500	50	......	......	161, 191	152, 418
27	Wisconsin	......	......	......	......	......	......	......	......	63, 675	206, 944
28	District of Columbia	......	......	......	......	......	......	......	......	790	2, 264
29	Utah Territory	......	......	......	......	......	......	......	......	......	......
30	Wyoming Territory	......	......	......	......	......	......	......	......	10, 499	50, 000

OF THE UNITED STATES—Continued.

MATERIALS—Continued.				PRODUCTS.										
Tons of coke.	Value.	Value of all other materials.	Total value of all materials.	Tons of bar iron.*	Value.*	Tons of rod iron.*	Value.*	Tons of structural iron.	Value.	Tons of skelp iron.†	Value.†	Tons of rolled-iron car-axles.	Value.	
14,834	$48,589	$1,608,830	$88,277,233	663,211	$35,302,431	145,626	$9,303,133	96,810	$5,520,719	128,321	$7,910,409	2,630	$179,154	
....	....	....	25,400	150	10,000	....	....	....	....	....	....	....	....	1
....	....	....	535,500	8,000	480,000	....	....	....	....	....	....	....	....	2
....	....	....	131,700	....	....	....	....	....	....	....	....	....	....	3
....	....	3,356	612,308	6,365	306,275	9,838	631,682	....	....	....	....	....	....	4
....	....	22,855	1,214,050	15,650	939,000	....	....	2,200	143,000	1,987	140,050	....	....	5
140	525	1,480	373,276	2,828	134,136	....	....	....	....	....	....	....	....	6
....	....	3,680	4,626,099	28,656	1,663,521	....	....	....	....	....	....	....	....	7
36	252	32,700	2,957,467	16,993	798,000	1,700	100,000	....	....	....	....	....	....	8
100	1,250	....	734,245	450	2,500	15	800	....	....	....	....	....	....	9
....	....	66,126	2,404,614	16,253	984,571	4,341	238,611	2,000	130,000	....	....	....	....	10
....	....	2,565	356,942	4,652	282,645	....	....	....	....	1,600	120,000	....	....	11
20	40	15,200	1,829,042	18,418	740,900	2,167	119,185	300	15,000	3,910	249,158	....	....	12
3,545	10,410	538,830	4,879,149	18,855	977,684	22,697	1,847,953	....	....	5,563	384,513	....	....	13
105	588	....	1,188,196	12,605	672,175	....	....	....	....	....	....	....	....	14
692	3,125	70,000	800,391	5,490	319,053	....	....	....	....	....	....	....	....	15
....	....	....	114,500	....	....	....	....	....	....	....	....	....	....	16
....	....	....	265,250	2,832	172,000	....	....	....	....	....	....	....	....	17
566	2,680	23,200	2,778,669	15,998	825,027	5,600	461,000	20,490	1,276,503	1,650	125,000	....	....	18
....	....	148,514	5,286,659	90,304	4,786,174	7,015	472,548	2,467	150,795	1,921	102,510	....	....	19
110	235	55,883	11,450,038	115,049	5,986,599	11,651	676,560	485	35,100	1,000	50,000	....	....	20
9,520	29,484	519,686	38,879,358	232,399	12,335,625	74,963	4,456,149	68,868	3,770,321	110,690	6,739,178	2,330	158,154	21
....	....	....	375,347	....	....	....	....	....	....	....	....	....	....	22
....	....	....	723,215	3,022	151,100	4,000	220,000	....	....	....	....	....	....	23
....	....	....	75,000	....	....	....	....	....	....	....	....	....	....	24
....	....	11,065	1,199,698	12,519	618,596	1,460	73,000	....	....	....	....	300	21,000	25
....	....	93,690	2,326,014	4,046	222,520	160	4,600	....	....	....	....	....	....	26
....	....	....	1,729,274	31,101	1,866,060	....	....	....	....	....	....	....	....	27
....	....	....	2,264	226	9,020	....	....	....	....	....	....	....	....	28
....	....	....	....	....	....	....	....	....	....	....	....	....	....	29
....	....	....	403,568	350	19,250	19	1,045	....	....	....	....	....	....	30

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*These quantities and values only include bar iron and rod iron sold in the form of bars and rods; they do *not* include bar iron and rod iron worked into spikes and other finished forms by the same establishments, the quantities and values of which are found under the head of "other finished products," on page 29

†Skelp iron is used for wrought iron tubes and pipes. These quantities and values do not include finished pipe made in the same works, which finished pipe is embraced in "other finished products."

TABLE II.—THE IRON ROLLING MILLS

	STATES AND TERRITORIES.	PRODUCTS—Continued.									
		Tons of hammered-iron car-axles.*	Value.	Tons of iron rails.	Value.	Tons of muck bar produced for sale.	Value.	Tons of sheet iron.	Value.	Tons of boiler-plate iron.	Value.
	Total	21, 884	$1, 600, 104	466, 917	$20, 978, 697	64, 469	$2, 440, 941	94, 992	$8, 473, 642	89, 560	$6, 501, 298
1	Alabama										
2	California			6, 000	300, 000						
3	Colorado			4, 500	225, 000						
4	Connecticut										
5	Delaware							5, 243	481, 924	1, 241	111, 690
6	Georgia			8, 673	352, 624						
7	Illinois			72, 802	3, 192, 178						
8	Indiana			38, 600	1, 946, 500			6, 383	427, 320	54	3, 270
9	Kansas			13, 500	709, 700						
10	Kentucky			18, 000	800, 000			4, 784	364, 795	5, 375	507, 500
11	Maine										
12	Maryland			9, 280	431, 814			3, 178	317, 800	6, 612	426, 236
13	Massachusetts	50	4, 000	5, 600	308, 000					1, 879	165, 846
14	Michigan	4, 600	322, 000					1, 300	92, 718	4, 600	357, 158
15	Missouri	6, 675	521, 110								
16	Nebraska										
17	New Hampshire	1, 320	88, 440							100	6, 700
18	New Jersey							1, 150	101, 200		
19	New York	511	41, 000	34, 305	1, 508, 839	3, 510	175, 500				
20	Ohio	1, 803	91, 377	41, 838	1, 907, 244	5, 954	224, 890	14, 440	1, 137, 935	9, 180	584, 100
21	Pennsylvania	6, 925	532, 177	157, 213	6, 559, 920	53, 014	1, 984, 755	54, 174	5, 249, 950	60, 519	4, 338, 798
22	Rhode Island										
23	Tennessee			12, 800	640, 000	100	2, 900				
24	Vermont			1, 500	60, 000						
25	Virginia										
26	West Virginia			3, 333	147, 332	1, 891	52, 896	4, 340	300, 000		
27	Wisconsin			29, 552	1, 418, 496						
28	District of Columbia										
29	Utah Territory										
30	Wyoming Territory			9, 421	471, 050						

*This column only includes the car axles hammered in forges attached to rolling mills, and does not profess to give the total production of hammered axles in the country, a considerable quantity being made by forging establishments the statistics of which do not belong to iron rolling mill statistics.

OF THE UNITED STATES—Continued.

PRODUCTS—Continued.															
Tons of all other plate iron, except nail plate.	Value.	Tons of hoop iron.	Value.	Tons of all other rolled iron.*	Value.	Tons of all other hammered iron.†	Value.	Tons of cut nails.‡	Value.	Tons of all other finished products.§	Value.	Value of all other products (including repairing).	Total tons of all products.	Total value of all products.	
94,749	$5,688,863	96,843	$6,069,484	48,345	$2,867,872	3,703	$294,010	252,830	$16,295,300	82,358	$5,974,405	$1,398,112	2,353,248	$136,798,574	
......	......	500	37,500	......	......	......	......	......	......	......	......	......	650	47,500	1
......	......	......	......	......	......	......	......	......	......	......	......	......	14,000	780,000	2
......	......	......	......	......	......	......	......	......	......	......	......	......	4,500	225,000	3
......	......	......	......	......	......	......	......	......	......	......	......	14,500	16,203	952,457	4
2,482	186,130	......	......	1,900	118,650	......	......	......	......	3,215	225,800	933	33,918	2,347,177	5
......	......	......	......	......	......	......	......	......	......	......	......	......	11,501	486,760	6
......	......	......	......	4,466	263,908	......	......	11,127	823,452	......	......	1,000	117,051	5,944,059	7
......	......	......	......	......	......	......	......	14,038	794,036	112	11,242	10,500	77,880	4,090,868	8
......	......	......	......	3,350	160,800	30	2,500	......	......	1,710	103,800	24,000	19,055	1,004,100	9
3,155	197,350	785	52,800	100	7,000	......	......	10,500	525,000	......	......	......	65,293	3,807,627	10
......	......	375	22,500	2,000	81,808	......	......	224	16,000	......	......	......	8,851	522,953	11
3,702	241,403	12	555	......	......	......	......	......	......	30	1,500	6,500	47,609	2,550,051	12
23,410	1,333,915	3,983	229,562	1,947	183,050	250	30,000	24,544	1,773,929	474	29,440	505,166	109,252	7,773,058	13
......	......	......	......	......	......	25	2,500	......	......	......	......	......	23,130	1,446,551	14
......	......	......	......	......	......	421	45,871	......	......	3,922	374,479	18,000	16,508	1,278,513	15
......	......	......	......	......	......	......	......	2,000	82,000	......	......	......	2,000	82,000	16
......	......	......	......	......	......	500	67,000	......	......	......	......	3,000	4,752	337,140	17
......	......	......	......	100	7,000	......	......	14,803	954,123	6,239	789,693	17,219	66,030	4,556,765	18
2,750	117,692	3,077	239,218	13,049	693,250	......	......	611	40,840	4,018	253,955	115,125	163,538	8,697,446	19
7,050	479,000	23,149	1,397,375	......	......	......	......	36,697	2,334,490	3,798	318,600	24,500	272,094	15,247,770	20
52,162	3,131,423	64,722	4,077,974	21,310	1,347,486	2,477	146,139	75,200	4,842,470	34,132	2,387,746	586,101	1,071,098	62,644,366	21
......	......	......	......	......	......	......	......	......	......	8,134	488,040	......	8,134	488,040	22
......	......	......	......	......	......	......	......	5,209	197,458	250	9,692	11,000	25,381	1,232,150	23
......	......	......	......	......	......	......	......	......	......	......	......	......	1,500	60,000	24
......	......	......	......	......	......	......	......	5,082	324,320	15,815	949,500	......	35,176	1,986,416	25
......	......	240	12,000	123	4,920	......	......	52,795	3,587,182	509	30,918	60,568	67,437	4,422,936	26
......	......	......	......	......	......	......	......	......	......	......	......	......	60,653	3,284,556	27
38	1,950	......	......	......	......	......	......	......	......	......	......	......	264	10,970	28
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	29
......	......	......	......	......	......	......	......	......	......	......	......	......	9,790	491,345	30

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* Fish-plates, etc.

† This column only includes the quantity of iron hammered in forges connected with rolling mills, there being a considerable quantity of iron hammered in forging establishments the statistics of which do not belong to iron rolling mill statistics.

‡ The quantity of cut nails here given can be reduced to kegs (which are always 100 pounds in weight) by multiplying by 20.

§ Horse-shoes, railroad spikes, wire, etc.

TABLE III.—THE BESSEMER AND OPEN-HEARTH

	STATES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.				WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.
				Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	
	Total	36	$20, 975, 999	10, 835	10, 213	621	1	62	$3 21	$1 25	$4, 930, 349	9
1	Connecticut*											
2	Illinois	5	2, 545, 000	2, 281	2, 187	94		64	3 51	1 34	1, 230, 636	9
3	Kentucky	1	30, 000	15	13	2		60	5 00	1 15	1, 500	2
4	Massachusetts	2	250, 000	105	105			55	4 50	1 75	51, 000	12
5	Missouri	1	2, 200, 000	934	885	49		65	2 40	1 25	57, 618	2
6	New Hampshire	1	250, 000	40	39	1		54	1 75	1 25	27, 690	12
7	New Jersey†	1										2
8	New York	2	2, 250, 000	1, 650	1, 521	129		66	2 18	1 07	692, 218	12
9	Ohio	5	1, 254, 105	821	725	96		62	3 96	1 34	503, 421	10
10	Pennsylvania	15	11, 616, 894	4, 754	4, 513	240	1	63	2 46	1 17	2, 278, 266	12
11	Rhode Island‡	1	80, 000									
12	Tennessee	1	200, 000	70	60	10		60	2 50	1 00	40, 000	8
13	Vermont	1	300, 000	165	165			72	3 85	1 15	48, 000	12

	STATES.	MATERIALS—Continued.									
		Tons of old steel rails and steel-rail ends.	Value.	Tons of purchased Bessemer steel ingots and blooms.	Value.	Tons of purchased open-hearth steel ingots and blooms.	Value.	Tons of scrap iron.	Value.	Tons of scrap steel.	Value.
	Total	85, 653	$2, 435, 263	42, 939	$2, 300, 988	17, 713	$1, 129, 662	13, 911	$295, 074	90, 645	$2, 257, 053
1	Connecticut*					1, 020	72, 600				
2	Illinois	25, 192	610, 051					2, 570	57, 820	20, 490	584, 732
3	Kentucky	50	1, 500								
4	Massachusetts	1, 400	35, 000	15, 000	900, 000	2, 420	193, 600	540	12, 140	2, 600	66, 500
5	Missouri	4, 500	196, 000	700	56, 000					1, 617	53, 925
6	New Hampshire									1, 300	39, 000
7	New Jersey†	300	10, 500			5, 511	324, 462				
8	New York	9, 091	194, 000	146	7, 000	450	33, 000			6, 745	122, 000
9	Ohio	11, 334	449, 422					2, 550	61, 200	1, 968	58, 883
10	Pennsylvania	33, 586	932, 790	25, 493	1, 273, 988	8, 312	506, 000	8, 181	162, 164	55, 875	1, 330, 013
11	Rhode Island										
12	Tennessee	200	6, 000					50	1, 250	50	2, 000
13	Vermont			1, 600	64, 000			20	500		

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* A crucible steel works in Connecticut manipulates open-hearth steel.

† The only open-hearth steel works in New Jersey is so interwoven with a crucible steel works that it is not possible to separate all the details.

‡ This establishment was not in operation in the census year.

STEEL WORKS OF THE UNITED STATES.

MACHINES.								MATERIALS.						
Number of Bessemer converters.	Total daily capacity, in tons of ingots.	Number of open-hearth furnaces.	Total daily capacity, in tons of ingots.	Number of heating-furnaces.	Number of trains of rolls.	Total daily capacity, in tons of rolled steel.	Number of hammers.	Tons of iron ore.	Value.	Tons of spiegeleisen and ferro-manganese.	Value.	Tons of other pig iron.	Value.	
24	4, 467	37	827	177	50	5, 223	49	7, 327	$59, 997	86, 138	$2, 868, 519	966, 603	$22, 521. 098	
														1
6	1, 201	2	240	42	12	1, 302	13	86	1, 290	21, 444	764, 786	242, 382	5, 965, 896	2
		1	7					70	1, 050	20	1, 500	125	3, 700	3
		4	52	3	1	47		10	80	75	6, 700	1, 900	52, 800	4
[illegible]	300			7	2	250	1			906	31, 710	7, 910	237, 300	5
		1	19					18	180	480	4, 800	1, 800	72, 000	6
		1	15					5	50	15	600	140	5, 600	7
2	400			40	10	930	5			7, 625	192, 000	83, 555	1, 950, 000	8
2	364	10	159	[illegible]	5	45	7	2, 097	16, 346	7, 629	317, 133	91, 010	1, 945, 132	9
12	2, 202	14	275	67	18	2, 549	22	4, 141	36, 001	47, 554	1, 531, 290	532, 031	12, 161, 170	10
		1	30											11
		2	10	1				200	1, 000	90	8, 000	4, 500	90, 000	12
		1	20	8	2	100	1	700	4, 000	300	10, 000	1, 250	37, 500	13

MATERIALS—Continued.														
Tons of hammered iron-ore blooms.	Value.	Tons of hammered pig and scrap blooms.	Value.	Tons of anthracite coal.	Value.	Tons of bituminous coal.	Value.	Tons of coke.	Value.	Bushels of charcoal.	Value.	Value of all other materials.	Total value of all materials.	
16, 053	$899, 136	250	$10, 500	140, 458	$348, 752	465, 655	$1, 087, 731	104, 980	$471, 618	37, 552	$3, 461	$138, 076	$36, 826, 928	
													72, 600	1
				830	3, 907	137, 403	358, 125	35, 423	216, 830	10, 000	500	20, 000	8, 583, 937	2
50	3, 000					500	1, 200						11, 950	3
5, 250	236, 200					10, 000	53, 000					40, 000	1, 596, 020	4
						12, 536	37, 608						612, 543	5
1, 800	126, 000			20	125	2, 500	16, 000						258, 105	6
						225	1, 125						342, 337	7
				41, 853	125, 500	23, 157	74, 013	2, 317	11, 600	11, 716	1, 504	34, 485	2, 745, 102	8
6, 216	341, 606					61, 879	140, 964	10, 801	45, 574			1, 562	3, 377, 822	9
2, 737	192, 330	250	10, 500	96, 755	213, 220	204, 455	359, 696	55, 939	195, 114	14, 836	1, 357	32, 029	18, 937, 662	10
														11
						8, 000	16, 000	500	2, 500			10, 000	136, 750	12
				1, 000	6, 000	5, 000	30, 000			1, 000	100		152, 100	13

TABLE III.—THE BESSEMER AND OPEN-HEARTH STEEL WORKS OF THE UNITED STATES—Cont'd.

	STATES.	PRODUCTS.																
		Tons of Bessemer steel rails.	Value.	Tons of open-hearth steel rails.	Value.	Tons of Bessemer steel bars.	Value.	Tons of open-hearth steel bars.	Value.	Tons of Bessemer steel rods.	Value.	Tons of open-hearth steel rods.	Value.	Tons of Bessemer steel structural shapes.	Value.	
	Total	741, 475	$37,408,625	9, 105	$483, 450	76, 710	$4, 718, 354	43, 296	$3, 454, 321	49, 064	$3, 795, 240	1, 134	$123, 200	557	$63, 060	
1	Connecticut							1, 014	101, 400							1
2	Illinois	201, 186	11, 961, 130			1, 807	90, 000									2
3	Kentucky															3
4	Massachusetts							2, 200	176, 000	14, 906	1, 500, 000	234	29, 200			4
5	Missouri	5, 100	357, 000													5
6	New Hampshire							490	49, 000							6
7	New Jersey							3, 700	345, 000							7
8	New York	57, 870	2, 480, 000			27, 037	1, 981, 000			226	18, 000	400	44, 000			8
9	Ohio	66, 480	3, 324, 000			3, 000	182, 395	11, 647	810, 602	18, 532	1, 297, 240					9
10	Pennsylvania	409, 339	19, 173, 995	3, 360	151, 200	44, 866	2, 464, 959	24, 245	1, 972, 319	15, 400	980, 000	500	50, 000	557	63, 060	10
11	Rhode Island															11
12	Tennessee			2, 745	137, 250											12
13	Vermont	1, 500	112, 500	3, 000	195, 000											13

	STATES.	PRODUCTS—Continued.																
		Tons of open-hearth steel structural shapes.	Value.	Tons of open-hearth steel sheets.	Value.	Tons of Bessemer steel plates.	Value.	Tons of open-hearth steel plates.	Value.	Tons of other Bessemer steel.	Value.	Tons of other open-hearth steel.	Value.	Value of all other products, including jobbing and repairing.	Total tons of all products.	Total value of all products.	
	Total	80	$8, 800	1, 700	$191, 955	1, 475	$148, 144	11, 034	$1, 428, 300	20, 615	$1, 362, 162	26, 794	$2, 476, 659	$142, 940	983, 039	$55, 805, 210	
1	Connecticut														1, 014	101, 400	1
2	Illinois									1, 400	100, 000	925	46, 250		205, 318	12, 197, 380	2
3	Kentucky											275	24, 750		275	24, 750	3
4	Massachusetts							2, 302	284, 660			2, 700	189, 000		22, 342	2, 178, 860	4
5	Missouri									5, 100	550, 000				10, 200	907, 000	5
6	New Hampshire							1, 276	187, 600			1, 460	233, 600		3, 226	470, 200	6
7	New Jersey											1, 698	189, 439		5, 398	534, 439	7
8	New York					430	45, 000			1, 202	139, 000			95, 036	87, 165	4, 802, 036	8
9	Ohio	80	8, 800	650	64, 955			5, 176	662, 840			3, 410	242, 218	3, 747	108, 975	6, 596, 797	9
10	Pennsylvania			1, 050	127, 000	1, 045	103, 144	2, 280	293, 200	12, 913	573, 162	16, 326	1, 551, 402	44, 157	531, 881	27, 547, 598	10
11	Rhode Island																11
12	Tennessee														2, 745	137, 250	12
13	Vermont														4, 500	307, 500	13

TABLE IV.—THE CRUCIBLE AND MISCELLANEOUS STEEL WORKS OF THE UNITED STATES.

STATES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.				WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	MACHINES.						
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.		Number of cementing furnaces.	Number of pot holes.	Number of heating furnaces.	Number of single puddling furnaces.	Number of trains of rolls.	Number of hammers.	Daily capacity, in tons of ingots or unwrought steel.
Total	37	$10, 665, 547	5, 196	5, 010	185	1	58	$3 06	$1 39	$2, 945, 539	8	42	2, 691	340	57	86	170	445
Connecticut	3	500, 000	95	91	4		58	3 13	1 38	54, 747	11	1	174	7	1	5	8	14
Illinois	1	50, 000	6	6			55	3 50	1 50	3, 000	6	2	15				2	1½
Kentucky	1	17, 000	20	20			60	2 50	1 25	6, 000	5		10					2
Maryland*	1	50, 000											24	1			2	4
Massachusetts	1	50, 000	25	25			60	2 50	1 50	5, 584	4		28	4		1	1	2½
New Jersey	5	1, 290, 000	675	675			60	2 63	1 42	326, 247	12		672	54	8	13	31	46
New York	3	825, 000	255	240	15		58	3 58	1 25	95, 654	9	2	104	17		5	16	16
Ohio	2	40, 000	40	40			60	3 50	1 50	5, 940	4		56	4			3	5
Pennsylvania	20	7, 843, 547	4, 080	3, 913	166	1	54	3 16	1 34	2, 448, 367	11	37	1, 608	253	48	62	107	354

STATES.	MATERIALS.																	
	Tons of iron ore.	Value.	Tons of pig iron.	Value.	Tons of old iron.	Value.	Tons of old steel.	Value.	Tons of hammered iron-ore blooms.	Value.	Tons of hammered pig and scrap blooms.	Value.	Tons of Swedish billets and bars.	Value.	Tons of other billets and bars.	Value.	Bushels of charcoal.	Value.
Total	2, 128	$19, 715	17, 226	$580, 653	1, 952	$77, 596	19, 726	$746, 661	13, 211	$931, 300	2, 400	$157, 000	10, 410	$855, 176	16, 496	$908, 407	60, 594	$5, 612
Connecticut	20	100			145	9, 500	1, 008	48, 020	400	30, 000			565	39, 280	250	12, 500	1, 050	110
Illinois							100	3, 500										
Kentucky			35	1, 050	25	750	25	750										
Maryland																		
Massachusetts							100	3, 239	50	4, 250								
New Jersey	240	1, 600	2, 000	90, 000	295	8, 100	3, 262	147, 319	1, 201	72, 050	1, 500	91, 000	965	79, 057	2, 355	181, 740	6, 412	1, 017
New York					100	4, 000	1, 062	43, 420					1, 257	119, 000	185	11, 525	1, 000	155
Ohio					20	150	474	11, 830					80	6, 400			600	55
Pennsylvania	1, 868	18, 015	15, 191	489, 603	1, 367	55, 096	13, 695	488, 583	11, 560	825, 000	900	66, 000	7, 543	611, 439	13, 706	702, 642	51, 532	4, 275

STATES.	MATERIALS—Continued.										PRODUCTS.						
	Tons of anthracite coal.	Value.	Tons of bituminous coal.	Value.	Tons of coke.	Value.	Tons of other material.	Value.	Value of all other materials.	Total value of all materials.	Tons of finished crucible steel.	Value.	Tons of other products.	Value.	Value of other products (including jobbing and repairing).	Total tons of all products.	Total value of all products.
Total	40, 392	$168, 233	224, 657	$375, 470	22, 791	$62, 694	30	$3, 100	$108, 715	$5, 000, 332	70, 319	$10, 015, 511	4, 956	$628, 954	$25, 793	75, 275	$10, 670, 258
Connecticut	6, 920	32, 600	2, 390	12, 740						184, 850	1, 981	284, 330	84	12, 600	3, 000	2, 065	299, 930
Illinois					150	1, 000				4, 500	130	12, 000				130	12, 000
Kentucky			140	275	500	3, 000				5, 825	75	9, 000				75	9, 000
Maryland																	
Massachusetts	430	2, 514	200	1, 200						11, 203	140	21, 993				140	21, 993
New Jersey	18, 600	71, 875	10, 510	48, 499	360	1, 507			200	793, 964	10, 189	1, 508, 350	1, 000	100, 000	4, 500	11, 189	1, 612, 850
New York	3, 512	15, 304	7, 100	24, 340	150	900	20	2, 400	11, 381	232, 425	2, 511	425, 140				2, 511	425, 140
Ohio			1, 100	2, 000						20, 435	360	35, 600				360	35, 600
Pennsylvania	10, 930	45, 940	203, 217	286, 416	21, 631	56, 287	10	700	97, 134	3, 747, 130	54, 933	7, 719, 098	3, 872	516, 354	18, 293	58, 805	8, 253, 745

* This establishment was not in operation in the census year.

TABLE V.—THE FORGES AND BLOOMARIES OF THE UNITED STATES.

STATES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.				WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	MACHINES.		
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.		Number of charcoal forge fires.	Number of hammers.	Daily capacity, in tons of blooms.
Total	118	$4, 395, 963	2, 939	2, 875	61	3	62	$2 25	$0 97	$915, 395	8	495*	141	520
Georgia	3	11, 800	49	49			62	3 63	75	5, 835	9	6	3	5
Maryland	1	60, 000	67	66	1		55	2 12	1 00	18, 138	12	18	2	24
Massachusetts	1	5, 000	8	8			60	3 00	1 20	564	4	2	1	2
Missouri	3	228, 600	165	150	15		68	2 50	1 25	60, 000	10	27	6	29
New Jersey	7	114, 000	123	123			58	2 24	1 19	30, 187	7	28	7	43
New York	22	2, 254, 000	1, 489	1, 460	29		66	2 48	1 14	471, 331	10	141	31	174
North Carolina	15	289, 400	63	63			73	1 25	54	7, 907	7	28	12	9
Ohio†	1	30, 000										8	1	4
Pennsylvania	33	1, 158, 000	660	655	5		62	2 43	1 11	243, 436	9	159*	39	188
Tennessee	20	76, 450	148	139	6	3	63	1 11	60	21, 090	6	42	25	7
Vermont	2	90, 000										7	2	8
Virginia	10	78, 713	167	162	5		57	1 75	87	56, 907	6	29	12	27

STATES.	MATERIALS.													
	Tons of iron ore.	Value.	Tons of pig iron.	Value.	Tons of scrap iron.	Value.	Bushels of charcoal.	Value.	Tons of anthracite coal.	Value.	Tons of bituminous coal.	Value.	Tons of coke.	Value.
Total	79, 610	$531, 540	38, 113	$945, 375	8, 933	$215, 576	13, 014, 361	$812, 615	340	$1, 220	1, 613	$4, 298	6, 695	$31, 241
Georgia	260	1, 040			675	12, 150	67, 800	3, 445						
Maryland			3, 313	65, 072	1, 080	18, 500	210, 000	14, 254					400	3, 800
Massachusetts					57	1, 234	7, 000	600						
Missouri	8, 000	80, 000					800, 000	70, 000			500	1, 500		
New Jersey	1, 040	9, 600	78	1, 850	4, 488	116, 438	264, 703	23, 476	200	800	3	20	25	159
New York	65, 304	428, 439	20	650	163	4, 130	8, 736, 679	531, 202						
North Carolina	1, 355	3, 510					248, 734	8, 282						
Ohio														
Pennsylvania	772	3, 083	31, 265	802, 663	2, 436	62, 319	1, 850, 520	125, 810	140	420	990	2, 578	6, 270	27, 282
Tennessee	2, 318	4, 941	377	8, 540	1	10	429, 100	12, 963			120	200		
Vermont														
Virginia	561	927	3, 060	66, 600	33	795	399, 825	22, 583						

STATES.	MATERIALS—Continued.				PRODUCTS.						
	Barrels of oil.	Value.	Value of all other materials.	Total value of all materials.	Tons of blooms and bar iron made from ore.	Value.	Tons of blooms made from pig and scrap iron.	Value.	Value of all other products (including jobbing and repairing).	Total tons of all products.	Total value of all products.
Total	853	$900	$4, 150	$2, 546, 915	37, 633	$1, 812, 380	34, 924	$2, 129, 933	$25, 761	72, 557	$3, 968, 074
Georgia				16, 635	102	10, 200	450	27, 000		552	37, 200
Maryland			1, 100	102, 726			3, 661	219, 660		3, 661	219, 660
Massachusetts				1, 834			44	2, 200		44	2, 200
Missouri				151, 500	4, 000	200, 000				4, 000	200, 000
New Jersey			300	152, 643	523	29, 650	3, 306	177, 945	1, 500	3, 829	209, 095
New York				964, 421	31, 580	1, 462, 456	138	8, 320	7, 580	31, 718	1, 478, 356
North Carolina				11, 792	439	41, 010			75	439	41, 085
Ohio											
Pennsylvania	853	900	2, 750	1, 027, 805	175	16, 258	24, 398	1, 527, 008	13, 543	24, 573	1, 556, 809
Tennessee				26, 654	756	46, 786	345	16, 800	1, 195	1, 101	64, 781
Vermont											
Virginia				90, 905	58	6, 020	2, 582	151, 000	1, 868	2, 640	158, 888

* And 1 Siemens rotator.

† This establishment was not in operation in the census year.

TABLE VI.—GRAND AGGREGATE OF THE IRON AND STEEL MANUFACTURE OF THE UNITED STATES, BY STATES.

STATES AND TERRITORIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of products (tons).
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.				
Total	1,005	$230,971,884	140,978	133,203	7,709	45	21	65	$2 59	$1 24	$55,476,785	9	$191,271,150	$296,557,685	7,265,140
Alabama	14	3,309,196	1,626	1,581	45	....	....	74	2 27	1 14	571,713	10	601,073	1,452,856	62,986
California	1	1,000,000	319	284	35	....	....	60	3 00	1 75	177,722	12	535,500	780,000	14,000
Colorado	1	100,000	125	125	....	....	....	60	4 00	1 75	7,000	4	131,700	225,000	4,500
Connecticut	19	2,682,000	685	663	22	....	....	64	2 74	1 27	331,184	10	1,341,225	1,998,698	38,061
Delaware	9	1,431,469	867	818	49	....	....	56	2 49	1 17	344,476	11	1,214,050	2,347,177	33,918
Georgia	14	1,135,900	1,303	1,266	37	....	....	62	2 19	85	185,489	9	631,707	990,850	35,152
Illinois	21	6,460,620	5,253	4,887	366	....	....	63	3 43	1 27	2,508,718	9	14,977,145	20,545,289	417,967
Indiana	12	2,283,000	2,048	1,883	165	....	....	67	3 21	1 23	364,921	10	3,293,073	4,551,403	96,117
Kansas	2	450,000	630	570	60	....	....	56	3 00	1 25	166,500	5	734,245	1,004,100	19,055
Kentucky	29	5,493,035	4,095	3,831	264	....	....	69	2 73	1 13	1,344,400	9	3,223,799	5,090,029	123,751
Maine	3	450,000	700	683	17	....	....	65	2 47	1 15	141,494	7	380,511	583,328	10,866
Maryland	23	4,962,125	2,763	2,656	107	....	....	72	1 90	96	905,090	8	2,888,574	4,470,050	110,934
Massachusetts	30	6,738,408	6,513	6,367	125	21	....	60	2 71	1 27	2,576,539	9	6,657,232	10,288,921	141,321
Michigan	22	4,175,386	3,089	3,054	35	....	....	70	1 92	1 25	922,597	10	3,279,420	4,591,613	142,716
Minnesota	1	150,000	180	180	....	....	....	60	2 00	1 50	25,275	(*)	....	....	....
Missouri	22	9,152,472	3,139	2,989	150	....	....	69	2 74	1 27	734,575	9	3,249,558	4,660,530	125,758
Nebraska	1	100,000	100	90	10	....	....	60	3 00	1 50	50,000	10	114,500	82,000	2,000
New Hampshire	2	650,000	290	289	1	....	....	57	2 00	1 19	127,690	12	523,355	807,340	7,978
New Jersey	40	9,099,050	4,792	4,711	81	....	....	63	2 32	1 21	1,808,448	9	6,556,283	10,341,896	243,860
New York	89	21,543,221	11,444	10,697	747	....	....	68	2 43	1 18	4,099,451	9	13,395,229	22,219,219	598,300
North Carolina	20	759,400	63	63	....	....	....	73	1 25	54	7,907	7	11,792	41,085	439
Ohio	134	25,141,294	20,071	18,885	1,171	....	15	66	2 89	1 30	8,265,070	9	23,997,915	34,918,360	930,141
Oregon	1	100,000	250	247	3	....	....	72	3 00	1 50	46,822	9	33,073	78,393	3,200
Pennsylvania	366	107,304,782	57,952	54,637	3,297	12	6	66	2 32	1 13	25,095,850	9	92,267,030	145,576,268	3,616,608
Rhode Island	3	630,000	275	200	75	....	....	60	4 00	1 17	130,969	10	375,347	488,040	8,134
Tennessee	43	3,681,776	3,077	2,758	309	10	....	67	1 62	88	659,773	7	1,376,059	2,274,203	77,100
Texas	1	40,000	140	140	....	....	....	60	2 00	1 00	27,720	6	23,580	36,000	1,400
Vermont	4	410,000	191	190	1	....	....	75	3 30	1 28	50,035	7	240,900	392,300	6,620
Virginia	44	4,329,713	2,522	2,399	121	2	..	61	1 73	89	665,432	7	1,496,151	2,585,999	55,722
West Virginia	20	3,913,616	4,121	3,780	341	....	....	66	2 26	1 10	1,541,816	7	3,484,625	6,054,032	147,487
Wisconsin	9	2,843,218	2,153	2,088	65	....	....	74	2 07	1 19	1,004,931	10	3,830,667	6,580,391	178,935
District of Columbia	1	89,600	18	18	....	....	....	54	2 50	1 62	7,528	6	2,264	10,970	264
Utah Territory†	3	150,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Wyoming Territory	1	212,603	184	174	10	....	....	60	4 00	2 00	79,650	9	463,568	491,345	9,790

* Repairing.

† These establishments were not in operation in the census year.

TABLE VII.—THE GRAND AGGREGATE OF THE IRON AND STEEL MANUFACTURE OF THE UNITED STATES, BY COUNTIES.

ALABAMA.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.				
Bibb*	2	$104, 000	....	....	....	....	....	....	....	....	....	....	....	....	....
Calhoun	1	586, 396	538	515	23	....	....	66	$2 00	$0 90	$185, 857	12	$124, 261	$299, 594	11, 262
Cherokee	5	530, 000	476	476	....	....	....	69	2 29	1 00	102, 525	6	88, 691	201, 938	8, 747
Jefferson	3	1, 233, 800	200	200	....	....	....	84	2 00	1 90	51, 257	11	214, 931	516, 362	26, 052
Shelby	2	725, 000	262	240	22	....	....	69	2 58	90	172, 074	10	136, 190	354, 962	13, 725
Talladega	1	130, 000	150	150	....	....	....	84	2 50	1 00	60, 000	9	37, 000	80, 000	3, 200

CALIFORNIA.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
San Francisco	1	$1, 000, 000	319	284	35	....	....	60	$3 00	$1 75	$177, 722	12	$535, 500	$780, 000	14, 000

COLORADO.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Arapahoe	1	$100, 000	125	125	....	....	....	60	$4 00	$1 75	$7, 000	4	$131, 700	$225, 000	4, 500

CONNECTICUT.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Fairfield	3	$400, 000	71	71	....	....	....	63	$3 00	$1 32	$41, 749	9	$133, 902	$214, 500	2, 330
Hartford	4	600, 000	186	167	19	....	....	60	3 13	1 25	84, 758	11	300, 670	489, 880	6, 314
Litchfield	8	1, 297, 000	139	139	....	....	....	78	1 48	1 17	65, 974	8	471, 467	644, 911	18, 779
New Haven	2	285, 000	196	196	....	....	....	57	2 94	1 40	95, 190	10	315, 508	471, 370	6, 922
New London	2	100, 000	93	90	3	....	....	62	3 13	1 20	43, 513	10	119, 678	178, 037	3, 716

DELAWARE.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Newcastle	9	$1, 431, 469	867	818	49	....	....	56	$2 49	$1 17	$344, 47[illegible]	11	$1, 214, 050	$2, 347, 177	33, 918

GEORGIA.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Bartow	6	$197, 100	135	135	....	....	....	68	$3 67	$0 98	$11, 585	5	$30, 860	$68, 040	1, 980
Dade	1	130, 000	200	192	8	....	....	60	2 00	1 00	9, 000	11	173, 183	282, 150	14, 850
Fannin	2	3, 800	24	24	....	....	....	51	1 75	50	2, 500	11	3, 000	10, 200	102
Floyd	2	115, 000	100	100	....	....	....	69	1 50	90	3, 271	(†)	....	....	....
Fulton	1	250, 000	500	475	25	....	....	60	2 50	85	102, 239	12	373, 276	486, 760	11, 501
Polk	2	440, 000	344	340	4	....	....	66	1 72	88	56, 894	7	51, 388	143, 700	6, 719

ILLINOIS.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Cook	11	$3, 875, 000	2, 996	2, 871	125	....	....	64	$3 17	$1 41	$1, 477, 563	10	$8, 006, 970	$10, 441, 891	248, 479
Hardin *	1	20, 000	....	....	....	....	....	....	....	....	....	....	....	....	....
Jackson *	1	170, 000	....	....	....	....	....	....	....	....	....	....	....	....	....
Marion	1	100, 000	120	117	3	....	....	58	4 00	1 25	53, 148	8	78, 812	159, 000	2, 252
Saint Clair	3	450, 000	625	555	70	....	....	65	3 23	1 20	231, 200	6	739, 325	1, 207, 400	26, 650
Sangamon	2	845, 620	800	670	130	....	....	66	3 15	1 38	309, 642	7	2, 222, 360	2, 441, 974	56, 492
Will	2	1, 000, 000	712	674	38	....	....	60	3 62	1 12	437, 165	12	3, 929, 678	6, 295, 024	84, 094

INDIANA.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Clay	1	$230, 000	50	50	....	....	....	84	$1 75	$1 25	$16, 610	11	$99, 981	$150, 535	5, 737
Dearborn	1	350, 000	270	225	45	....	....	60	4 37	1 25	100, 851	12	323, 435	558, 300	8, 601
Floyd	2	458, 000	500	470	30	....	....	60	4 00	1 33	180, 000	11	1, 184, 860	1, 472, 600	26, 803
Marion	2	640, 000	320	320	....	....	....	55	4 00	1 25	123, 305	10	769, 382	885, 000	19, 500
Martin	1	100, 000	213	198	15	....	....	80	1 50	1 00	6, 230	4	3, 125	10, 000	500
Putnam	1	100, 000	150	125	25	....	....	60	3 50	1 25	100, 000	11	123, 900	253, 000	4, 000
Vanderburgh *	1	50, 000	....	....	....	....	....	....	....	....	....	....	....	....	....
Vigo	3	355, 000	545	495	50	....	....	68	3 32	1 25	337, 925	11	788, 390	1, 221, 968	30, 976

* These counties contain iron establishments, but they were not in operation in the census year.

† Repairing.

TABLE VII.—THE GRAND AGGREGATE OF THE IRON AND STEEL MANUFACTURE OF THE UNITED STATES, BY COUNTIES—Continued.

KANSAS.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.				
Shawnee	1	$150,000	200	190	10	....	....	60	$3 00	$1 25	$6,500	1	$52,750	$64,900	1,100
Wyandotte	1	300,000	430	380	50	....	....	52	3 00	1 25	160,000	9	681,495	939,200	17,955

KENTUCKY.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Bath*	1	$18,000	......	......	......	....	....	......	......	......	......	......	......	......	......
Boyd	4	1,415,000	600	450	150	....	....	63	$3 50	$1 14	$255,350	10	$597,884	$1,074,600	37,620
Campbell	3	640,000	760	760	......	....	....	64	3 88	1 44	305,500	12	1,359,990	2,033,950	45,785
Carter	3	185,000	350	320	30	....	....	72	1 60	1 00	98,000	7	60,750	114,000	4,000
Estill	2	130,000	250	250	......	....	....	75	1 40	75	30,481	12	11,924	30,252	902
Greenup	6	1,293,035	900	850	50	....	....	78	1 75	1 06	163,957	10	180,762	238,600	11,376
Jefferson	3	392,000	470	468	2	....	....	60	3 24	1 32	149,187	6	305,784	514,623	7,008
Kenton	3	730,000	565	533	32	....	....	59	4 94	1 30	281,925	7	663,705	1,012,004	14,560
Lyon	2	500,000	200	200	......	....	....	84	1 50	1 00	60,000	9	43,000	77,000	2,500
Trigg*	2	190,000	......	......	......	....	....	......	......	......	......	......	......	......	......

MAINE.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Cumberland	1	$100,000	200	190	10	....	....	60	$2 90	$1 17	$51,544	7	$241,242	$322,748	5,729
Piscataquis	1	150,000	300	300	......	....	....	75	1 50	1 25	44,950	7	23,569	60,375	2,015
Washington	1	200,000	200	193	7	....	....	60	3 00	1 04	45,000	6	115,700	200,205	3,122

MARYLAND.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Alleghany	3	$1,650,000	601	579	22	....	....	72	$4 00	$1 23	$153,368	7	$579,496	$822,000	20,311
Baltimore	10	1,632,125	1,408	1,343	65	....	....	67	1 95	1 09	532,579	10	1,803,209	2,672,940	69,944
Cecil	3	550,000	310	305	5	....	....	65	1 93	1 08	132,157	10	322,292	637,460	9,739
Frederick	2	575,000	200	200	......	....	....	80	1 43	87	50,000	5	112,000	185,000	6,000
Harford*	1	350,000	......	......	......	....	....	......	......	......	......	......	......	......	......
Howard*	1	35,000	......	......	......	....	....	......	......	......	......	......	......	......	......
Prince George's	1	60,000	205	190	15	....	....	73	1 25	80	31,300	10	47,042	86,700	2,331
Washington	2	110,000	39	39	......	....	....	72	81	66	5,686	8	24,535	65,950	2,609

MASSACHUSETTS.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Berkshire	4	$682,000	390	390	......	....	....	69	$1 88	$1 33	$176,000	7	$169,026	$312,810	9,543
Bristol	5	947,000	1,129	1,079	50	....	....	58	2 20	1 18	367,226	11	960,268	1,793,350	28,260
Essex	1	100,000	30	30	......	....	....	60	3 00	1 00	5,500	7	70,000	108,000	1,700
Middlesex	1	100,000	100	100	......	....	....	59	3 00	1 25	64,000	11	266,100	460,000	7,300
Norfolk	2	300,000	372	358	14	....	....	60	2 55	1 18	148,402	10	395,227	593,002	9,974
Plymouth	9	1,235,000	993	948	39	6	....	61	2 57	1 17	387,315	7	1,456,324	2,129,779	27,163
Suffolk	5	1,624,408	1,120	1,108	12	....	...	54	3 88	1 60	444,095	12	1,552,002	2,189,987	27,201
Worcester	3	1,750,000	2,379	2,354	10	15	....	57	2 63	1 41	984,001	7	1,688,285	2,701,993	30,180

MICHIGAN.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Antrim	1	$500,000	251	251	......	....	....	77	$1 75	$1 25	$98,603	11	$190,981	$389,740	12,975
Benzie	1	100,000	50	50	......	....	....	84	2 00	1 25	5,000	(†)	......	......	......
Charlevoix*	1	20,000	......	......	......	....	....	......	......	......	......	......	......	......	......
Delta	1	325,000	225	225	......	....	....	60	1 88	1 40	100,000	12	192,510	217,650	10,851
Huron	1	100,000	67	64	3	....	....	70	1 50	1 25	2,500	(†)	......	......	......
Leelenaw	1	45,000	130	130	......	....	....	60	2 00	1 00	......	(†)	......	......	......
Marquette	4	880,000	470	445	25	....	....	65	1 87	1 42	94,541	8	459,257	633,329	25,547
Menominee	1	40,000	150	150	......	....	....	77	2 00	1 25	60,000	11	181,000	270,000	9,000
Muskegon	1	150,000	200	200	......	....	....	70	1 75	1 25	24,000	3	82,917	129,108	4,611
Schoolcraft*	1	168,000	......	......	......	....	....	......	......	......	......	......	......	......	......
Van Buren	2	300,000	451	451	......	....	....	70	1 75	1 13	100,967	12	300,348	453,152	16,184
Wayne	7	1,547,386	1,095	1,088	7	....	....	68	2 70	1 27	436,986	11	1,872,407	2,498,634	63,548

* These counties contain iron establishments, but they were not in operation in the census year.

† Repairing.

TABLE VII.—THE GRAND AGGREGATE OF THE IRON AND STEEL MANUFACTURE OF THE UNITED STATES, BY COUNTIES—Continued.

MINNESOTA.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.				
Saint Louis	1	$150,000	180	180				60	$2 00	$1 50	$25,275	(†)			

MISSOURI.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.				
Crawford	2	$400,000	700	675	25			72	$2 50	$1 18	$54,000	10	$275,000	$510,000	19,114
Dent *	1	99,372													
Franklin *	1	140,000													
Iron *	1	1,500,000													
Jefferson	1	150,000	165	150	15			68	2 50	1 25	60,000	10	151,500	200,000	4,000
Phelps*	3	600,000													
Saint Francois *	1	202,500													
Saint Louis	10	5,960,600	2,268	2,158	110			67	3 23	1 39	616,575	7	2,823,058	3,950,530	102,644
Washington *	2	100,000	‡ 6	‡ 6							4,000				

NEBRASKA.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.				
Douglass	1	$100,000	100	90	10			60	$3 00	$1 50	$50,000	10	$114,500	$82,000	2,000

NEW HAMPSHIRE.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.				
Hillsborough	2	$650,000	290	289	1			57	$2 00	$1 19	$127,690	12	$523,355	$807,340	7,978

NEW JERSEY.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.				
Cumberland	1	$500,000	311	311				55	$2 00	$0 95	$124,000	11	$292,700	$441,000	6,161
Essex	3	600,000	281	281				65	2 50	1 48	126,144	9	471,946	771,078	9,016
Hudson	5	1,100,000	510	498	12			64	2 51	1 43	245,634	12	1,044,826	1,847,687	33,247
Mercer	3	1,945,550	1,391	1,361	30			57	2 59	1 23	518,325	12	1,371,245	2,340,381	28,315
Morris	13	1,140,500	474	472	2			62	2 59	1 22	111,103	7	491,833	704,229	22,455
Passaic	5	560,000	656	656				59	2 22	1 19	302,660	9	519,029	927,803	16,019
Sussex	2	700,000	256	249	7			73	1 60	1 08	106,872	12	714,515	1,130,480	50,825
Union	1	25,000	60	57	3			65	3 00	1 25	15,000	3	50,750	72,000	1,200
Warren	7	2,528,000	853	826	27			65	1 99	1 09	258,710	8	1,599,439	2,107,238	76,622

NEW YORK.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.				
Albany	3	$1,816,967	541	526	15			66	$2 20	$1 18	$185,957	9	$599,674	$1,167,158	40,611
Cayuga	2	120,000	70	68	2			68	2 94	1 03	29,871	12	196,288	255,660	6,021
Chemung	2	500,000	410	404	6			67	2 23	1 00	182,648	12	870,541	1,124,764	30,053
Clinton	17	1,499,000	751	717	34			69	2 27	1 10	267,773	8	869,076	1,202,419	23,634
Columbia	4	887,462	186	186				77	1 95	1 26	73,024	7	427,153	569,016	30,545
Dutchess	7	1,446,549	409	407	2			73	1 84	1 27	198,003	10	876,902	1,323,857	61,637
Erie	4	1,790,000	713	688	25			65	2 48	1 19	212,278	9	635,353	887,012	25,015
Essex	13	3,205,000	894	894				67	2 05	1 18	274,853	7	1,118,007	1,867,756	66,725
Franklin	1	300,000	237	237				66	2 50	1 25	114,885	12	128,281	213,195	4,643
Jefferson	2	70,000	40	40				77	1 50	1 00	9,857	10	57,338	116,900	3,346
Kings	1	300,000	30	30				60	5 00	1 50	10,000	6	47,060	135,000	450
Lewis	3	195,000	165	164	1			72	1 68	1 07	6,204	4	10,015	25,500	470
Monroe	1	100,000	52	50	2			77	2 00	1 12	17,000	10	102,560	165,000	8,250
New York	2	550,000	269	264	5			69	2 25	1 30	95,367	10	614,608	949,156	31,103
Niagara *	2	540,000													
Oneida	4	673,000	552	508	44			65	3 73	1 54	153,749	7	874,555	919,721	21,108
Onondaga	5	1,306,000	735	685	50			66	1 75	1 00	271,487	11	629,141	1,268,852	24,445
Orange	3	767,493	475	439	36			64	2 88	1 17	189,808	11	409,017	682,570	27,548
Putnam *	1	96,750													

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* These counties contain iron establishments, but they were not in operation in the census year.

† Repairing.

‡ Watchmen.

TABLE VII.—THE GRAND AGGREGATE OF THE IRON AND STEEL MANUFACTURE OF THE UNITED STATES, BY COUNTIES—Continued.

NEW YORK—Continued.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.				
Rensselaer	4	$4, 550, 000	4, 352	3, 857	495			67	$2 41	$1 18	$1, 657, 396	11	$4, 618, 862	$8, 702, 189	177, 967
Rockland	1	110, 000	30	20	10			60	2 50	1 25	4, 700	4	12, 315	23, 100	275
Saint Lawrence*	1	15, 000													
Ulster	3	325, 000	387	367	20			60	4 30	1 25	123, 418	7	151, 019	411, 255	6, 200
Washington	1	200, 000	46	46				77	1 30	1 13	18, 470	11	141, 564	200, 239	7, 815
Wayne	1	90, 000	100	100				68	1 63	1 00	2, 703	1	5, 900	8, 900	445
Westchester*	1	90, 000													

NORTH CAROLINA.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Catawba	3	$13, 000	13	13				72	$1 25	$0 30	$1, 500	10	$1, 680	$4, 880	61
Chatham*	2	370, 000													
Cherokee	4	15, 200	33	33				60	1 50	50	3, 400	5	3, 332	12, 910	144
Cumberland†		10, 000													
Guilford*	1	100, 000													
Harnett†		10, 000													
Lincoln	4	72, 700	5	5				72	1 25	60	190	2	450	795	9
Mitchell	2	140, 000	12	12				88	1 00	75	2, 817	9	4, 850	17, 000	170
Moore†		10, 000													
Surry‡	4	18, 500											1, 480	5, 500	55

OHIO.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Athens	1	$175, 000	215	215				84	$2 00	$1 40	$130, 000	12	$82, 000	$230, 495	8, 070
Belmont	5	1, 205, 440	986	864	107		15	72	3 06	1 49	518, 805	11	1, 458, 595	2, 385, 696	56, 193
Columbiana	4	460, 000	758	703	55			69	4 04	1 27	247, 271	8	837, 538	1, 251, 084	44, 110
Cuyahoga	10	2, 839, 042	2, 999	2, 788	211			67	2 58	1 29	1, 960, 237	9	6, 491, 506	9, 435, 432	210, 354
Erie	1	275, 000	225	220	5			48	3 50	1 60	7, 232	2	75, 000	105, 000	2, 000
Franklin	3	800, 000	530	504	26			69	2 63	1 27	177, 008	7	734, 794	1, 149, 525	22, 898
Gallia*	1	150, 000													
Hamilton	4	610, 689	313	305	8			60	4 63	1 38	163, 590	8	338, 479	596, 160	8, 384
Hocking	6	1, 890, 000	927	923	4			72	1 91	1 32	135, 107	5	322, 447	491, 965	21, 415
Jackson	16	1, 762, 000	1, 541	1, 462	79			70	2 08	1 15	528, 520	8	667, 853	986, 003	41, 086
Jefferson	7	1, 103, 999	589	564	25			66	2 79	1 35	293, 675	9	1, 125, 833	1, 267, 312	40, 561
Lawrence	15	4, 010, 000	3, 523	3, 278	245			62	3 01	1 16	1, 045, 052	11	1, 332, 760	2, 307, 874	70, 794
Lucas*	1	50, 000													
Mahoning	13	3, 781, 715	2, 889	2, 774	115			67	2 75	1 27	1, 326, 366	10	6, 066, 349	7, 850, 278	219, 957
Meigs	1	100, 000	250	225	25			60	4 00	1 25	37, 500	6	137, 950	245, 000	4, 675
Muskingum	2	400, 000	267	256	11			68	2 50	1 20	174, 394	11	529, 944	848, 018	23, 147
Paulding	3	200, 000	180	180				70	1 40	1 25	37, 000	8	88, 100	122, 000	5, 000
Perry	6	913, 500	605	603	2			74	1 91	1 40	211, 427	10	438, 908	644, 275	34, 834
Scioto	10	1, 130, 000	1, 206	1, 091	115			63	3 46	1 41	430, 577	7	618, 650	859, 000	16, 791
Stark	4	450, 000	139	136	3			60	5 00	1 15	61, 106	12	111, 137	282, 889	2, 999
Summit	2	207, 000	197	178	19			55	2 90	1 25	123, 475	10	362, 954	603, 427	7, 783
Trumbull	10	1, 330, 000	1, 632	1, 516	116			66	2 87	1 26	604, 228	10	1, 888, 167	2, 866, 927	73, 369
Tuscarawas	3	627, 909	100	100				65	1 74	1 10	42, 500	9	288, 951	390, 000	15, 726
Vinton*	5	610, 000													
Washington*	1	60, 000													

OREGON.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Clackamas	1	$100, 000	250	247	3			72	$3 00	$1 50	$46, 822	9	$33, 073	$78, 393	3, 200

* These counties contain iron establishments, but they were not in operation in the census year.

† These counties have capital invested by iron establishments, but do not contain any works.

‡ No further statistics could be procured than are here given.

TABLE VII.—THE GRAND AGGREGATE OF THE IRON AND STEEL MANUFACTURE OF THE UNITED STATES, BY COUNTIES—Continued.

PENNSYLVANIA.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.				
Adams *	1	$13, 000													
Allegheny	56	32, 596, 364	19, 798	18, 345	1, 436	11	6	64	$3 15	$1 39	$9, 966, 803	10	$26, 827, 087	$46, 078, 375	848, 146
Armstrong	6	690, 000	445	395	50			51	4 13	1 28	235, 000	12	236, 265	668, 513	9, 300
Beaver	2	290, 000	79	76	3			60	3 52	1 27	34, 942	8	107, 868	149, 101	1, 320
Bedford	3	678, 334	120	116	4			72	1 46	1 00	46, 861	12	117, 691	216, 667	10, 396
Berks	33	5, 365, 118	3, 048	2, 949	99			68	2 37	1 09	1, 123, 946	9	5, 409, 091	7, 730, 512	213, 580
Blair	16	1, 796, 916	1, 290	1, 227	63			62	2 33	1 11	409, 703	9	1, 390, 976	2, 176, 362	68, 039
Bradford	1	25, 000	40	40				65	2 00	1 00	4, 404	2	9, 327	2, 700	45
Bucks	2	430, 000	378	348	30			68	3 30	1 25	124, 046	11	350, 646	658, 387	23, 695
Cambria	4	7, 500, 000	2, 585	2, 425	160			64	2 17	1 10	1, 217, 680	12	6, 848, 300	12, 672, 000	260, 140
Carbon	3	530, 000	223	220	3			69	1 77	88	56, 437	6	507, 501	732, 191	28, 455
Centre	12	1, 080, 000	524	500	24			67	2 34	1 18	217, 842	10	542, 345	899, 126	17, 411
Chester	12	2, 159, 900	1, 735	1, 654	81			70	2 28	1 26	812, 079	9	2, 650, 898	4, 162, 957	78, 363
Clarion *	1	150, 000													
Clinton *	2	160, 000													
Columbia	4	575, 000	424	415	9			61	1 86	1 03	153, 528	9	419, 165	695, 644	22, 121
Crawford	1	50, 000	21	21				60	3 00	1 25	10, 941	7	9, 917	22, 827	427
Cumberland	6	760, 000	687	665	22			67	2 04	99	239, 624	11	414, 034	860, 400	16, 959
Dauphin	16	6, 368, 692	2, 508	2, 425	83			65	2 49	1 10	976, 946	10	5, 714, 076	8, 383, 390	223, 676
Delaware	3	597, 895	493	485	8			54	2 78	1 29	174, 795	12	388, 666	590, 275	9, 988
Erie	2	325, 000	235	229	6			58	2 45	1 30	97, 309	7	368, 076	499, 186	10, 365
Fayette	5	1, 158, 000	739	716	23			65	2 02	1 28	348, 619	9	480, 376	766, 831	37, 108
Franklin	6	383, 000	220	209	11			84	1 64	1 03	48, 974	10	179, 326	320, 794	8, 693
Huntingdon	7	2, 065, 916	426	419	7			64	2 02	99	102, 363	11	455, 400	668, 393	28, 481
Lackawanna	4	2, 294, 000	1, 596	1, 534	62			64	1 98	1 02	605, 953	11	4, 792, 978	5, 400, 085	151, 273
Lancaster	18	2, 407, 500	1, 605	1, 491	114			61	2 06	1 03	444, 305	8	1, 757, 828	2, 663, 223	87, 019
Lawrence	9	1, 514, 895	871	812	59			70	2 50	1 41	483, 976	8	2, 019, 474	2, 864, 509	88, 443
Lebanon	13	1, 428, 628	501	488	13			68	2 14	1 03	230, 134	11	1, 250, 411	1, 904, 489	73, 149
Lehigh	9	9, 514, 850	2, 673	2, 552	121			69	2 85	1 10	890, 926	10	5, 631, 985	8, 578, 871	324, 875
Lycoming	4	170, 000	96	92	4			58	1 63	1 00	25, 700	6	47, 974	104, 740	1, 439
Mercer	18	2, 725, 284	1, 977	1, 812	165			69	2 90	1 32	896, 485	9	3, 946, 881	5, 832, 729	182, 881
Mifflin	4	625, 000	324	314	10			68	2 13	1 10	149, 284	12	590, 214	990, 170	22, 036
Montgomery	19	5, 245, 613	2, 973	2, 927	46			68	2 36	1 20	1, 301, 610	9	4, 593, 563	7, 194, 821	168, 628
Montour	7	1, 973, 632	1, 381	1, 236	144	1		68	2 22	1 01	473, 744	10	2, 110, 377	2, 751, 088	79, 789
Northampton	10	6, 375, 000	3, 220	3, 078	142			68	2 05	1 18	1, 207, 126	11	6, 221, 028	9, 263, 865	322, 882
Northumberland	5	745, 000	513	490	23			72	2 28	1 06	193, 949	9	446, 768	724, 559	16, 399
Perry	5	590, 000	463	438	25			61	2 50	1 10	174, 918	12	544, 554	786, 156	17, 689
Philadelphia	16	2, 999, 245	2, 068	1, 897	171			63	2 74	1 31	1, 045, 570	9	2, 580, 512	4, 257, 179	65, 983
Schuylkill	14	2, 211, 000	1, 360	1, 300	60			71	2 26	1 03	416, 919	11	1, 909, 366	2, 519, 921	70, 609
Tioga	1	80, 000	40	40				77	2 25	1 10	2, 850	2	7, 001	8, 680	434
Union	1	125, 000	28	24	4			70	1 00	95	7, 368	10	50, 303	93, 760	4, 059
Westmoreland	2	307, 000	210	198	12			72	2 38	1 18	130, 686	11	284, 249	582, 792	18, 302
York	3	225, 000	35	35				72	1 40	1 10	11, 505	8	54, 533	100, 000	4, 071
RHODE ISLAND.															
Providence	3	$630, 000	275	200	75			60	$4 00	$1 17	$130, 969	10	$375, 347	$488, 040	8, 134
TENNESSEE.															
Carter	2	$48, 000	263	260		3		60	$1 13	$0 75	$6, 205	8	$25, 325	$52, 565	1, 389
Claiborne*	3	24, 000													
Decatur	1	100, 000	60	60				78	1 00	75	10, 000	2	10, 875	22, 800	600
Dickson	1	150, 000	150	130	15	5		84	1 00	70	40, 000	8	21, 300	70, 000	2, 400
Greene	3	126, 000	4	4				72	90		90	4	230	900	15
Hamilton	6	1, 272, 000	1, 204	1, 119	85			67	2 23	1 01	329, 410	9	835, 892	1, 324, 350	35, 645
Houston †		20, 000													
Johnson	16	77, 450	177	169	6	2		67	1 26	60	21, 000	7	19, 687	50, 861	876

* These counties contain iron establishments, but they were not in operation in the census year.

† This county has capital invested by an iron establishment, but does not contain any works.

TABLE VII.—THE GRAND AGGREGATE OF THE IRON AND STEEL MANUFACTURE OF THE UNITED STATES, BY COUNTIES—Continued.

TENNESSEE—Continued.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.				
Knox	1	$230,000	225	115	110			60	$3 30	$0 95	$73,786	10	$142,390	$213,250	4,181
Lawrence	1	50,000	125	120	5			60	1 25	95	30,000	6	2,831	4,720	236
Marion	1	210,626	148	140	8			75	2 50	1 00	51,457	12	184,818	305,257	17,958
Roane	2	700,000	400	370	30			60	2 00	1 10	70,000	12	98,250	182,500	12,000
Stewart	3	570,000	321	271	50			54	1 25	1 00	27,825	4	34,461	47,000	1,800
Sullivan*	1	2,700													
Unicoi*	1	1,000													
Wayne*	1	100,000													

TEXAS.

COUNTIES.	Number of establishments.	Amount of capital.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Marion	1	$40,000	140	140				60	$2 00	$1 00	$27,720	6	$23,580	$36,000	1,400

VERMONT.

COUNTIES.	Number of establishments.	Amount of capital.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Addison*	1	$15,000													
Franklin	1	300,000	165	165				72	$3 85	$1 15	$48,000	12	$227,100	$367,500	6,000
Rutland	1	30,000	26	25	1			78	2 75	1 40	2,035	2	13,800	24,800	620
Windsor*	1	65,000													

VIRGINIA.

COUNTIES.	Number of establishments.	Amount of capital.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Alexandria	1	$25,000	30	30				60	$2 00	$1 25	$2,000	2	$10,200	$12,000	200
Alleghany	2	1,000,000	150	144	6			77	1 75	90	62,468	11	76,179	168,920	8,437
Amherst	1	52,000	75	75				72	1 25	80	6,500	(†)		2,000	
Augusta*	3	405,000												7,000	
Bath†	1	76,000													
Botetourt	3	230,000	50	47	3			60	2 40	85	32,313	(†)			
Campbell	2	203,000	80	80				60	2 13	1 25	16,228	6	25,897	12,500	230
Giles	1	50,000	120	120				48	1 25	75	6,000	(†)			
Henrico	3	702,000	1,054	1,004	50			58	2 77	1 00	336,311	10	1,173,801	1,973,916	34,946
Lee	3	4,013	3	3				60	2 00	1 00	107	3	674	1,688	13
Louisa*	1	30,000													
Page	2	580,000	250	235	15			65	1 50	85	80,000	11	105,068	200,450	5,073
Pulaski	2	127,300	162	162				63	1 88	95	7,880	10	2,505	6,200	50
Rockbridge†	1	300,000													
Rockingham*	2	50,000													
Scott	1	400	2	2				50	1 00	50	20	3	151	240	4
Shenandoah	6	307,000	215	175	40			57	1 25	78	46,400	7	36,950	67,760	1,918
Smyth	1	25,000	60	60				72	1 15	80	4,600	(†)			
Wythe	8	163,000	271	262	7	2		57	1 84	76	64,605	8	64,726	133,325	4,851

WEST VIRGINIA.

COUNTIES.	Number of establishments.	Amount of capital.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Braxton	1	$43,000	50	40	10			50	$1 25	$0 90	$834	1	$3,735	$8,800	116
Fayette	1	250,000	57	57				84	1 50	1 10	37,710	12	140,039	238,394	10,787
Hampshire	1	75,000	5	5				60		1 25	2,000	(†)			
Hardy	1	62,000	50	48	2			60	1 25	80	3,500	(†)			
Kanawha*	1	40,000													
Marshall	3	745,191	746	679	67			64	2 91	1 25	267,785	10	686,978	1,180,114	37,700
Mason	1	75,000	175	160	15			56	4 50	1 25	26,445	2	50,284	97,257	1,000
Ohio	7	2,214,425	2,573	2,327	246			72	3 72	1 41	1,098,296	10	2,472,053	4,306,567	84,767
Preston	3	159,000	430	429	1			64	1 45	98	93,246	8	75,536	159,400	9,107
Taylor	1	250,000	35	35				84	1 50	1 00	12,000	8	56,000	63,500	4,010

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* These counties contain iron establishments, but they were not in operation in the census year.

† Repairing.

TABLE VII.—THE GRAND AGGREGATE OF THE IRON AND STEEL MANUFACTURE OF THE UNITED STATES, BY COUNTIES—Continued.

WISCONSIN.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	AVERAGE NUMBER OF HANDS EMPLOYED.					WAGES AND HOURS OF LABOR.				Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
			Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.				
Brown	2	$350,000	425	425				80	$2 25	$1 30	$191,000	11	$639,810	$1,254,000	35,650
Dodge	2	935,000	70	70				84	2 25	1 13	9,200	5	117,993	81,100	4,055
Fond du Lac *	1	75,000													
Milwaukee	2	1,300,000	1,535	1,470	65			75	2 85	1 25	763,114	11	2,927,944	4,973,011	128,191
Outagamie	1	123,218	98	98				73	1 50	1 12	36,617	12	129,720	230,080	9,799
Sauk	1	60,000	25	25				60	1 50	1 13	5,000	9	15,200	42,200	1,240

DISTRICT OF COLUMBIA.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Washington	1	$89,600	18	18				54	$2 50	$1 62	$7,528	6	$2,264	$10,970	264

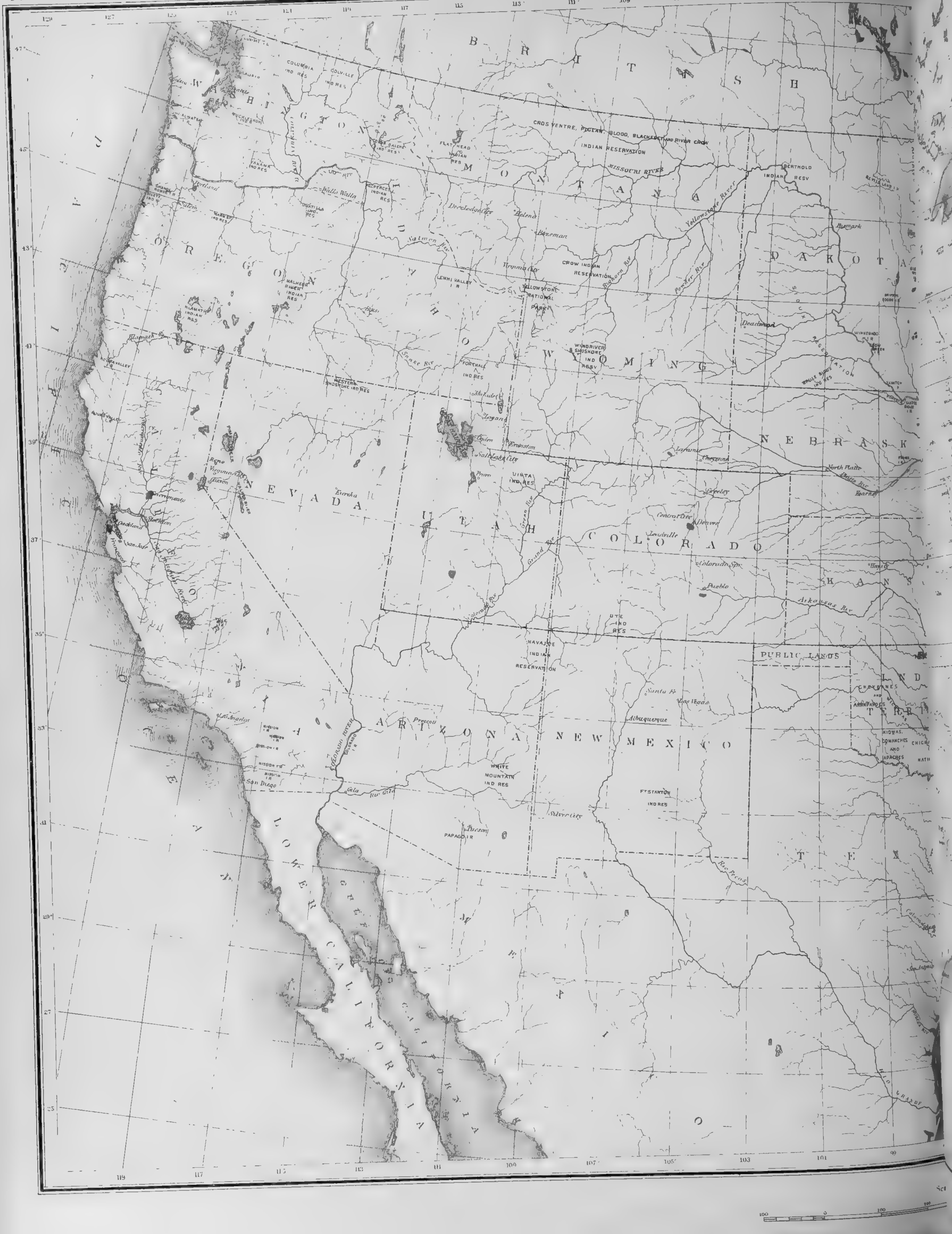
UTAH.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Iron *	1	$10,000													
Weber *	2	140,000													

WYOMING.

COUNTIES.	Number of establishments.	Amount of capital (real and personal) invested in the business.	Total hands employed.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	Average number of hours of labor per week.	Average day's wages for a skilled mechanic.	Average day's wages for an ordinary laborer.	Total amount paid in wages during the year.	Number of months in active operation, reducing part time to full time.	Total value of all materials.	Total value of all products.	Total weight of all products (tons).
Albany	1	$212,603	184	174	10			60	$4 00	$2 00	$79,650	9	$403,568	$491,345	9,790

* These counties contain iron establishments, but they were not in operation in the census year.


BRITISH
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
DAKOTA
NEBRASKA
KANSAS
IND TER
TEXAS
MEXICO
LOWER CALIFORNIA
GULF OF CALIFORNIA
PACIFIC OCEAN
COLUMBIA IND RES
COLVILLE IND RES
CŒUR D'ALENE IND RES
FLAT HEAD INDIAN RES
GROS VENTRE, PIEGAN, BLOOD, BLACKFEET AND RIVER CROW INDIAN RESERVATION
MISSOURI RIVER
BERTHOLD INDIAN RESV
YAKAMA IND RES
NEZ PERCES INDIAN RES
UMATILLA IND RES
WARM SP. IND RES
SILETZ IND RES
KLAMATH INDIAN RES
MALHEUR RIVER INDIAN RES
LEMHI VALLEY I R
CROW INDIAN RESERVATION
YELLOWSTONE NATIONAL PARK
WIND RIVER & SHOSHONE IND RESV
SIOUX RESERVATION
FORT HALL IND RES
WESTERN SHOSHONE IND RES
HOOPA VALLEY
ROUND VALLEY
PYRAMID LAKE
WALKER RIVER
UINTA IND RES
UTE IND RES
NAVAJOE INDIAN RESERVATION
PUBLIC LANDS
CHEYENNES AND ARRAPAHOES
KIOWAS, COMANCHES AND APACHES
WHITE MOUNTAIN IND RES
FT STANTON IND RES
PAPAGO I R
MISSION I R
COLORADO RIVER I R
Portland
Salem
Walla Walla
Deer Lodge City
Helena
Bozeman
Virginia City
Bismark
Deadwood
Boise
Salmon Riv
Snake Riv
Yellowstone River
Powder Riv
Big Horn Riv
Logan
Ogden
Salt Lake City
Provo
Evanston
Laramie
Cheyenne
North Platte
Platte Riv
Kearney
Greeley
Central City
Denver
Leadville
Colorado Spr
Pueblo
Arkansas Riv
Grand Riv
Green Riv
Colorado Riv
Reno
Virginia City
Carson
Eureka
Sacramento
Oakland
San Francisco
San Jose
Stockton
San Joaquin River
Klamath R
Los Angeles
San Diego
Prescott
Gila Riv
Tucson
Santa Fe
Las Vegas
Albuquerque
Silver City
Rio Pecos
Rio Grande
San Antonio
Colorado R
Hays
Winnebago I R
Crow Creek
Yankton
Ponca
Santee Sioux I R
Devils Lake I R
Sisseton I R
Pine Ridge Ind Res
Rosebud
47°
45°
43°
41°
39°
37°
35°
33°
31°
29°
27°
25°
129
127
125
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117
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113
111
109
107
105
103
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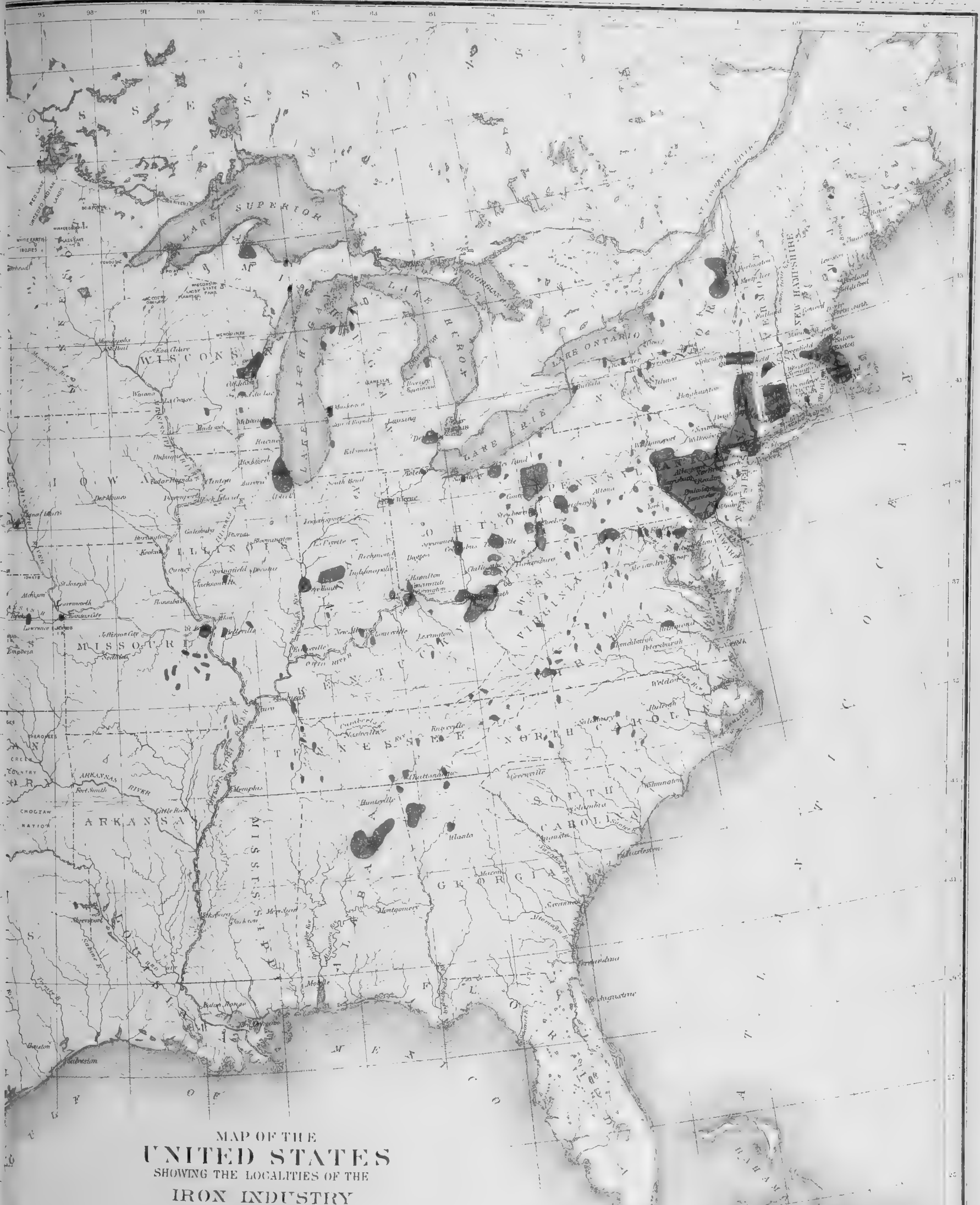
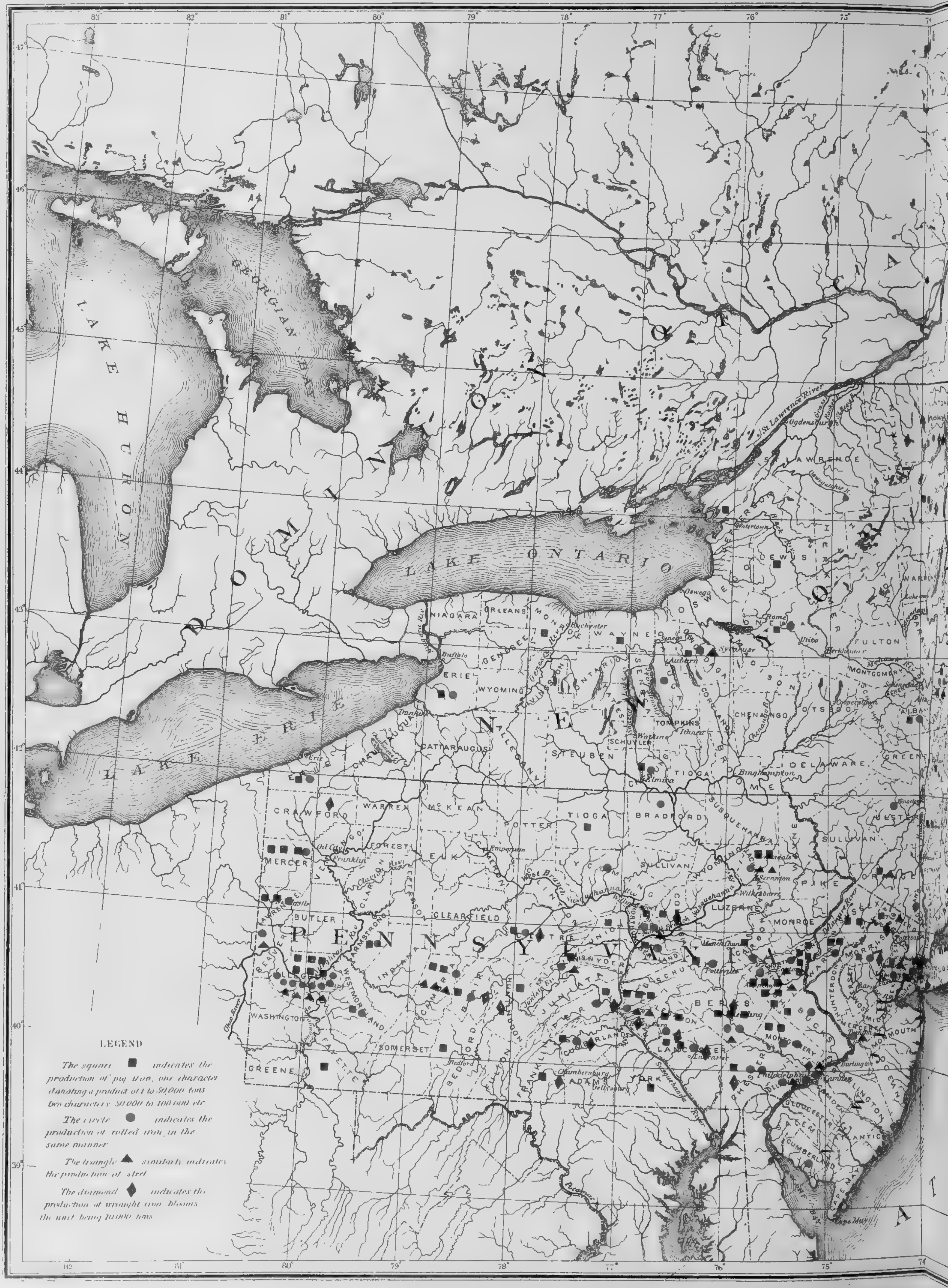
200



MAP OF THE
UNITED STATES
SHOWING THE LOCALITIES OF THE
IRON INDUSTRY
Prepared under the direction of
JAMES M. SWANK
SPECIAL AGENT
1880

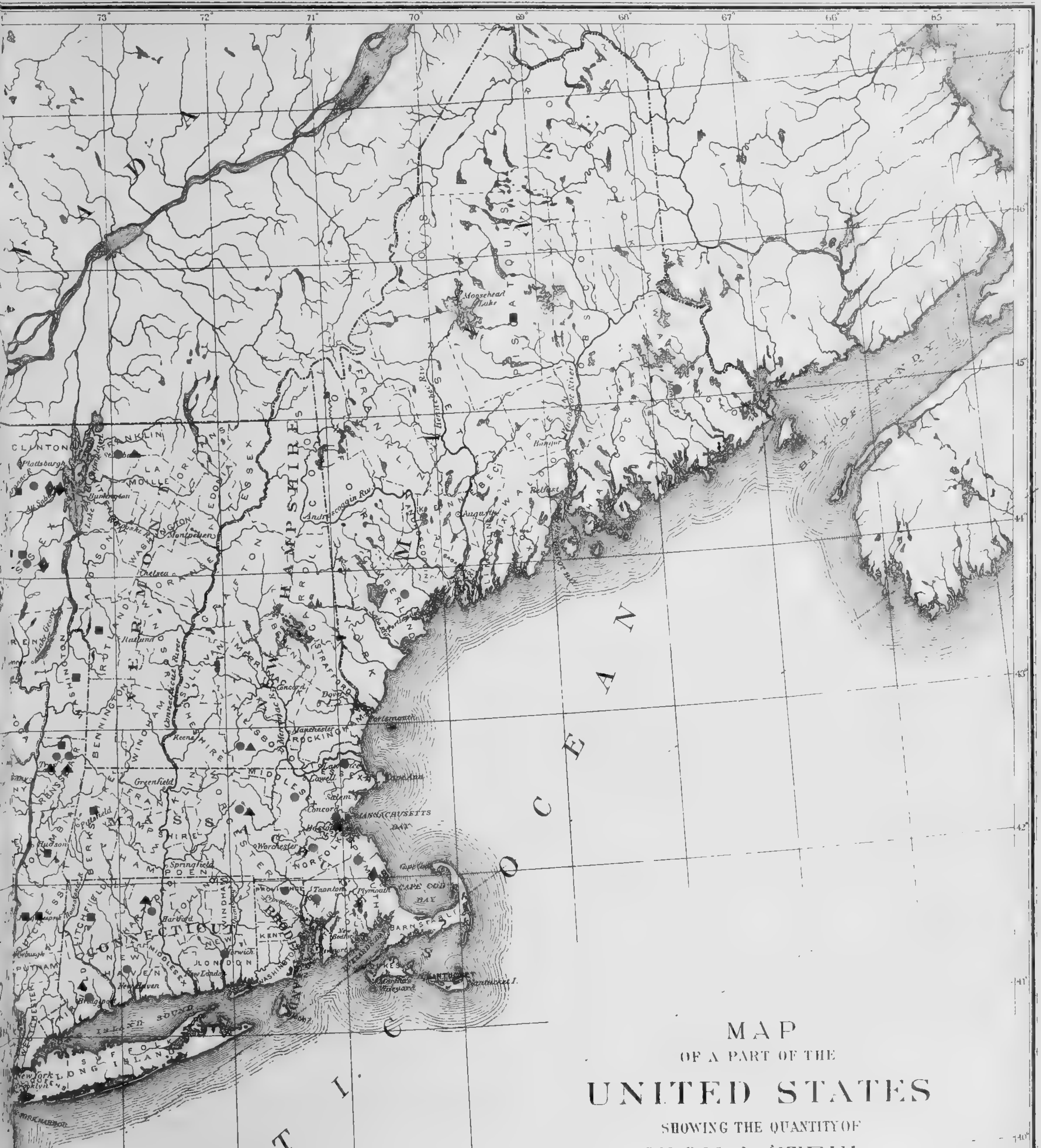
DEPARTMENT OF THE INTERIOR

Sheet N



MAINE NEW HAMPSHIRE VERMONT MASSACHUSETTS, RHODE IS

No 1.

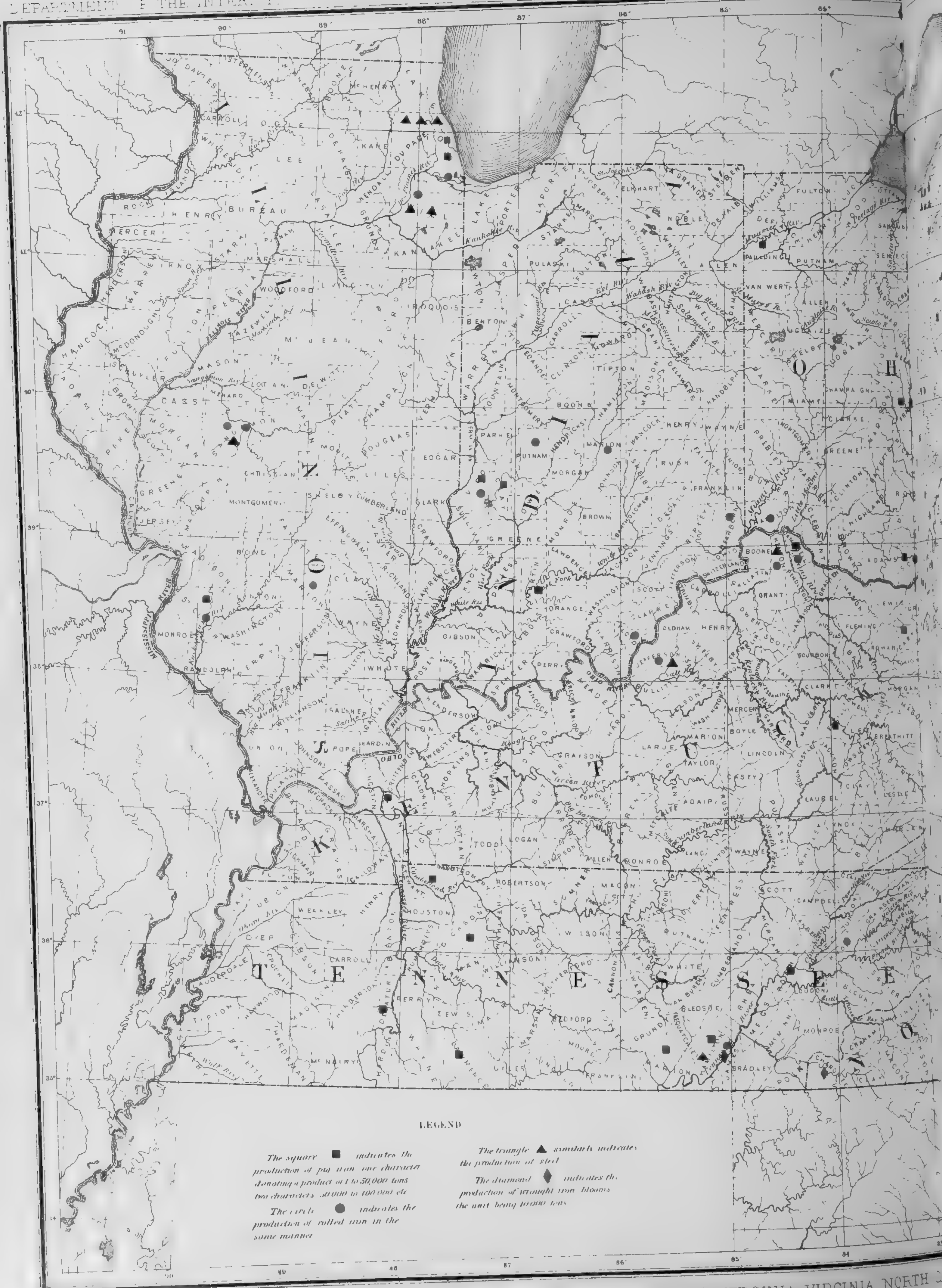


MAP
OF A PART OF THE
UNITED STATES
SHOWING THE QUANTITY OF
IRON & STEEL
PRODUCED IN EACH COUNTY
DURING THE CENSUS YEAR
Prepared under the direction of
JAMES M SWANK
SPECIAL AGENT
1880.

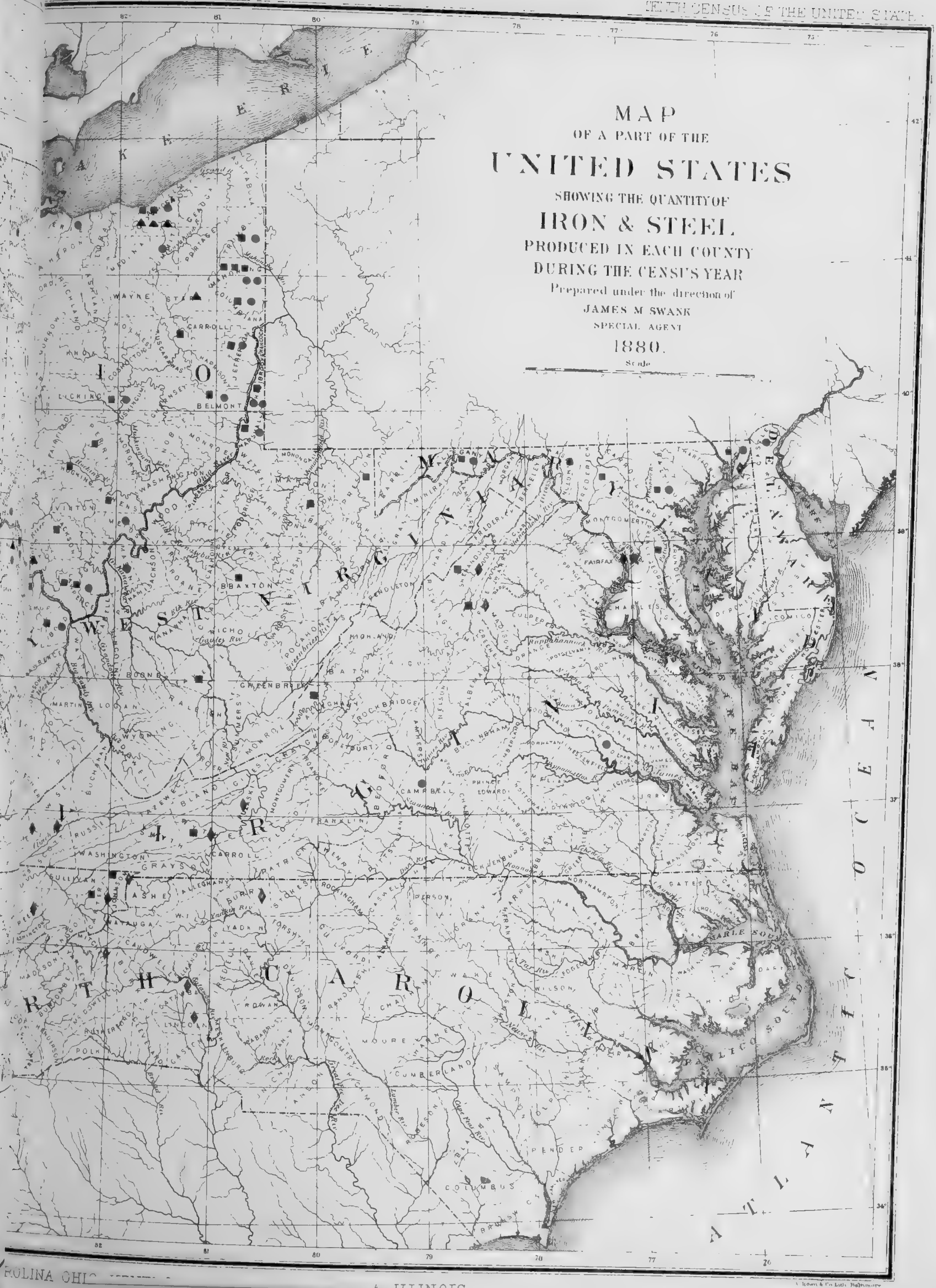
LAND CONNECTICUT NEW YORK NEW JERSEY PENNSYLVANIA

Sheet

DEPARTMENT OF THE INTERIOR


ILLINOIS
INDIANA
OHIO
KENTUCKY
TENNESSEE
LEGEND
The square ■ indicates the production of pig iron one character denoting a product of 1 to 50,000 tons two characters 50,000 to 100,000 etc
The circle ● indicates the production of rolled iron in the same manner
The triangle ▲ similarly indicates the production of steel
The diamond ◆ indicates the production of wrought iron blooms the unit being 10,000 tons

DELAWARE MARYLAND WEST VIRGINIA VIRGINIA NORTH C



MAP
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DURING THE CENSUS YEAR
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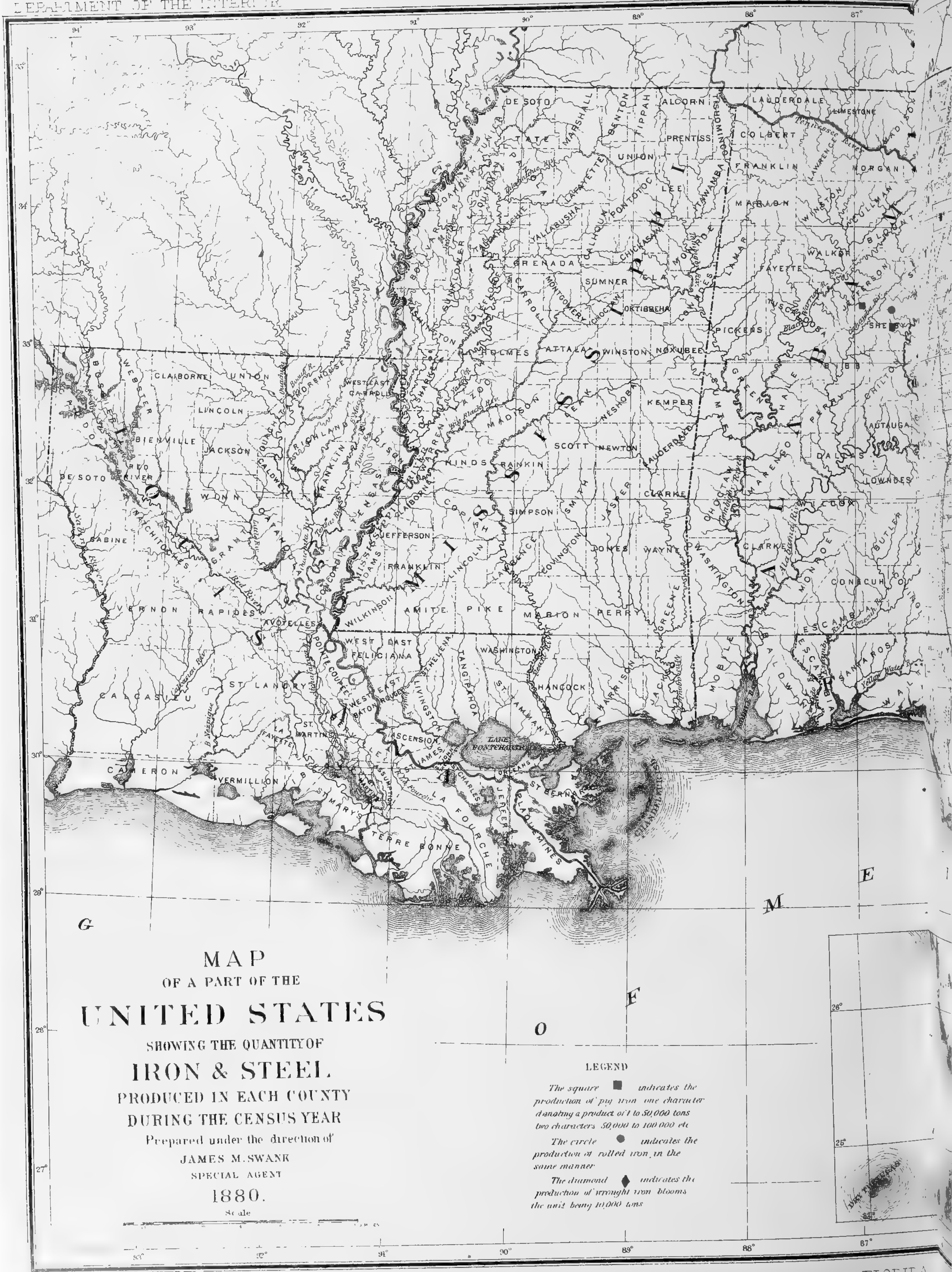
JAMES M SWANK
SPECIAL AGENT
1880.
Scale

A. Hoen & Co. Lith. Baltimore

Sheet No.

DEPARTMENT OF THE INTERIOR



MAP
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PRODUCED IN EACH COUNTY DURING THE CENSUS YEAR

Prepared under the direction of
JAMES M. SWANK
SPECIAL AGENT
1880.

Scale

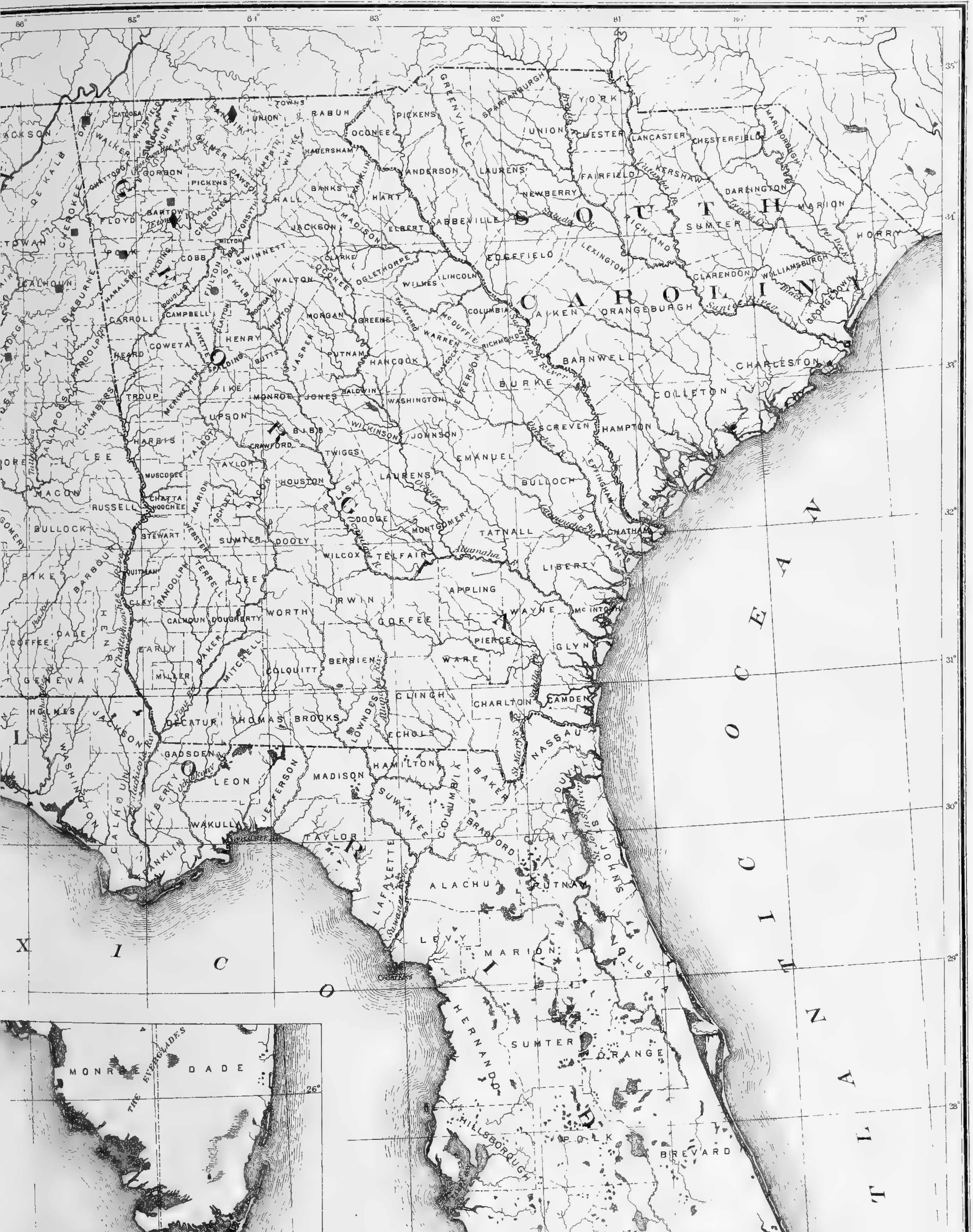
LEGEND

The square ■ *indicates the production of pig iron one character denoting a product of 1 to 50,000 tons two characters 50,000 to 100,000 etc*

The circle ● *indicates the production of rolled iron, in the same manner*

The diamond ◆ *indicates the production of wrought iron blooms the unit being 10,000 tons*

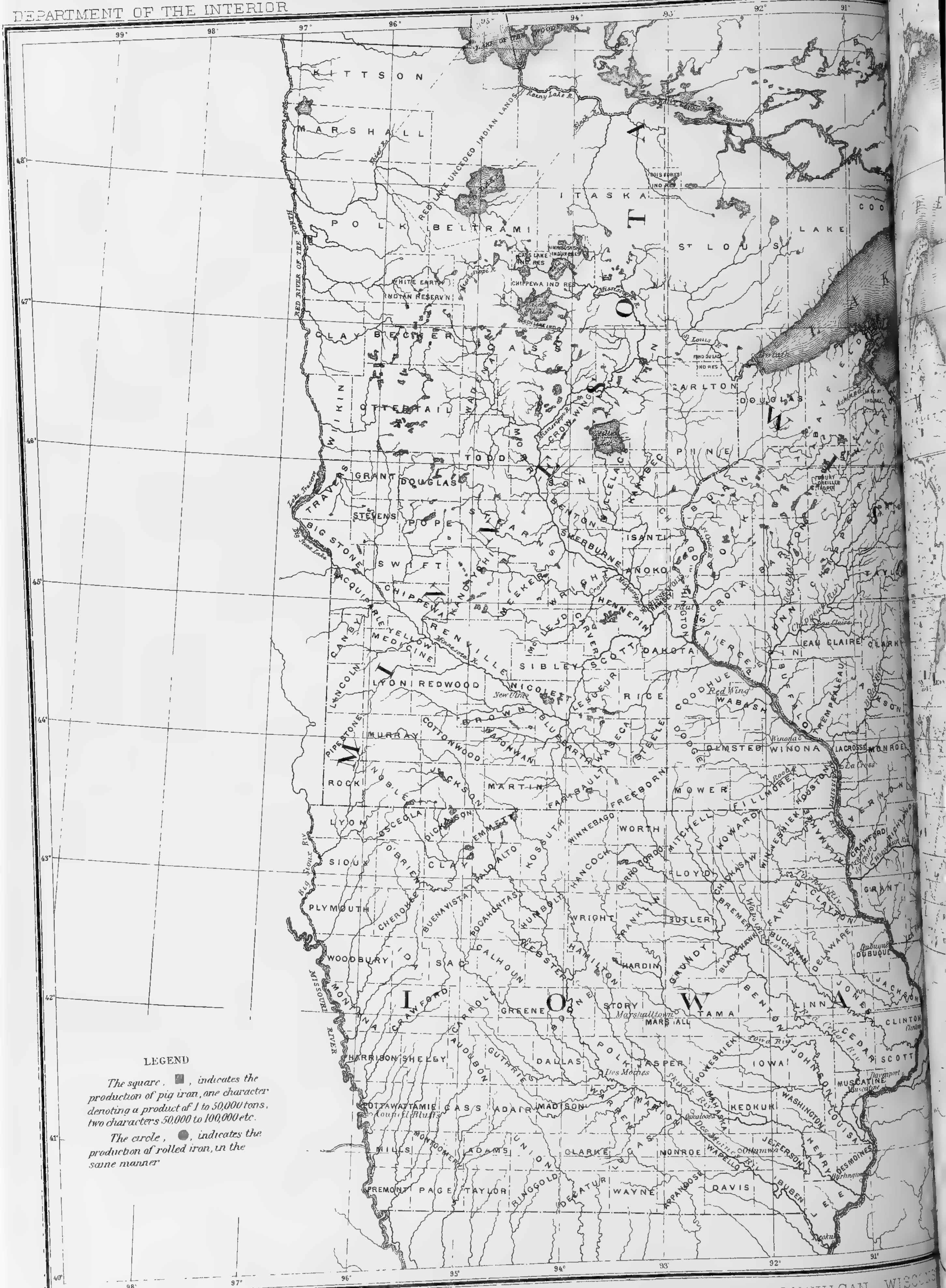
SOUTH CAROLINA, GEORGIA FLORIDA



ALABAMA MISSISSIPPI LOUISIANA

A. Hoen & Co. Lith. Baltimore

Shee



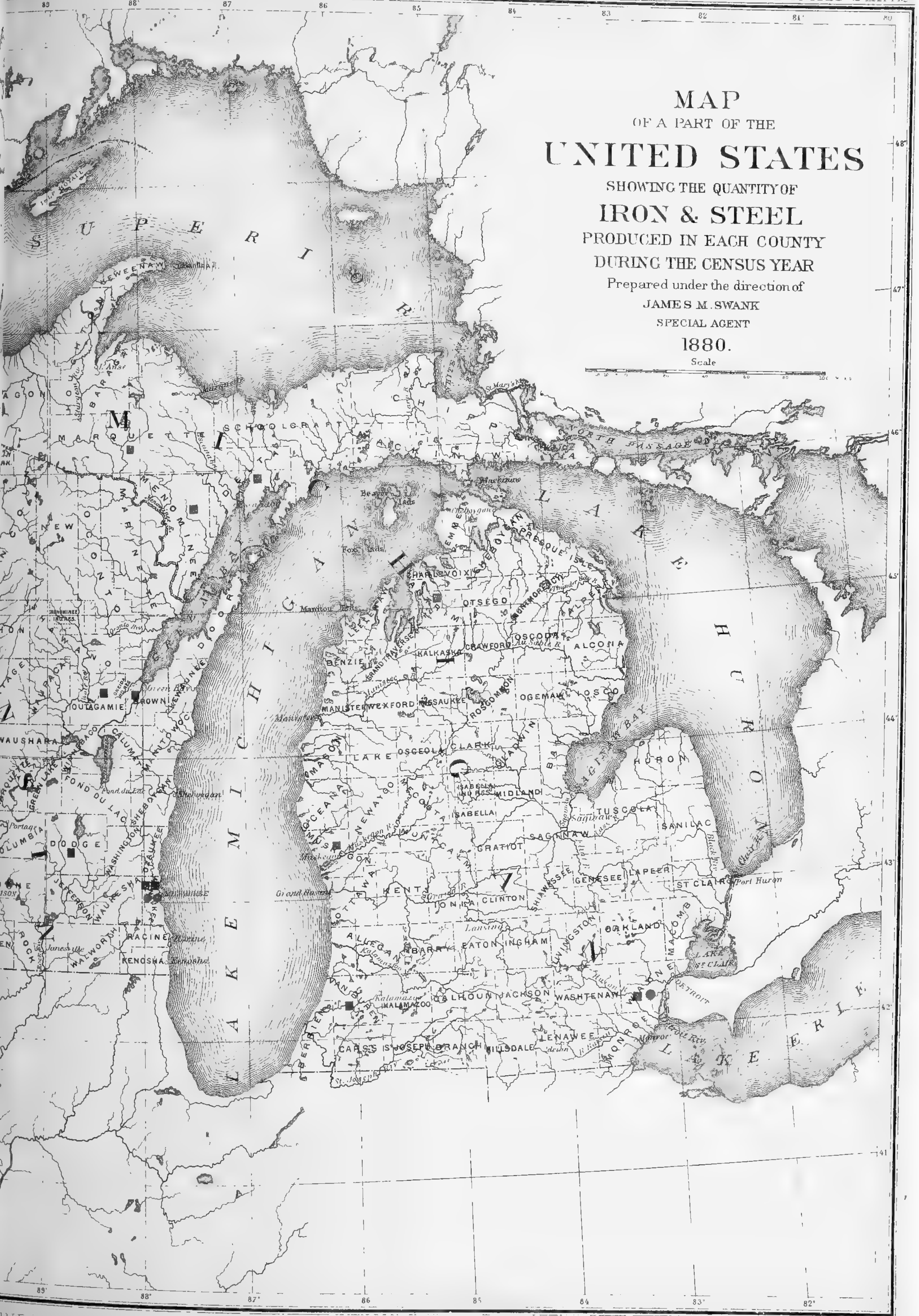
LEGEND

The square, ■, indicates the production of pig iron, one character denoting a product of 1 to 50,000 tons, two characters 50,000 to 100,000 etc.

The circle, ●, indicates the production of rolled iron, in the same manner.

MICHIGAN, WISC

94.



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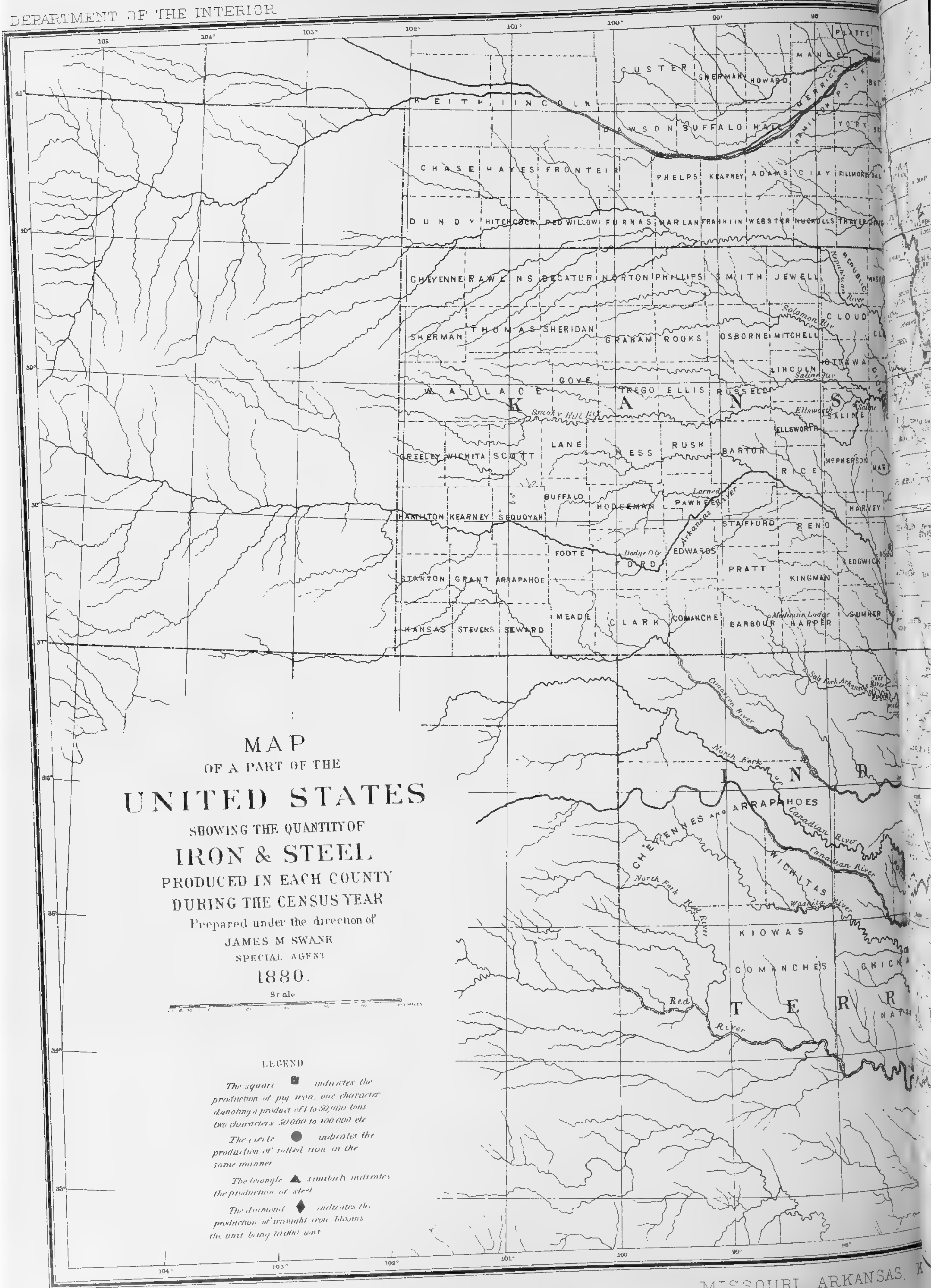

MAP
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1880.

Scale

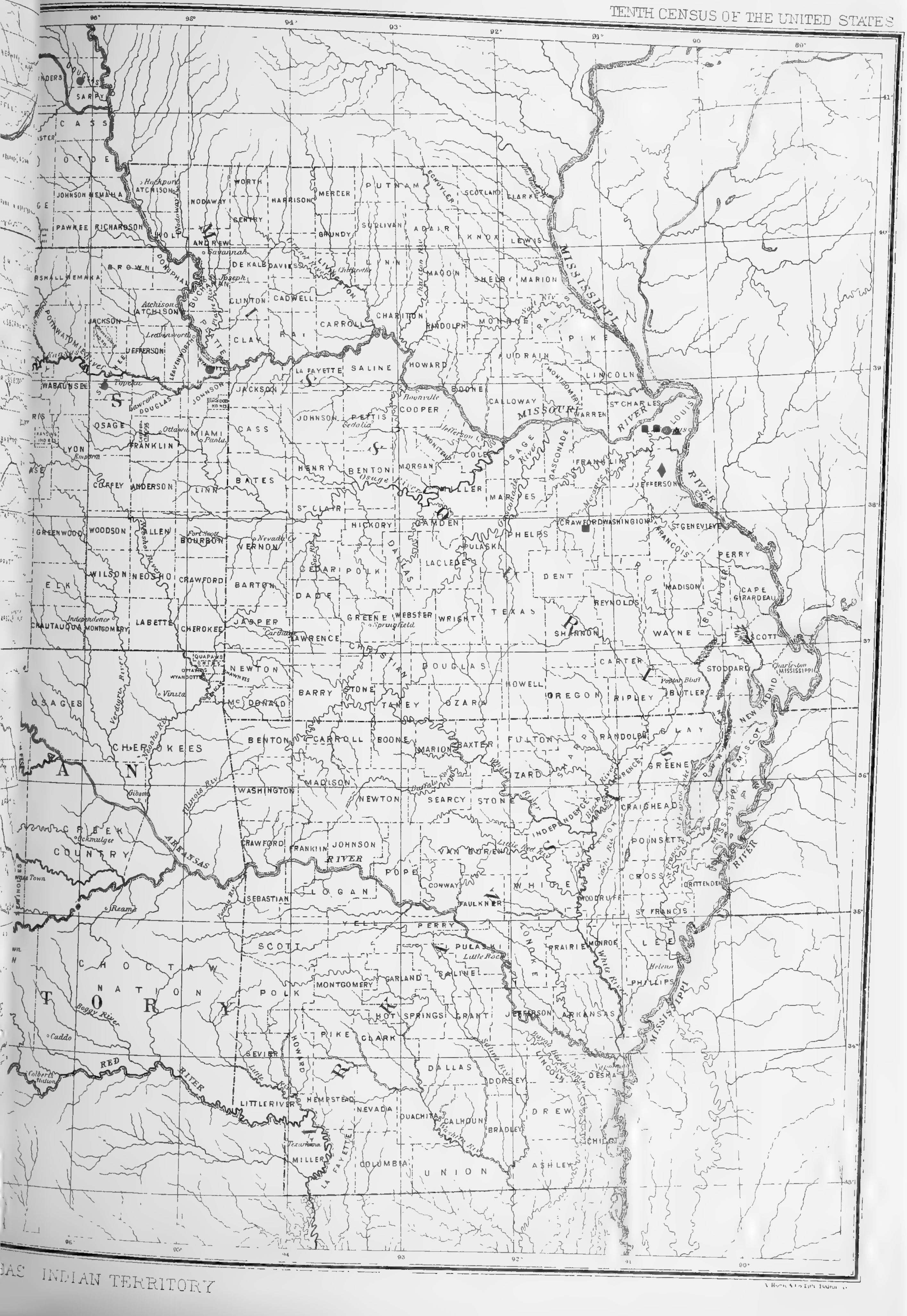
LEGEND

The square ■ *indicates the production of pig iron, one character denoting a product of 1 to 50,000 tons two characters 50 000 to 100 000 etc*

The circle ● *indicates the production of rolled iron in the same manner*

The triangle ▲ *similarly indicates the production of steel*

The diamond ◆ *indicates the production of wrought iron blooms the unit being 10 000 tons*



KANSAS INDIAN TERRITORY

A. Hoen & Co. Lith. Baltimore

PART II.–HISTORY.

THE EARLIEST USE OF IRON.

THE use of iron can be traced to the earliest ages of antiquity. It was first used in Asia, the birthplace of the human race, and soon after the time when "men began to multiply on the face of the earth." Tubal Cain, who was born in the seventh generation from Adam, is described as "an instructor of every artificer in brass and iron." The Egyptians, whose existence as a nation probably dates from the second generation after Noah, and whose civilization is the most ancient of which we have any exact knowledge, were at an early period familiar with the use of iron, and it seems probable that they were engaged in its manufacture. Iron tools are mentioned by Herodotus as having been used in the construction of the pyramids. In the sepulchres at Thebes and Memphis, cities of such great antiquity that their origin is lost, butchers are represented as using tools which archæologists decide to have been made of iron and steel. Iron sickles are also pictured in the tombs at Memphis, and at Thebes various articles of iron have been found which are preserved by the New York Historical Society and are probably three thousand years old. Kenrick, in his *Ancient Egypt under the Pharaohs*, is authority for the statement that Thothmes the First, who reigned about seventeen centuries before Christ, is said, in a long inscription at Karnak, to have received from the chiefs, tributary kings, or allied sovereigns of Lower Egypt, presents of silver and gold, "bars of wrought metal, and vessels of copper, and of bronze, and of iron." From the region of Memphis he received wine, iron, lead, wrought metal, animals, etc. An expedition which the same king sent against Chadasha returned, bringing among the spoil "iron of the mountains, 40 cubes." Belzoni found an iron sickle under the feet of one of the sphinxes at Karnak, which is supposed to have been placed there at least six hundred years before Christ. A piece of iron was taken from an inner joint of the great pyramid at Gizeh in 1837. Both of these relics are in the British Museum. The reference to iron in Deuteronomy, iv. 20, apparently indicates that in the time of Moses the Egyptians were engaged in its manufacture, and that the Israelites, if they did not make iron for their taskmasters, were at least familiar with the art of manufacturing it. "But the Lord hath taken you, and brought you forth out of the iron furnace, even out of Egypt." This expression is repeated in I. Kings, viii. 51. A small piece of very pure iron was found under the Egyptian obelisk which has recently been removed to New York.

The use of iron and the art of manufacturing it were introduced into the southern and western portions of Arabia at a very early day, and this may have been done by the Egyptians; it is at least established that some of their own works were located east of the Red sea. In 1873 the ruins of extensive iron works of great antiquity and of undoubted Egyptian origin were discovered near the Wells of Moses, in the Sinaitic peninsula.

The country which lay to the south of Egypt is supposed to have produced iron in large quantities. Iron was also known to the Chaldeans, the Babylonians, and the Assyrians, who were cotemporaries of the early Egyptians. Some writers suppose that the Egyptians derived their supply of iron principally from these Asiatic neighbors and from the Arabians. Babylon was built about seventeen centuries before Christ, and Nineveh was of about equal antiquity. Iron ornaments have been found in Chaldean ruins, and Chaldean inscriptions show that iron was known to the most ancient inhabitants of Mesopotamia. In the ruins of Nineveh the antiquarian Layard found many articles of iron and inscriptions referring to its use. Among the articles discovered by him were iron scales of armor, from two to three inches in length. "Two or three baskets were filled with these relics." He also found "a perfect helmet of iron, inlaid with copper bands." In the British Museum there are preserved several tools of iron which were found at Nineveh by Layard, including a saw and a pick. The art of casting bronze over iron, which has only recently been introduced into modern metallurgy, was known to the Assyrians. At Babylon iron was used in the fortifications of the city just prior to its capture by Cyrus, in the sixth century before Christ. In a celebrated inscription Nebuchadnezzar declares: "With pillars and beams plated with copper and strengthened with iron I built up its gates." The huge stones of the bridge built by his daughter, Nitocris, were held together by bands of iron fixed in place by molten lead.

The Book of Job, which relates to a patriarchal period between Abraham and Moses, contains frequent references to iron, even to "bars of iron," "barbed irons," "the iron weapon," and "the bow of steel." In the 28th chapter and 2d verse it is declared that "iron is taken out of the earth." In the 19th chapter and 24th verse the "iron pen," which could be used to engrave upon a rock, is mentioned. Job is supposed to have lived in the northern part of Arabia, in the Land of Uz, which was separated from Ur of the Chaldees, where Abraham was born, by the Euphrates. Iron ore of remarkable richness is still found between the Euphrates and the Tigris.

Moses led the children of Israel out of Egypt fifteen or sixteen hundred years before the Christian era. In the story of their wanderings iron is frequently mentioned. In Leviticus, vii. 9, the frying-pan is mentioned. When the Israelites under Moses spoiled the Midianites they took from them iron and other metals; when they smote Og, the king of Bashan, they found with him an iron bedstead. Canaan, the Land of Promise, was described by Moses in Deuteronomy, viii. 9, as "a land whose stones are iron." Iron is still made in the Lebanon mountains. In Deuteronomy, xxvii. 5, 6, and in Joshua, viii. 31, the use of iron tools in building an altar of "whole stones" to the Lord is prohibited, which shows that, not only did the Israelites in the days of Moses have a knowledge of iron tools that would cut stone, but that the Egyptians must have possessed the same knowledge. After the Israelites came into possession of Canaan iron is frequently mentioned in their history, some of the earliest references being to chariots of iron, which the Canaanites used in their wars with them, and which were probably armed with iron scythes. Chariots of the same kind were doubtless used by the Egyptians. Frequent mention is made of agricultural implements and tools of iron, and of iron weapons of war. In the description of the armor of Goliath it is said that "his spear's head weighed six hundred shekels of iron." Axes and saws and harrows of iron are mentioned in the reign of David, and axes and hammers and tools of iron in the reign of Solomon. Isaiah also speaks of harrows of iron. Daniel says that "iron breaketh in pieces and subdueth all things." When David, about a thousand years before Christ, made preparations for the building of the temple he "prepared iron in abundance for the nails for the doors of the gates and for the joinings;" and in his instructions to Solomon concerning it he said that he had prepared "brass and iron without weight," and that of gold, silver, brass, and iron "there is no number."

It would appear that the Israelites in the early part of their history were not skilled in the manufacture or manipulation of iron, but were greatly dependent upon their neighbors for iron itself and for the skill to fashion it. In the reign of Saul, because of the oppression of the Philistines, "there was no smith found throughout all the land of Israel; but all the Israelites went down to the Philistines to sharpen every man his share, and his coulter, and his axe, and his mattock." When Solomon came to build the temple he sent to Hiram, king of Tyre, for "a man cunning to work in gold, and in silver, and in brass, and in iron." The Phœnicians were celebrated as workers in all the metals.

In Jeremiah, xv. 12, the question is asked by the prophet: "Shall iron break the northern iron and the steel?" The northern iron and steel here referred to were probably products of Chalybia, a small district lying on the southeastern shore of the Euxine, the inhabitants of which, called Chalibees or Chalybians, were famous in the days of Asiatic pre-eminence for the fine quality of their iron and steel. Herodotus, in the fifth century before Christ, speaks of "the Chalybians, a people of ironworkers." They are said to have invented the art of converting iron into steel, but it is probable that, as they used magnetic sand, they made steel mainly. Latin and Greek names for steel were derived from the name of this people. From the same source we obtain the words "chalybean" and "chalybeate."

But other eastern nations doubtless made steel at as early a day as the Chalybians. In Ezekiel, xxvii. 12, the merchants of Tarshish are said to supply Tyre with iron and other metals, and in the 19th verse of the same chapter the merchants of Dan and Javan are said to supply its market with "bright iron." Tarshish is supposed to have been a city in the south of Spain, and Dan and Javan were probably cities in the south of Arabia. The name Tarshish may, however, have referred generally to the countries lying along the western coast of the Mediterranean and beyond the Pillars of Hercules. Dan and Javan may have supplied iron made in the southern part of Arabia, or they may have traded in the "bright iron," or steel, of India. The period embraced in the references quoted from the prophet was about six hundred years before Christ. Both Tyre and Sidon traded in all the products of the East and the West for centuries before and after Ezekiel, and iron was one of the products which they supplied to their neighbors, the Israelites.

The Persians and their northern neighbors, the Medes, made iron long before the Christian era, and so did the Parthians and other Scythian tribes. The Parthian arrow was first tipped with bronze, but afterwards with steel. The Parthian kings are said to have engaged with pride in the forging and sharpening of arrow-heads. Iron is still made in Persia by primitive methods.

India appears to have been acquainted with the manufacture of iron and steel from a very early period. When Alexander defeated Porus, one of the Punjaub kings, in the fourth century before the Christian era, Porus gave him thirty pounds of Indian steel, or wootz. This steel, which is still made in India and Persia, was a true steel, and of a quality unsurpassed even in our day. It was and still is manufactured by a process of great simplicity, similar to that by which crucible steel is now manufactured. Long prior to the Christian era, as well as for many centuries afterwards, Damascus, the capital of Syria, manufactured its famous swords in part from Indian wootz. The people of India further appear to have become familiar, at an early period in their history, with processes for the manufacture of iron on a large scale which have since been lost. It is circumstantially stated that a cylindrical wrought-iron pillar is now standing at the principal gate of the ancient mosque of the Kutub, near Delhi, in India, which is about 60 feet long, 16 inches in diameter near the base, contains about 80 cubic feet of metal, and weighs probably over 17 tons. The immense proportions of this pillar are not more striking than its ornate finish. An inscription in Sanscrit is variously interpreted to assign its erection to the ninth or tenth century before the Christian era or to the early part of the fourth century after it. In the ruins of Indian temples there have been found wrought-iron beams similar in size and appearance to those used in the construction of buildings at the present time. Metallurgists are unable to understand how these large masses of iron could have been forged by a people who appear not to have possessed any of the mechanical appliances for their manufacture which are now necessary to the production of similar articles.

The period at which China first made iron is uncertain, but great antiquity is claimed for its manufacture in that mysterious country. In a Chinese record which is supposed to have been written two thousand years before Christ iron is mentioned, and in other ancient Chinese writings iron and steel are both mentioned. Pliny the Elder, writing in the first century of the Christian era, thus speaks of the iron of China, the inhabitants of which were known in his day as the Seres: "Howbeit, as many kinds of iron as there be, none shall match in goodness the steel that cometh from the Seres, for this commodity also, as hard ware as it is, they send and sell with their soft silks and fine furs. In a second degree of goodness may be placed the Parthian iron."

It may be assumed as susceptible of proof that the knowledge of the use of iron, if not of its manufacture, was common to all the people of Asia and of Northern Africa long previous to the Christian era. The Phœnicians would carry this knowledge to their own great colony, Carthage, which was founded in the ninth century before Christ, and to all the colonies and nations inhabiting the shores of the Mediterranean. Phœnician merchants obtained iron from such distant countries as Morocco and Spain, and possibly even from India and China, as well as from nearer sources. But in time the merchants of Tyre and the "ships of Tarshish" deserted the places that long had known them, empire after empire fell in ruins, and with the fading away of Asiatic and African civilization and magnificence the manufacture and the use of iron in Asia and Africa ceased to advance. Egypt has probably not made iron for nearly three thousand years, and probably no more iron is made in all Asia to-day than was made in its borders twenty-five centuries ago, when Babylon was "the glory of kingdoms, the beauty of the Chaldees' excellency."

THE EARLY USE OF IRON IN EUROPE.

The authentic history of the use of iron in Europe does not begin until about the period of the first Olympiad, corresponding to the year 776 before the Christian era, although both Grecian poetry and the traditions of the Grecian heroic age have transmitted to us many references to iron long prior to that period. About the time of Moses the Phœnicians are said to have introduced into Greece the art of working in iron and other metals. Minos, king of Crete, was indebted to them for the tools which enabled him to build his powerful fleet. In the fifteenth century before Christ the burning of the forests on Mount Ida, in Crete, is said to have accidentally communicated to the inhabitants the art of obtaining iron from native ores. This discovery enabled the Idæi Dactyli, who were priests of Cybele, to introduce the manufacture of iron and steel into Phrygia, a Greek colony in Asia Minor. So read some of the stories which have come down to us from the heroic age of Greece, and which, like the well-known story of Vulcan and his forges on the island of Lemnos, may be wholly fabulous; but there is nothing improbable in the conclusion which may be derived from them, that they point to a very early use of iron by the Greeks. From Phœnicia certainly, and probably also from Egypt, they would be likely to derive a knowledge of its use in the mechanic arts at least a thousand years before Christ. It is worthy of notice that the mythologies of both Greece and Egypt attributed the invention of the art of manufacturing iron to the gods—a fact which of itself may be regarded as establishing the great antiquity of the art in both countries.

The poems of Homer, who is supposed to have lived about 850 years before the Christian era, and therefore before the era of authentic Grecian history, make frequent mention of iron, and the art of hardening and tempering steel is fully described in the reference to the plunging of Ulysses' firebrand into the eye of Polyphemus—an act likened to that of the smith who "plunges the loud-hissing axe into cold water to temper it, for hence is the strength of iron." It would appear, however, from the offer by Achilles of "a mass of iron, shapeless from the forge," as a prize at the funeral games of Patroclus, that iron was not abundant in Greece at the time of the Trojan war, nor in the days of Homer himself. Troy fell in the year 1184 before the Christian era. The address of Achilles to the Greeks, when offering the prize, indicates how valuable iron was to them in the heroic age.

> Stand forth, whoever will contend for this;
> And if broad fields and rich be his, the mass
> Will last him many years. The man who tends
> His flocks, or guides his plow, need not be sent
> To town for iron: he will have it here.

Homer mentions steel axes as valuable prizes to be contended for in the Grecian games, and he also mentions steel weapons of war, although rarely. He speaks again of some iron as being bright and white, the inference being that steel is referred to. The Right Honorable William E. Gladstone, in his *Homeric Synchronisms*, says: "Iron is in Homer extremely rare and precious. He mentions nothing massive that is made of this material." Mr. Gladstone cites a number of references in Homer to iron and steel—the arrow-head of Pandaros, the dagger of Achilles, "the cutting tool of the chariot-maker for such fine work as shaping the felloe of the wheel," a knife for slaying oxen, and axes and adzes of steel. Hesiod, who is supposed to have been cotemporary with Homer, mentions iron and its qualities in his writings.

We come next to that period of Grecian history which introduces us to historical personages and historical events. Lycurgus, who lived about the time of the first Olympiad, required the Spartans to use iron as money; he "allowed nothing but bars of iron to pass in exchange for every commodity." These bars, for which iron rings or quoits were afterwards substituted, may have been made from the iron ores which were found in abundance in Laconia, or they may have been obtained abroad; but the use of iron as a measure of value in the days of Lycurgus indicates that this metal could not then have been a rare commodity. If it had been a precious metal Lycurgus would not have enforced its use as money. The iron ores of Elba were worked by the Greeks as early as the year 700 before Christ. They called the island Æthalia, "from the blazes of the iron works." The working of the ores of this island is mentioned by Herodotus, who lived in the fifth century before Christ; by Diodorus, a Sicilian historian of the first century before Christ; and by Strabo, a Greek traveler and geographer, who lived at the beginning of the Christian era. The Phœnicians made iron on the island of Eubœa at a very early day, and the Greeks afterwards actively prosecuted the same pursuit. Strabo speaks of the mines of Eubœa as being partially exhausted in his day. In Bœotia, on the mainland of Greece, iron was also made in very early times, and probably in other parts of the Grecian mainland and on the Grecian islands where iron ores are now found. On the island of Seriphos the ores are of the richest quality. Herodotus speaks of iron heads to lances and arrows in his day. He also mentions a silver bowl inlaid with iron, the work of Glaucus the Chian, which Alyattes dedicated at Delphi about the year 560 before Christ. Chalybian steel was imported into Greece in the time of Herodotus; and in the time of Aristotle, who lived a century later, the Greeks were themselves familiar with the manufacture of steel. Sophocles, who died in the year 406 before Christ, speaks of the tempering of iron in water. The manufacture of swords of steel about this time received some attention in Greece, as it did elsewhere. The father of Demosthenes, who was a manufacturer of arms, probably made steel swords. Iron and steel weapons of war began to displace those of bronze in most Mediterranean countries about the time of the battle of Marathon, which was fought in the year 490 before Christ. When Xerxes invaded Greece, ten years after the battle of Marathon, the Assyrians in his army carried wooden clubs "knotted with iron." The use of iron scythes as well as iron sickles was common among the Greeks about this time. Alexander, in the fourth century before Christ, is said by Pliny to have strengthened a bridge over the Euphrates, at Zeugma, with a chain made of links of iron. Daimachus, a writer who was cotemporary with Alexander, enumerates four different kinds of steel and their uses—the Chalybdic, Synopic, Lydian, and Lacedæmonian. Each kind of steel was adapted to the manufacture of a particular tool. From the Chalybdic and Synopic were made ordinary tools; from the Lacedæmonian were made files, augers, chisels, and stone-cutting implements; and from the Lydian were made swords, razors, and surgical instruments. The accounts left by this and other writers indicate great proficiency by the Greeks in the use of steel, and the possession of much skill in its manufacture.

A description of one of the "naval monsters" constructed by Archimedes for King Hiero, of Syracuse, about the middle of the third century before the Christian era, shows the great extent to which the use of iron had then been carried by the Greeks. "To each of the three masts was attached a couple of engines which darted iron bars and masses of lead against the enemy. The sides of the ship bristled with iron spikes, designed to protect it against boarding; and on all sides were likewise grapples which could be flung by machines into the galleys of the foe. The ship was supplied with twelve anchors, of which four were of wood and eight of iron."

According to accepted chronology, Rome was founded in the year 753 before the Christian era. It reached the culmination of its power about the end of the first century of that era. From its foundation to the beginning of its decline embraced a period of about nine hundred years. During the first part of this period Rome was favored with the experience of older nations in the use and manufacture of iron, and during the last part of it she greatly contributed by her energy and progressive spirit to extend its use and to increase its production. The Greeks were the great teachers of the Romans in all the arts, including metallurgy; but the Etruscans, who were the near neighbors of the Romans, and whom they in time supplanted, also contributed greatly to their knowledge of the arts of ancient civilization. The Etruscans, however, owed their civilization in large part to the Tyrrhenian Greeks, with whom they coalesced centuries before Rome was founded. Etruria was largely devoted to commerce, and among the countries with which it traded were Phœnicia and Carthage, as well as Greece and its colonies. From all these countries Etruscan civilization was invigorated and diversified, and Rome in its early days enjoyed the benefit of this invigoration and diversification. That it early acquired from the Etruscans a knowledge of the use and manufacture of iron can easily be imagined, and subsequent direct contact with Grecian colonies and with Greece itself would extend this knowledge. The island of Elba lay off the Etruscan coast, and, as has been already stated, its iron ores were extensively used by the Greeks about the time when Rome was founded. Its mines were also worked by the Etruscans, and its ores were smelted both on the island and on the mainland. They were also taken to other countries to be converted into iron. After a lapse of twenty-five centuries the iron ores of this celebrated island are still exported, many cargoes finding their way to the United States. The Romans would also obtain iron from the islands of Corsica and Sardinia, but chiefly from the former. This island was occupied by the Ligurians and the Etruscans about the time of the founding of Rome, and by the Etruscans for centuries afterwards. The Carthaginians succeeded the Etruscans, and the Romans the Carthaginians. Iron was made in Corsica from the earliest times, and is still made in small quantities. The island has given a name to the Corsican forge, which is yet in use. A few years ago ten of these forges were in operation in Corsica, and they were probably almost identical in character with those which were used on the island when Rome was founded.

Iron is frequently mentioned in the early history of Rome. A war between the Romans and the Etruscans, the latter being led by their king, Porsenna, occurred in the year 507 before Christ, and among the conditions of peace exacted by the victorious Etruscan king was one which prohibited the Romans from using iron except for agricultural purposes. In the year 390 before Christ, when Rome was about to be ransomed from the Gauls, under Brennus, by a large payment of gold, Camillus, the Roman dictator, demurred, and declared that Rome should be ransomed with iron and not with gold, and that his sword alone should purchase peace. Another notable mention of iron in the early history of Rome occurs in the account of the defeat of the Carthaginian fleet in the first Punic war. The consul Duilius took command of the hastily-constructed Roman fleet, and upon encountering the Carthaginian fleet he connected his ships with those of the enemy by means of grappling-irons, through which, and the superior prowess of the Romans, he gained for Rome, in the year 260 before Christ, her first naval triumph. The Etruscan town of Pupluna furnished Scipio with iron in the second Punic war, and it is stated that many thousand tons of scoria are now lying on the beach close to its site.

Some of the swords and javelins of the Romans were made of iron or steel in the fifth century before the Christian era, but their agricultural implements, as has been shown in the reference to Etruria, were made of iron at an earlier period. The Roman battering-ram, which was borrowed from the Greeks, had a head of iron, and iron rings were placed around its beam. The Romans used this engine of war at the siege of Syracuse, in the year 212 before Christ. Prior to this time iron and steel tools were in common use among the carpenters, masons, shipwrights, and other tradesmen of Rome. At the beginning of the Christian era iron was in general use throughout the Roman Empire, the supply being derived from many countries which were subject to its sway. In the Acts of the Apostles, xii. 10, is a statement which indicates that iron was used at this period for architectural purposes and in public works. "When they were past the first and second ward they came unto the iron gate that leadeth unto the city." Iron was, however, used especially for tools, agricultural implements, and weapons of offense and defense. Pliny says that "iron ores are found almost everywhere," and that "the processes for refining the metal are nearly everywhere the same." It does not appear, however, that the Romans made iron at this time either at Rome or in its immediate vicinity. Pliny remarks that "in abundance of metals of every kind Italy yields to no land whatever, but all search for them has been prohibited by an ancient decree of the Senate." This prohibition probably applied only to the territory surrounding Rome. Vestiges of iron used by the Romans in the first century after Christ have been found in the ruins of the Coliseum, which was built by the emperor Vespasian. This iron was used as clamps to bind together the stones of that remarkable structure. Iron has also been found in the ruins of Pompeii, which was destroyed about the time the Coliseum was built.

In the northern part of Italy, just south of the Alps, corresponding to Piedmont and Lombardy of the present day, iron was made by the Romans in the first and second centuries before the Christian era. Pliny speaks of the excellence of the water at Comum, now Como, for tempering iron, although iron ores were not found there. Among the provinces which contributed largely to the Roman supply of iron at this time was Noricum, corresponding to Styria and Carinthia in Austria. Both Pliny and Ovid, who lived at the beginning of the Christian era, speak of Norican iron as being of superior quality, and it is certain that *ferrum noricum* was celebrated throughout Italy before their day. The best of swords were made from it in the reign of Augustus: Horace speaks of them. The spathic ores of Styria and Carinthia are still held in high favor; and the supply of ore, especially in the famous iron mountains of Erzberg and Huttenberg, shows no signs of exhaustion at the end of twenty centuries of almost constant use. Iron is still made in these provinces of Austria in small forges which are almost as primitive in character as those used by their ancient Celtic inhabitants. Celtic and Roman implements and medals, including a coin of the emperor Nerva, who lived in the first century of the Christian era, have been found in mounds of slag in the vicinity of Carinthian mines.

Cotemporaneously with the working of the Norican iron mines by the Celts, the Quadi, who inhabited the province of Moravia, lying north of Noricum, also made iron. The geographer Ptolemy, who lived in the second century of the Christian era, makes mention of the Quadi as ironworkers. Great antiquity is also claimed for the iron industry of that vast country which was known to the Romans as Sarmatia, now known as Russia in Europe. The nomadic Scythians would doubtless carry the art of ironmaking to the Ural mountains, where iron ore was and still is abundant. One of the Greek poets calls Scythia "the mother of iron"—Scythia comprising the countries lying north, east, and south of the Caspian sea.

The Phœnicians are known to have founded colonies in France and in Spain prior to the sixth century before Christ. They had settlements in Southern Gaul, on the Garonne and Rhone. The ancient city of Massilia, now Marseilles, is supposed to occupy the site of a Phœnician trading-post which fell into the possession of the Phocæan Greeks about the period we have mentioned, who gave to it great commercial and manufacturing importance. The Greeks also planted other colonies in Southern France. The city of Tartessus, or Tarshish, is supposed to have been one of the Phœnician settlements in the south of Spain; the city of Gades, or Cadiz, was another. Tartessus stood between the two arms of the Guadalquivir; but in the time of Strabo, who died about the year 25 of the Christian era, it had ceased to exist; Gades was its near neighbor, and still exists. It is probable that the Phœnicians introduced the manufacture of iron among the native inhabitants of France and Spain; the Iberians and Celtiberians of the latter country were certainly active in mining and working in metals several hundred years before the Christian era, and enjoyed an extensive trade in metals with Tyre and Carthage.

Under Grecian influence, which succeeded that of the Phœnicians in Spain, the Celtiberians, who inhabited the central and northeastern parts of the country, continued to make iron, and to this was joined the manufacture of steel. The famous forges of Aragon and Catalonia were active during the Grecian occupation of Spain. The Carthaginians for a brief time succeeded the Greeks in Spain, and about two centuries before the Christian era the Romans succeeded the Carthaginians. The Romans greatly extended the arts of their advanced civilization among the native inhabitants. They gave special encouragement to the manufacture of iron and steel, although in justice to the Celtiberians it must be said that their metallurgical skill was at least equal to that of the Romans. Polybius, a Greek historian who flourished in the second century before Christ, says that the helmet and armor of the Roman soldier were of bronze, but that the sword was a cut-and-thrust blade of Spanish steel. At the battle of Cannæ, in the year 216 before Christ, the Romans had learned from the Carthaginians at very great cost the value of the Spanish sword. Livy has recorded the fines which were imposed by Cato the Censor on the Celtiberian iron works after the Roman war with Spain in the year 194 before Christ. About the time these fines were imposed, the town of Bilbilis, near the present Moorish-built town of Calatayud, in Aragon, and the little river Salo were celebrated as the center of the iron district of Celtiberia. The water of the Salo was supposed to possess special qualities for the tempering of steel. The same excellence was attributed to other streams in Spain and in some other countries. Diodorus speaks of the excellent two-edged swords, "exactly tempered with steel," and of other arms which the Celtiberians in Aragon manufactured from rods of iron which had been rusted in the ground "to eat out all the weaker particles of the metal, and leave only the strongest and purest." He says that the swords which were manufactured from these rods "are so keen that there is no helmet or shield which cannot be cut through by them." Plutarch, who died about the year 140 of the Christian era, gives the same account of the Celtiberian method of purifying iron. Pliny speaks of the excellent iron of Bilbilis and Turiasso, the latter a town in Tarragona, and of an extensive mountain of iron upon the coast of Biscay, probably Somorrostro. Iron ore from the coast of Biscay is now exported in large quantities to Great Britain, the United States, and other countries. Toledo has been famous since the Roman occupation of Spain for its manufacture of swords, but this industry existed at Toledo before the appearance of the Romans. The town was captured by them in the year 192 before Christ. The Roman army from that time forward was provided with steel swords from Toledo and other places in Spain. The manufacture of Toledo blades probably attained its greatest development in the fifteenth and sixteenth centuries. The business still continues. A certain degree of mystery has always surrounded the manufacture of these swords, and the same may be said of the manufacture of the equally-celebrated Damascus blades.

The iron industry of Spain was the first in the world for many hundred years after the Romans obtained a foothold in the country, surviving the downfall of the Roman power in the peninsula, and flourishing under the subsequent rule of the Visigoths. This distinction was strengthened when the Moors became masters of the greater part of Spain, in the beginning of the eighth century of the Christian era. They stimulated the further development of the iron manufacture in the districts subject to their sway. At the same time the native inhabitants who had successfully resisted the Moorish arms continued to push their small Catalan forges still farther into the Pyrenees and along the coast of Biscay, lighting up the forests in every direction. So prominent did the iron industry of Spain become that its ironworkers were sought for by other countries, and on the French side of the Pyrenees, and in the mountains of Germany, and along the Rhine, they set up many of their small forges. The Catalan forge, which received its name from Catalonia, has been introduced into every civilized country of modern times that produces iron, and it still exists in almost its original simplicity in the mountains of both Spain and France.

France did not at an early period in its history make the same progress in the manufacture of iron that has been recorded of Spain, partly because it did not receive the same outside attention which made Spain a center successively of Grecian, Roman, Gothic, and Moorish civilization, but partly also because it did not possess iron ores of the same rich quality as those of Spain. It may be said, however, that the use of iron weapons was well known to the Gauls who confronted the Romans hundreds of years before the Christian era, and to their successors who opposed the armies of Julius Cæsar, who refers frequently to their use of iron. In speaking of the Veneti, who inhabited the southern part of Brittany, he makes the remarkable statement that the anchors for their ships were fastened to them with iron chains instead of cables. He also says that the benches of the ships were fastened with iron spikes of the thickness of a man's thumb. This circumstantial statement denotes great familiarity with the use of iron by the Veneti. In describing the siege of Avaricum, the modern Bourges, a fortified town of the Bituriges, Cæsar says that "there are in their territories extensive iron mines, and consequently every description of mining operations is known and practiced by them."

For hundreds of years after Cæsar's time only faint glimpses are furnished us of an iron industry in France. During this period it was doubtless wholly confined to Catalan forges. *Stückofens*, or high bloomaries, were in use in Alsatia and Burgundy in the tenth century. When William the Norman invaded England in 1066 he was accompanied by many smiths who were armorers and horse-shoers, and therefore skilled workers in iron. The modern blast furnace is supposed to have originated in the Rhine provinces about the beginning of the fourteenth century, but whether in France or Germany or Belgium is not clear. A hundred years later, in 1409, there was a blast furnace in the valley of Massevaux, in France, and it is claimed by Landrin that France had many blast furnaces about 1450.

Iron was made by the Belgæ as early as the time of Julius Cæsar, and possibly at an earlier date. Heaps of iron cinder, which archæologists decide to be as old at least as the Roman occupation of Gallia Belgica, have recently been found on the tops of ferruginous hillocks in the provinces of Brabant and Antwerp, and in these cinder heaps flint arrow-heads and fragments of coarse pottery, characteristic of the earliest dawn of civilization, have been discovered. During the Roman occupation of the country iron was produced in many places in Belgium, a fact which is attested by heaps of cinder or slag which yet exist and are found in association with Roman relics. It has been supposed that the iron which was made in Belgium at this period was produced in low bloomaries without an artificial blast. We do not again hear of the Belgian iron industry until the tenth century, when high bloomaries, or wolf furnaces, otherwise *stückofens*, were in operation in the valley of the Meuse. We are informed that "iron was made to perfection in the Netherlands" in the twelfth century. In the fourteenth century high furnaces, or *flussofens*, were in existence in Belgium. In 1340 a furnace of this description was built at Marche les Dames, near Namur, to which, in 1345, special privileges were granted by William, count of Namur. These furnaces were true blast furnaces, producing cast iron. In 1560 there were in operation in Belgium, according to M. Déby, 35 blast furnaces and 85 forges.

Near Saarbrucken, in Rhenish Prussia, where the first battle between the French and the Germans was fought in the war of 1870, iron is said to have been made in the days of Roman ascendency, but the Germans do not appear during this period to have been as familiar as their neighbors with its manufacture. Polybius, however, states that the Teutons and the Cimbri, from northwestern Germany, who invaded Italy and Gaul near the close of the second century before Christ, "were already familiar with iron, and possessed weapons of that metal." Tacitus informs us that "iron does not abound in Germany, if we may judge from the weapons in general use. Swords and large lances are seldom seen. The soldier grasps his javelin, or, as it is called in their language, his *fram*, an instrument tipped with a short and narrow piece of iron, sharply pointed, and so commodious that, as occasion requires, he can manage it in close engagement or in distant combat." He further says that the use of iron was unknown to the Æstyans, who inhabited the northern part of Germany lying upon the Baltic; "their general weapon was the club." The Gothinians are described by Tacitus as a people who "submit to the drudgery of digging iron in mines" for the Quadi, who were their neighbors. Ernest, the German editor, says the Gothinians had iron of their own, and did not make use of it to assert their liberty. Tacitus wrote his *Treatise on Germany* about the close of the first century of the Christian era. From this time forward the condition of the German iron industry is enveloped in obscurity until the eighth century, when we hear of iron works, probably wolf furnaces or *stückofens*, in the district of the river Lahn, in Nassau, where iron of great celebrity was made by a guild of "forest smiths" in 780. We are informed by Maw and Dredge that "they had their special privileges, kept an iron mart at Wetzlar, and sent their products regularly to the great annual fairs at Frankfort-on-the-Main. This iron industry was especially flourishing during the thirteenth, fourteenth, and fifteenth centuries." During the eighth century we hear also of the iron industry of the principality of Siegen. There was a steel forge at the town of Siegen in 1288, which had been in existence before the eleventh century. The iron industry of Siegen was very active during the Middle Ages. About the middle of the thirteenth century *stückofens* were in use in Siegen. Percy says that in the beginning of the fifteenth century pig iron was made in Siegen in *blauofens*. Iron was made in Saxony as early as the eighth century. Alexander informs us that the *flussofen* was introduced into Saxony in 1550, and that the wooden bellows was invented about this time by Hans Lobsinger, an organist of Nuremberg. Iron was made in the Hartz mountains in the eighth century. In the Thuringian mountains wolf furnaces and bloomaries were in existence in the tenth century, and blast furnaces in the fourteenth century. Alexander states that in the latter half of the sixteenth century there was a furnace in these mountains 24 feet high and 6 feet wide at the boshes, built by Hans-sien, a Voigtlander. In 1377 cast-iron guns were made near Erfurt, in Thuringia. In the fifteenth century pots, plates, balls, etc., of iron were cast at the celebrated Ilsenberg foundry in Germany. Stoves are said to have been cast for the first time in 1490, in Alsace.

Recurring to the iron industry of Austria, Alexander says that the mines of Styria were "opened again" in 712. It appears probable that wolf furnaces were in use in Styria, Carinthia, and Carniola as early as the eighth century, which appears to be the epoch of their introduction in most European countries. The first blast furnace in the Alps provinces was, however, introduced very much later than in Belgium or on the Rhine—the first in Carinthia being built in 1567, at Urtl; the first in Styria in 1760, at Eisenerz; and the first in Carniola in the early part of the present century. Iron was made in Bohemia and Silesia at an early period. "The Bohemian chronicler, Hajek, of Liboschan, mentions that iron works existed in 677, near Schasslau." Heaps of cinder and remains of wolf furnaces and ore bloomaries are numerous in Bohemia. In 1365 bloomaries were in use in Upper Silesia.

The iron industry of Sweden had an existence as early at least as the thirteenth century. A Swedish historian says that the oldest iron mine in Sweden is probably Norberg, in Westmanland, on the southern borders of Dalecarlia. There are documents still in existence, dated July 29, 1303, signed by Thorkel Knutson, the royal marshal, in which Norberg is mentioned as an iron mine. To the miners of Norberg, also, the first recorded privileges exclusively for iron mines appear to have been granted by King Magnus Ericsson, on February 24, 1354. In 1488 the mines of Dannemora were opened, and in 1614 Gustavus Adolphus encouraged the immigration of German furnacemen into Sweden. The celebrated iron works at Finspong were established in 1641 by Louis de Gier, from Liège, as a cannon foundry. The Walloon refining process, which takes its name from the Walloons, who were inhabitants of Flanders, was introduced into Sweden from Flanders in the time of Charles the Twelfth, who reigned from 1697 to 1718. Percy states that the osmund furnace, which was a modification of the *stückofen*, was formerly very common in Sweden.

The iron industry of Russia dates historically from 1569, in which year, as recorded by Scrivenor, the English "obtained the privilege of seeking for and smelting iron ore, on condition that they should teach the Russians the art of working this metal." The first historical iron works in Russia, however, were established long afterwards, according to the same author, in the reign of the czar Alexy Michaelovitch, about sixty miles from Moscow, and were the only ones in Russia prior to the reign of Peter the Great, who is said to have worked in them before he set out, in 1698, on his first journey into foreign countries. It is not known when the celebrated Russia sheet iron was first made. There is reason to believe that the Russians were skilled ironworkers and metallurgists long before the historic period above mentioned. The bells of Moscow have been famous for hundreds of years.

The use of iron in a limited way was known to the Britons before the invasion of England by Julius Cæsar in the year 55 before Christ. The Phœnicians, who traded with the Britons probably as early as the year 600 before Christ, may be supposed to have introduced among this barbarous people the use of iron, but we have no proof that they instructed them in its manufacture. The Greeks and Carthaginians succeeded the Phœnicians in trading with the Britons, but there is no evidence that they taught them the art of making iron. They, as well as the Phœnicians, probably took iron into Britain in exchange for tin and other native products. Cæsar, in his *Commentaries*, says of the Britons who opposed his occupation of the island that "they use either brass or iron rings, determined at a certain weight, as their money. Tin is produced in the midland regions; in the maritime, iron; but the quantity of it is small: they employ brass, which is imported." This quotation from Cæsar would appear to establish the fact that iron was a precious metal in Britain at the time of his invasion; at least it would seem to show that it was not in common use, and could not have been used as an article of export. Cæsar nowhere mentions the use of iron weapons of war by the Britons. It is worthy of mention that the Belgæ had passed over to Britain before Cæsar's time and made settlements upon its coast, and whatever arts they possessed they would of course take with them. It cannot be *proved* that the Belgæ made iron in their own country before Cæsar's invasion of it; if it could be shown that they did, it might safely be assumed that they would introduce their methods of manufacture into Britain. Cæsar says that a small quantity of iron was made in the maritime regions of the island, and this the Belgæ may have made.

THE GROWTH OF THE BRITISH IRON INDUSTRY.

If the manufacture of iron by the Britons prior to the Roman invasion is enveloped in obscurity and even in doubt, there can be no doubt that iron was made in considerable quantities during the Roman *occupation* of Britain, which nominally extended from about the middle of the first century of the Christian era to the year 411. The Romans, it may here be remarked, were never themselves prominent as iron manufacturers in any country occupied by them; but, knowing the value of iron, they encouraged its manufacture wherever their arms were borne and the necessary conditions existed. The remains of iron works which were in existence and were operated during their stay in Britain are still pointed out. Dismissing all speculation concerning the origin of the first iron works in Britain, the remains of some of these works may well receive attention. They relate to a most interesting period in the history of the British iron trade.

Large heaps of iron scoria, or cinder, as old as the Roman era, have been discovered in the Wealds of Kent and Sussex, in the hills of Somerset, and in the Forest of Dean in Gloucester; also at Bierley, a few miles from Bradford in Yorkshire, and in the neighborhood of Leeds in the same county. There is also evidence that iron was made under the Romans in Northumberland, which is near Yorkshire; in Surrey, which adjoins Kent and Sussex; and in Monmouthshire, Hereford, and Worcester, which adjoin Gloucester. Except Bierley, Leeds, and Northumberland, all the places and districts named as having produced iron lie in the southeastern or southwestern parts of England, or within the ancient boundaries of South Wales—"the country of the Silures." Next to Cornwall, where tin was obtained by the Phœnicians and their successors, these southern portions of the country would be most likely to be visited and influenced by foreigners before the Roman invasion. Cæsar described the island of Britain as being shaped like a triangle, with one of its sides looking toward Gaul. "One angle of this side is in Kent, whither almost all ships from Gaul are directed." The cinder mentioned has been found almost invariably in connection with Roman coins, pottery, and altars. A coin of Antoninus Pius, who lived in the second century after Christ, was found in the Forest of Dean in 1762, together with a piece of fine pottery. Coins of other Roman emperors have been found in the cinder heaps of the Forest of Dean. In the cinder beds of Beauport, between Hastings and Battle, in Sussex, a bronze coin of Trajan has been found, and one of Adrian. These emperors lived in the first and second centuries after Christ. Coins found in the cinder heaps of Maresfield, not far from Uckfield, have dates ranging from Nero to Diocletian, or from the year 54 to the year 286 after Christ. In the cinder mounds of Sussex many specimens of pottery have been discovered, including black and red Samian ware. On one of these, the base of a *patera*, is the potter's mark, "Albvciani." One relic consisted of a bronze *ligula*, very thin and elastic, more than four inches long, in good preservation, and having an elegantly-shaped bowl. Altars erected to Jupiter Dolichenus, the protector of iron works, have been discovered in various places in association with the remains of such works.

Much of the cinder has been found on the tops of hills or mounds, a circumstance which has led to the belief that bellows were not employed in producing a blast, but that the wind was relied upon to produce a draft sufficient to smelt the ore in charcoal bloomaries, some of which were mere excavations in the tops of hills, with covered channels leading to the hillside in the direction of the prevailing winds. This method of making iron is that which appears to have prevailed in Belgica at the same time. It is a curious fact that bloomaries of similar form and adaptation were in use in Derbyshire, for smelting lead, as late as the seventeenth century. Scrivenor mentions that similar furnaces were used by the Peruvians to smelt the silver ore of the country before the arrival of the Spaniards. Other air-bloomaries in England are supposed by Fairbairn and other writers to have been simple conical structures, with small openings below for the admission of air, and erected on high grounds that the wind might assist combustion. Iron is made to-day in Burmah without the aid of an artificial blast. The cinder found in England and Wales was very rich in iron; in the Forest of Dean it was so rich and so abundant that for many years after its discovery, a few centuries ago, about twenty small charcoal furnaces were engaged in smelting it.

Recent researches by Mr. James Rock, of Hastings, in Sussex, throw much new light on the Roman and early British methods of manufacturing iron. Cinder beds, or cinder heaps, were formerly very numerous in East Sussex, and many of them still exist. The neighborhood of Hastings appears to have been a great center of the iron industry "from the earliest times." The cinder heaps yet remaining are large enough to be quarried, and contain many thousand tons of scoria, some of the heaps having large oak trees growing upon their summits.

It was stated in 1681, by Andrew Yarranton, in the second part of his *England's Improvements by Sea and Land*, that "within 100 yards of the walls of the city of Worcester there was dug up one of the hearths of the Roman foot-blasts, it being then firm and in order, and was 7 foot deep in the earth; and by the side of the work there was found a pot of Roman coin to the quantity of a peck." The foot-blast here referred to must have been a leather bellows, with which the Romans and their Mediterranean neighbors were certainly acquainted. There is nothing improbable in the supposition that the Romans while in Britain used both the wind-bloomaries and the foot-blasts.

Strabo mentions the exportation of iron from Britain in his day. This was before the Romans had subdued the Britons, but after the influence of Roman civilization had been felt in the island. The emperor Adrian landed in Britain in the year 120, and in the following year there was established at Bath, in Wiltshire, a great Roman military forge, or *fabrica*, for the manufacture of iron arms. This forge was close to the bloomaries in Somerset and the Forest of Dean, from which it was supplied with iron. That the manufacture of iron at this time and for some time subsequent was almost wholly confined to the southern parts of England seems probable from a passage in Herodian, quoted by Smiles in his *Industrial Biography*, who says of the British pursued by the emperor Severus, in the year 208, through the fens and marshes of the east coast, that "they wore iron hoops round their middles and their necks, esteeming them as ornaments and tokens of riches, in like manner as other barbarous people then esteemed ornaments of silver and gold."

The Anglo-Saxons, who succeeded the Romans in the early part of the fifth century as the rulers of Britain, used iron weapons of war, and it is a reasonable supposition that they manufactured all the iron that was required for this purpose; but their enterprise as iron manufacturers probably extended but little further, although Bede speaks of the importance of the iron industry in his day, the beginning of the eighth century. The Anglo-Saxon monks frequently engaged in the manufacture of iron. Saint Dunstan, who lived in the tenth century, is said to have had a forge in his bedroom, and to have been a skilled blacksmith and metallurgist. During the ascendency of the Danes, and afterwards down to the accession of William the Conqueror in 1066, iron was made in the Forest of Dean and elsewhere, but in limited quantities. In the eleventh century the Anglo-Saxon plow consisted of a wooden wedge covered with straps of iron; to this the Normans added the coulter. The shipbuilders of Edward the Confessor, the last king of the Anglo-Saxons prior to Harold, who lost the battle of Hastings, obtained bolts and bars of iron from the city of Gloucester. The antiquarian Camden, quoted by Scrivenor and others, states that "in and before the reign of William the Conqueror the chief trade of the city of Gloucester was the forging of iron; and it is mentioned in *Doomsday-Book* that there was scarcely any other tribute required from that city by the king than certain *dicars* of iron and iron bars for the use of the royal navy. The quantity required was thirty-six *dicars* of iron: a *dicar* containing ten bars and one hundred iron rods for nails or bolts." Giraldis Cambrensis, who lived in the twelfth century, speaks of "the noble Forest of Dean, by which Gloucester was amply supplied with iron and venison." Nicholls, in *The Forest of Dean*, says that in the time of Edward the First, in the early part of the thirteenth century, the Free Miners of the Forest "applied for and obtained their 'customes and franchises,' which were granted, as the record of them declares, 'time out of mind.'" In 1282, according to Nicholls, there were "upward of seventy-two" *forgeæ errantes*, or movable forges, in the Forest, each of which paid a license of 7*s*. a year to the crown. Scrivenor states that during the period from the Conquest to the death of John, in 1216, iron and steel were imported into Britain from Germany and other countries. The Normans, however, contributed much to develop English iron and other resources. Green, in his *History of the English People*, says that one immediate result of the Conquest was a great immigration into England from the Continent. "A peaceful invasion of the industrial and trading classes of Normandy followed quick on the conquest of the Norman soldiery." Still the English iron industry made but slow progress. It is mentioned by Scrivenor that there were but few iron mines in the north of England in the thirteenth and fourteenth centuries, and that, in the tenth year of the reign of Edward the Second, in 1317, iron was so scarce in that section and in Scotland that the Scots, "in a predatory expedition which they made in that year, met with no iron worth their notice until they came to Furness, in Lancashire, where they seized all the manufactured iron they could find, and carried it off with the greatest joy, though so heavy of carriage, and preferred it to all other plunder." The Scots at this time were in great need of iron, which they did not produce, but for which they were wholly dependent on the Continent and on the favor or ill-fortune of England. Alexander says that there were iron works at Kimberworth, in Yorkshire, in 1160, and Smiles gives an extract from a contract for supplying wood and ore for iron "blomes" at Kirskill, near Otley, in Yorkshire, in 1352. A recent writer, Mr. H. A. Fletcher, says that "the earliest record which has been found of iron-ore mining in Cumberland seems to be the grant of the forge at Winefel to the monks of Holm Cultram Abbey, in the twelfth century, which also included a mine at Egremont, by inference of iron, being in connection with a forge; and Thomas de Multon confirms a gift to the same abbey *de quartuor duodenis minæ ferri in Coupland*."

Scrivenor mentions one art related to the manufacture of iron which flourished in England from William to John, if the manufacture itself did not. The art of making defensive armor was brought to such perfection during the period mentioned that "a knight completely armed was almost invulnerable." The history of the Crusades shows that the English were then very proficient in the manufacture of both arms and armor, as were the Turks who resisted them. Smiles says that it was the knowledge of the art of iron forging which laid the foundation of the Turkish empire. By means of this art they made the arms which first secured their own freedom and then enabled them to extend their power.

Edward the Third, who reigned from 1327 to 1377, did much to advance the manufacturing industries of England. He protected domestic manufactures by legislation which restricted the importation of foreign goods, and he encouraged the immigration into England of skilled workmen from the Continent. The use of iron was greatly extended in his reign, and its manufacture was active in Kent and Sussex and in the Forest of Dean. Nevertheless the domestic supply did not meet the wants of the people. Scrivenor says: "By an act passed in the twenty-eighth year of Edward the Third no iron manufactured in England, and also no iron imported and sold, could be carried out of the country, under the penalty of forfeiting double the quantity to the king; and the magistrates were empowered to regulate the selling price and to punish those who sold at too dear a rate, according to the extent of the transaction." This act appears to have remained in force long after Edward's death. Smiles quotes from Parker's *English Home* the statement that in Edward the Third's reign the pots, spits, and frying-pans of the royal kitchen were classed among the king's jewels.

The methods of manufacturing iron which were followed in England in the thirteenth and fourteenth centuries were still of a slow and restricted character, although greatly advanced beyond those which existed in the days of the Romans. The English were yet mainly devoted to agriculture, and were not even good farmers, their implements of husbandry and their methods of cultivating the soil being equally rude. Wool was their great staple, and this was largely exported to the Continent, where it was manufactured into finer fabrics than the English were capable of producing. Iron was often scarce and dear, because the domestic supply was insufficient. The iron industry on the Continent was at this period in a much more advanced stage of development, and most of the Continental iron was also of a better quality than the English iron.

Professor James E. Thorold Rogers, in his *History of Agriculture and Prices in England*, gives many interesting details concerning the iron industry of England in the thirteenth and fourteenth centuries. Iron was made at this time at Tendale, in Cumberland; at or near the city of Gloucester; and in Kent and Sussex. It was, doubtless, made in many other places. Steel is frequently mentioned, the first reference to it being in 1267. It is not clear whether all the steel used in England during the period under consideration was imported, but most of it certainly was. Much of the iron used was imported, frequent mention being made of Spanish and Osemond iron. Osemond steel is also frequently mentioned. In 1281 Norman iron, of a superior quality, was bought for the Newgate jail. Spain appears to have been the principal source of the supply of imported iron. It is probable that the Osemond iron and steel were imported from Sweden and Norway, the osmund furnace having been in use in these countries and in Finland about this time. Iron and steel were generally bought at fairs and markets. The Spaniard attended the Stourbridge fair with his stock of iron, and iron from the Sussex forges was sold at the same place. The prices of iron and steel were usually lower near the sea and at the great towns in the south of England than elsewhere. Among the farmers it was customary for the bailiff to buy the iron that might be needed on the farm, and to employ a smith to make the horseshoes and nails and to iron the implements. Steel appears to have been but little used by the farmers. Rogers says that "no direct information about the seasons, scanty as it is, is so frequent as that found in the notices which the bailiff gives of the great cost of iron." Iron for the tires of wagons and carts was so dear that many wheels were not ironed.

Iron was sold in several forms. The iron made at the works at Tendale was sold in the form of blooms in 1333 and subsequently. Blooms were sold as early as 1318, but the place of their manufacture is not given. Slabs and bars of iron are also mentioned, but the commonest form in which iron was sold was the *piece*, twenty-five pieces constituting a hundred-weight. "The small fagot of iron, each bar of which weighed a little over four pounds, was kept by the bailiff, and served, as occasion required, for the various uses of the farm." The Tendale bloom weighed about one hundred pounds, and was sold at a much lower price than other forms of iron. It was, of course, unrefined iron. Steel was usually sold by the garb, or sheaf, each sheaf containing thirty small pieces, the exact weight of which is not stated. Rogers supposes that the pieces of iron and steel were of about the same weight, and that the price of steel was about four times the price of iron. Occasional mention is made of steel which was sold by the cake; it was "a little higher in value and much greater in weight than the garb."

Plow-shoes, which appear to have been iron points to wooden shares, are of frequent occurrence in the accounts quoted by Rogers, and so are lath and board nails, clouts and clout nails, and horseshoes and horseshoe nails. Horseshoes were not purchased from the smiths until about the close of the fourteenth century; down to that time the smiths were supplied by the bailiffs with the iron for their manufacture. "Hinges, staples, and bolts were occasionally manufactured by the village smith, from iron supplied him by the bailiff, but were more frequently bought at the market-town or fair." Iron mattocks and hoes were used in the fourteenth century, as were iron sickles, scythes, and hay and other forks. Domestic utensils of iron were not in general use; pots and other articles used in the kitchen were usually of brass. A brass jug and pan are mentioned in 1272; a brass jug and basin in 1360; and two brass pots in 1383. Such iron utensils as were in use appear to have been made of wrought iron. Tinware was certainly unknown. Hammers, axes, pickaxes, and other tools were made of iron. Iron hoops were used for buckets and grain measures in the fourteenth century; "the iron-bound bucket that hung in the well" had an existence as early at least as 1331.

Passing to other authorities we find that arrow-heads were manufactured at Sheffield in the thirteenth century, and that knives were manufactured at the same place in the fourteenth century, as they are to-day. Chaucer, who wrote his *Canterbury Tales* near the close of the latter century, in describing the miller of Trompington says that "a Schefeld thwytel bar he in his hose." Birmingham was then, as it is now, a center of the manufacture of swords, tools, and nails. Smiles pays a deserved compliment to the English smith, to whom England owes so much of her greatness. In Anglo-Saxon times his person was protected by a double penalty, and he was treated as an officer of the highest rank. The forging of swords was then his great specialty. William the Conqueror did much to exalt the art of the smith, to which he was much indebted for his victory at Hastings, his soldiers being better armed than those of the Saxon Harold. At the close of the fourteenth century the smith had fairly entered upon the brilliant career which has since contributed so much to the industrial pre-eminence of England. Mr. Picton, in a recent address, says: "Iron work at this period was of the most elaborate description. The locks and keys, the hinges and bolts, the smith's work in gates and screens, exceed in beauty anything of the kind which has since been produced."

England appears to have first used cannon in field warfare at the battle of Cressy and the siege of Calais in the year 1346, when the bowmen of Edward the Third were drawn up "in the form of a harrow," with small bombards between them, "which, with fire, threw little iron balls to frighten the horses." These bombards were made of "iron bars joined together longitudinally, and strengthened by exterior hoops of iron." France, however, according to Scrivenor, appears to have used cannon as early as 1338, in which year it is reported that the government had an account with Henry de Faumichan "for gunpowder and other things necessary for the cannon at the siege of Puii Guillaume." But the archers of the English army continued to be the main reliance of the English kings for many years after Edward's first use of the bombards, and on the Continent gunpowder did not come into general use until the sixteenth century. At the battle of Pavia, in 1525, the match-lock was first used in an effective form, and it was then fired from a rest.

During the fifteenth and sixteenth centuries the manufacture of iron in England was greatly extended. The encouragement which Edward the Third and his immediate successors had given to the immigration of foreign workmen into England had resulted in the settlement in the country of many Flemish and French ironworkers, whose skill was eagerly sought by many landed proprietors, who entered with zeal into the manufacture of iron. Sussex became the principal seat of the industry; it possessed both ores and forests, the latter supplying the necessary fuel, and small streams furnished the requisite power to drive the "iron mills." As one marked result of the extension of the iron manufacture in England, the dependence of the country upon foreign sources of iron supply was greatly lessened; so much so that in 1483 an act was passed prohibiting the importation of gridirons, grates, iron wire, knives, hinges, scissors, and many other manufactured articles of iron or steel which competed with like articles of domestic production. Landrin, however, states that fine tools were still imported from Bilbao, in Spain, as late as 1548.

About the beginning of the fifteenth century blast furnaces were introduced into England from the Continent, and this event gave a fresh impetus to the iron industry of Sussex, Kent, Surrey, and other sections. Prior to the introduction of blast furnaces all the iron that was manufactured in England was produced in forges or bloomaries directly from the ore, and was consequently, when finished, wrought or bar iron. Little of it was cast iron. These bloomaries were doubtless modeled after the German *stückofen* during the latter part of the period antecedent to the introduction of the blast furnace. The exact date of the erection of the first blast furnace in England is unknown, but this event must have followed closely upon the introduction of the *flussofen*, or *blauofen*, on the Continent in the fourteenth century. The English antiquarian writer, M. A. Lower, in his account of the iron industry of Sussex, mentions iron castings which were made in Sussex in that century, but these may have been produced by the *stückofen*, or high bloomary. Mushet supposes that cast iron was made in the Forest of Dean in 1540, and he says that the oldest piece of cast iron he ever saw bore the initials "E. R." and the date "1555." Camden, who lived between 1551 and 1623, says that "Sussex is full of iron mines everywhere, for the casting of which there are furnaces up and down the country, and abundance of wood is yearly spent." He also says that the heavy forge-hammers, which were mostly worked by water-power, stored in hammer-ponds, "beating upon the iron, fill the neighborhood round about, day and night, with continual noise." About 1612 John Norden, quoted by Smiles, stated in a published document that "there are, or lately were, in Sussex neere 140 hammers and furnaces for iron." At this time Sussex is supposed to have produced one-half of all the iron made in England. The best of the Sussex furnaces did not, however, at this time produce more than eight or ten tons of pig iron in a week. At Pontypool, in Monmouthshire, a blast furnace was built in 1565 by Capel Hanbury, to smelt the Roman cinder which was found there, and about the same time several furnaces were built in the Forest of Dean to rework the cinder which was found there in large quantities. The first furnaces built in the Forest were 15 feet high and 6 feet wide at the boshes. The furnaces at work in 1677 were blown with bellows 20 feet long, driven by "a great wheel" turned by water.

Smiles says that "the iron manufacture of Sussex reached its height toward the close of the reign of Elizabeth, when the trade became so prosperous that, instead of importing iron, England began to export it in considerable quantities in the shape of iron ordnance." This ordnance was cast, and the time referred to was the close of the sixteenth century. Bronze cannon had succeeded the bombards about the beginning of that century, and as early as 1543 cast-iron cannon were made in Sussex, at a place called Bucksteed, by Ralph Hoge, who employed a Frenchman named Peter Baude as his assistant. "Many great guns" were subsequently cast in Sussex, John Johnson and his son Thomas Johnson, the former a servant of Peter Baude, being prominent in their manufacture. John Johnson is said to have "succeeded and exceeded his master in this his art of casting ordnance." About 1595 the weight of some of the cannon cast in Sussex amounted to three tons each. At a later period, in 1648, Bishop Wilkins, in his *Mathematicall Magick*, says that "a whole cannon weighed commonly 8,000 pounds, a half cannon 5,000, a culverin 4,500, a demi-culverin 3,000. A whole cannon required for every charge 40 pounds of powder and a bullet of 64 pounds."

But a still greater honor is claimed for Peter Baude than that with which his name is above associated. Stow, in his *Chronicle*, quoted by Froude and Smiles, says that two foreign workmen, whom Henry the Eighth tempted into his service, first invented shells. "One Peter Baude, a Frenchman-born, and another alien called Peter Van Cullen, a gunsmith, both the king's feed men, conferring together, devised and caused to be made certain mortar pieces, being at the mouth from 11 inches unto 19 inches wide, for the use whereof they caused to be made certain hollow shot of cast iron, to be stuffed with fire-work or wild-fire, whereof the bigger sort for the same had screws of iron to receive a match to carry fire kindled, that the fire-work might be set on fire for to break in pieces the same hollow shot, whereof the smallest piece hitting any man would kill or spoil him."

There is deposited in the library of the Historical Society of Pennsylvania, at Philadelphia, a stone cannon-ball, one of twenty-three which are said to have been fired at the boat in which Queen Mary and Douglass made their escape from Loch Leven in 1568. It is about 8 inches in diameter, is round, but not smooth, and weighs probably 15 pounds.

The exportation of cast-iron cannon became so extensive that complaint was made that Spain armed her ships with them to fight the ships of England, and the trade was for a time prohibited. Hume says that "shipbuilding and the founding of iron cannon were the sole manufactures in which the English excelled in James the First's reign," from 1603 to 1625. In 1629 the crown ordered 600 cannon to be cast for the States of Holland. England, however, continued to import from the Continent, particularly from Sweden, Germany, and Spain, some of the finer qualities of iron and considerable steel.

Before 1568 all iron wire which was made in England was "drawn by main strength alone," according to Camden. The Germans, says this author, then introduced into the Forest of Dean and elsewhere the art of drawing it by a mill. Prior to the year mentioned the greater part of the iron wire and ready-made wool-cards used in England was imported. Scrivenor quotes Williams's *History of Monmouthshire* as authority for the statement that the iron and wire works near Abbey Tintern were erected by Germans. There can be no doubt that the iron industry of England in the fourteenth, fifteenth, and sixteenth centuries was greatly indebted to the inventive genius and mechanical skill of the Continental nations.

Near the close of the sixteenth century there was introduced into England an invention for slitting flattened bars of iron into strips, called nail-rods. This invention was the slitting mill. Scrivenor, upon the authority of *Gough's Camden*, states that Godfrey Bochs, of Liège, Belgium, set up at Dartford, in 1590, "the first iron-mill for slitting bars." Dartford is a market town in Kent. Another story associates the name of "the founder of the Foley family, who was a fiddler living near Stourbridge," with the honor of introducing the first slitting mill into England, a knowledge of which he surreptitiously gained by visiting Swedish iron works and fiddling for the workmen. Percy states that Richard Foley, the founder of the Foley family at Stourbridge, who was first a seller of nails and afterwards a forgemaster, died in 1657 at the age of 80 years. In 1606 and 1618 patents were granted in England to Sir Davis Bulmer and Clement Dawbeny, respectively, for cutting iron into nail-rods by water-power. The slitting mill, by whomsoever invented and perfected, greatly benefited the nail trade of England. Birmingham became the center of this industry, and it was here, probably, that women and girls were first regularly employed in England in the manufacture of nails. Hutton, quoted by Dr. Young in his *Labor in Europe and America*, says that in 1741 they were thus employed in the numerous blacksmith shops of Birmingham, "wielding the hammer with all the grace of their sex." They were called "nailers." Machinery was not applied to the manufacture of nails until near the close of the eighteenth century.

The art of tinning iron was first practiced in Bohemia, and about 1620 it was introduced into Saxony. These countries for a time supplied all Europe with tin plates. In 1681 Andrew Yarranton asserted that tin plates were then made in England through his means, he having learned the art of making them in Saxony in 1665. The exact date of the introduction of the manufacture of tin plates into England by Yarranton is said to have been 1670. The first attempt to establish the new industry in England was made at Pontypool, in Monmouthshire. Scrivenor states that in 1740 the art "was brought to considerable perfection in England."

But, notwithstanding the progress which had been made in the development of the English iron trade, especially in the reigns of Henry the Eighth, Elizabeth, and James the First, an influence was at work which was destined to weigh heavily for a hundred and fifty years upon all further development. This was the growing scarcity of wood for the use of the forges and furnaces; mineral fuel, or pit-coal, not yet having come into use as a substitute for wood. The forests of England in the ironmaking districts had been largely consumed by "the voragious iron mills," and there were loud complaints that the whole community would be unable to obtain fuel for domestic purposes if this denudation were persisted in. In response to these complaints we learn from Scrivenor that, in 1558, the first year of the reign of Elizabeth, an act was passed which prohibited the cutting of timber in certain parts of the country for conversion into coal or fuel "for the making of iron," special exception being made of the Weald of Kent, certain parishes, and "high in the Weald of the county of Surrey." In 1581 a further act to prevent the destruction of timber was passed, which set forth the increasing scarcity of timber for fuel in consequence of "the late erection of sundry iron mills in divers places not far distant from the city of London and the suburbs of the same, or from the downs and sea-coast of Sussex," and provided that "no new iron works should be erected within twenty-two miles of London, nor within fourteen miles of the river Thames," nor in certain parts of Sussex near the sea; nor should any wood within the limits described, with certain exceptions, be converted to coal "or other fuel for making of iron." A more sweeping act was passed in 1584, which prohibited the erection of any new iron works in Surrey, Kent, and Sussex, and ordered that no timber one foot square at the stub should be used as fuel "at any iron work." It is said that these restrictions were not very rigidly enforced, but they served to narrow the limits within which the manufacture of iron could be prosecuted. About the middle of the seventeenth century the iron industry experienced another serious check through the civil commotion which then prevailed. Many of the forges and furnaces in Sussex and in the south of Wales were then destroyed, and not again rebuilt. Soon after the Restoration all of the royal iron works in the Forest of Dean were destroyed, owing to the scarcity of timber. There was then much apprehension felt lest the Forest of Dean should fail to supply timber for the royal navy. Owing to the scarcity of timber many of the iron works in Kent, Sussex, Surrey, and in the north of England were "laid down" in 1676, and England's supply of iron was largely derived from

"Sweadland, Flanders, and Spain." Dudley, in his *Metallum Martis*, says that in 1644 there were nearly 20,000 smiths of all sorts within ten miles of Dudley Castle, in Staffordshire, and that there were also "many iron works at that time within that circle decayed for want of wood (yet formerly a mighty woodland country)."

Notwithstanding these severe checks, the iron industry of England bravely refused to be utterly destroyed, and as late as 1720 it was still second in importance to the manufacture of woolen goods. In 1740, however, only 59 furnaces were left in all England and Wales, and their total production was but 17,350 tons of pig iron, or about 294 tons for each furnace. All of the furnaces may not have been in blast, as it has been proved that, ten years later, in 1750, each of the charcoal furnaces of Monmouthshire produced 24 tons of iron in a week. Ten of the furnaces existing in 1740 were in Sussex, but in 1788 only two of these were left. In 1740 there were 10 furnaces in the Forest of Dean. Pig iron is still made in this district, but with coke as fuel. The iron industry of Kent and Sussex is now extinct. The last furnace in the Weald of Sussex, at Ashburnham, was blown out in 1829.

During the seventeenth and eighteenth centuries England imported iron largely from Sweden, and in the latter century both Russia and the American colonies contributed to her supply. The scarcity of timber for fuel for blast furnaces in England continuing, a proposition was made in the British Parliament in 1737 to bring all pig iron from the British colonies in America; and in 1750, to facilitate the importation of pig iron from these colonies, the duty which had previously been imposed for the protection of British ironmakers was repealed. At this time the business of manufacturing iron in some parts of Great Britain was conducted upon such primitive principles that both charcoal and iron ore were carried to the furnaces of Monmouthshire on the backs of horses.

Soon after the passage of the act of 1750 mineral coal in the form of coke came into general use in the manufacture of iron in England, and the iron trade of that country and of Wales at once revived, while that of Scotland may be said to have been created by the new fuel. The first successful use of mineral coal in the blast furnace was by Abraham Darby, of Shropshire, at his furnace at Coalbrookdale, in 1735. This coal was coked. In 1740 a coke furnace was built at Pontypool, in Monmouthshire. In 1796 charcoal furnaces had been almost entirely abandoned in Great Britain. The manufacture of pig iron with mineral coal was greatly facilitated by the invention of a cylindrical cast-iron bellows by John Smeaton in 1760, to take the place of wooden or leather bellows, and by the improvements made in the steam engine by James Watt about 1769—both these valuable accessions to blast-furnace machinery being used for the first time, through the influence of Dr. Roebuck, at the Carron iron works in Scotland. The effect of their introduction was to greatly increase the blast and consequently to increase the production of iron. The blast, however, continued to be cold air at all furnaces, both coke and charcoal, and so remained until 1828, when James B. Neilson, of Scotland, invented the hot-blast.

These and other changes in the manufacture of pig iron were speedily followed by equally important innovations in the manufacture of finished iron. In 1783 Henry Cort, of Gosport, England, obtained a patent for rolling iron into bars with grooved iron rolls, and in the following year he obtained a patent for converting pig iron into malleable iron by means of a puddling furnace. These patents did not relate to absolutely new inventions in the manufacture of iron, but to important improvements on existing methods, which had not, however, been generally employed. Mineral coal was now used in the puddling furnace as well as in the blast furnace; it had long been used in refineries. To the improvements introduced by Cort the iron trade of Great Britain is greatly indebted. The refining of pig iron in forges and its subsequent conversion into bars and plates under a tilt-hammer virtually formed the only method of producing finished iron down to Cort's day, both in Great Britain and on the Continent, and it was wholly inadequate to the production of large quantities of iron of this character. With mineral fuel, powerful blowing engines, the puddling furnace, and grooved rolls Great Britain rapidly passed to the front of all ironmaking nations.

The invention of crucible cast steel originated with Benjamin Huntsman, an English clockmaker, about the middle of the eighteenth century, and not only Sheffield, the principal seat of its manufacture and of the manufacture of fine cutlery, but all England as well, has greatly profited by his discovery.

We now turn from the iron industry of England to that of Wales, Ireland, and Scotland.

In the sixteenth century, owing to the scarcity of timber in England, some of the ironmasters of Sussex emigrated to Glamorganshire, in South Wales, where they founded the iron works of Aberdare and Merthyr Tydvil, and other iron works. Remains of the works in the Aberdare valley still exist, and Merthyr Tydvil is the center of a great iron industry to-day. In 1770 the first coke furnace in South Wales was built at Cyfarthfa. In 1788 there were six coke furnaces in South Wales. Cort's inventions were promptly appropriated by Welsh ironmasters.

According to Scrivenor, iron-ore mines were opened in Ireland by the English who settled in the country during the reign of Elizabeth, and iron itself was extensively manufactured in Ireland by the English during the reign of James the First and afterwards. The most extensive works were in the provinces of Munster, Connaught, and Ulster, and in the counties of Queens, Kings, and Thomond. In some instances iron ore was taken from England to the sea-coast of Ulster and Munster, in Ireland, the latter country then abounding in forests, but generally Ireland supplied both the ore and fuel. Most of the iron produced was in bars from forges, but ordnance, pots, and other articles were also cast in foundries or furnaces. The rebellion of 1641 put an end to many of the English iron works in Ireland, some valuable works in the county of Mayo escaping. In 1660 Sir William Petty established extensive iron works in the county of Kerry, which continued in operation until the middle of the eighteenth century, when they were stopped in consequence of the scarcity of timber. In 1672 this gentleman stated that one thousand tons of iron were then made in Ireland. Near the close of the seventeenth century an act of the British Parliament remitted the duties on bar iron and on iron slit and hammered into bars imported from Ireland, the manufacturing industries of Ireland being then greatly depressed. The iron industry of Ireland survived until the reign of George the Second, in the early part of the eighteenth century, when it came to an end in consequence of the scarcity of timber, the competition of English iron, and the unsettled condition of the country. An effort was made to revive it at the close of the century, but it met with slight success. In 1840 there were no iron works in Ireland "going on." In 1857 there was but one furnace yet standing in Ireland. There are now no iron works in the country. Irish ores were imported into the United States in 1879 and 1880.

It has already been stated that iron was very scarce in Scotland in the closing centuries of the Middle Ages, Scotland obtaining all her supply of iron at that time from outside her borders. The Scotch, however, were noted during the period mentioned for the excellence of their swords and armor, the former vying in temper with those of Toledo and Milan. In Sir Walter Scott's story of *The Fair Maid of Perth*, the events of which are supposed to have occurred during the last years of the fourteenth century, the hero, Henry Gow, is an armorer—a forger of swords and bucklers and coats-of-mail. In 1547 an English chronicler wrote that "the Scots came with swords all broad and thin, of exceeding good temper, and universally so made to slice that I never saw none so good, so I think it hard to devise a better." Scotland had no noteworthy iron-producing industry of her own until the middle of the eighteenth century. It is conjectured, however, that her ancient inhabitants may have made iron in very small quantities, as pieces of iron slag were discovered in 1861 in the ruins of Celtic fortified towns in the Cheviot hills, on the border between England and Scotland. Mr. Richard Meade informs us that the earliest information bearing on iron smelting in Scotland dates from 1750, in which year the first furnace was erected at Bunawe, in Argyleshire, by a Mr. Ford. In this furnace the blast was driven by water-power obtained from the river Awe, the ore used being brought from Ulverstone, in Lancashire, while charcoal was exclusively used as fuel. The Bunawe furnace, now known as the Lorne, is still in existence, although not in operation. Previous to 1788 a similar furnace was erected at Goatfield, also in Argyleshire. In 1760 the first blast furnace at the celebrated Carron iron works, in Stirlingshire, was put in operation, where for some time charcoal was used. The manufacture of carronades was long a specialty of the Carron iron works. Mineral coal was soon substituted for charcoal at this furnace, and from that time forward the iron industry of Scotland was rapidly developed. In 1788 there were six coke furnaces in Scotland and the two charcoal furnaces of Bunawe and Goatfield.

The following statistics will show how rapidly the manufacture of pig iron in Great Britain has grown in the last hundred years. In 1788 there were 77 furnaces in England and Wales, and 8 furnaces in Scotland, the total production of which was 68,300 tons. Of the whole number of furnaces, 26 used charcoal and 59 used coke. The imports of iron by Great Britain in this year amounted to about 15,000 tons. In 1796 there were 104 furnaces in England and Wales, producing 108,793 tons of iron. In Scotland there were 17 furnaces, producing 16,086 tons. In 1806 there were 173 furnaces in Great Britain, producing 258,000 tons. In 1820 there were 284 furnaces, producing 400,000 tons. In 1827 the production was 690,500 tons. In 1840 it was 1,396,400 tons. In 1854 it rose to 3,069,838 tons. This quantity was then estimated to be fully one-half of the world's production of pig iron. The same proportion was steadily maintained by Great Britain for many years, but it is now lost. In 1857 Great Britain's production of pig iron was 3,659,447 tons, smelted from 9,573,281 tons of ore in 628 blast furnaces, of which 333 were in England, 170 in Wales, 124 in Scotland, and 1 in Ireland. In 1872 the product was 6,741,929 tons. In 1880 the production of pig iron by Great Britain was 7,749,233 tons. For several years there have been preserved only 4 charcoal furnaces in Great Britain, and these have produced but little iron. The whole number of blast furnaces in Great Britain in 1880 was 967, only 567 of which were in blast.

The eighteenth century marked a new era in many branches of manufacturing industry in which the British people have become prominent. It was the era of machinery, which then began to receive general attention as a substitute for hand labor. This era gave to the people of Great Britain the manufacture of Indian cotton goods, and it largely increased their woolen manufacture and assisted to develop their iron manufacture. It was in the eighteenth century that Great Britain, in consequence of her quick appreciation of the value of labor-saving machinery, became the first manufacturing nation in the world; in the preceding century four-fifths of the British working people were still farmers or farm laborers. During the latter part of the eighteenth century and the whole of the nineteenth century down to the present time no other country has occupied so conspicuous a position as Great Britain in the manufacture of iron and steel. Spain and Germany had in turn led modern nations in the production of these essentials of civilization, but Great Britain passed to the head when she began to make pig iron with the aid of mineral fuel and her powerful blowing engines. She had an abundance of iron ores and bituminous coal, and her people had applied to the utilization of these products their indomitable energy and newly-developed inventive genius. France, Germany, Belgium, and other Continental countries might have substituted mineral coal for charcoal, invented the puddling furnace, or perfected the rolling mill and the steam engine, but none of them did. To England and also to Scotland is the world indebted for the inventions that gave a fresh impetus to the manufacture of iron in the eighteenth century; and it is also indebted to the same countries for most of the inventions and changes of the present century which have further developed the manufacture of iron and increased the demand for it, and which have almost created the manufacture of steel. Stephenson, the Englishman, improved the locomotive in 1815, and in 1825 the first passenger railroad in the world was opened in England, Stephenson's locomotive hauling the trains. Neilson, the Scotchman, invented the hot-blast in 1828; Crane, the Englishman, applied it to the manufacture of pig iron with anthracite coal in 1837; Nasmyth, the Scotchman, invented the steam hammer in 1838 and the pile driver in 1843; and Bessemer, the Englishman, invented in 1855 the process which bears his name, and which is the flower of all metallurgical achievements. The Siemens regenerative gas furnace, which has been so extensively used in the manufacture of iron and steel, is also an English invention, although the inventors, Charles William and Frederick Siemens, while citizens of England, are natives of Hanover, in Germany. That Great Britain did not at first seek to extend the influence of her new light and life to other countries, but by various acts of Parliament sought to prevent the introduction of her inventions and the emigration of her skilled artisans into those countries, is not here a subject for comment; nor is the strict adherence of Great Britain to a policy of protection to home industries by customs duties during many centuries and down to almost the middle of the present century a subject of comment. Both measures undoubtedly fostered the growth of British manufacturing industries, and in the end the world was benefited by British inventions, which found their way across the British channel and the Atlantic ocean, and by the example of British energy and British enterprise in the utilization of native manufacturing resources.

EARLY PROCESSES IN THE MANUFACTURE OF IRON.

Except incidentally the various processes for the manufacture of iron which were in use in the early ages of the world's history, as well as in more recent times, have not been referred to in the preceding pages. Further notice of some of the processes that were successively in use before the present century seems, however, to be desirable, if for no other reason than to show how rude and unproductive were those processes in comparison with the improved methods that are now in use, and with which the reader is more or less familiar.

The methods of manufacturing iron that were in use in Asia and Africa in the earliest ages were few in number and of extreme simplicity. All of them produced wrought iron with the aid of wood or charcoal as fuel, although steel was also produced by some of them. One of these early processes, which still exists in Burmah, required no artificial blast. A perpendicular circular excavation, ten or twelve feet deep and open at the top, was made in the side of a bank or hillock, in which ore and fuel were placed in alternate layers, and to which the necessary draft for combustion was applied through one or more openings near the bottom. The product was a lump, or bloom, of iron. Another process applied an artificial blast to a small excavation in the ground, or to a low furnace built of clay and standing alone, the product also being a lump of iron. This artificial blast was supplied by bellows, which were usually made of goat skins, having a nozzle or tuyere of bamboo or burnt clay, and were worked by the feet or hands. Goat-skin bellows are in use in India and in the interior of Africa to-day in connection with clay furnaces. It is interesting to note the fact that the bellows and its tuyere, or nozzle, both of which in some form are in universal use to-day wherever iron is made, are undoubtedly of prehistoric origin, and that they are still used in their original simplicity in the manufacture of iron. In some parts of India, and in China, Japan, Borneo, and Madagascar, blowing cylinders of wood or bamboo, having valves and pistons, and worked like a pump by manual labor, are now used, and were probably used in remote ages. The bloom of iron, whether produced by natural or artificial blast, was reheated, and freed from impurities and adhering charcoal by repeated hammering, in the course of which refining operation it would be divided into suitable parts for practical use. The fire of the smith who would give to the iron its final shape would be supplied with a goat-skin or bamboo blast. The blacksmiths of India use a blast of this character at the present time. The ore which was smelted by these primitive processes was broken into small pieces and otherwise carefully prepared. In some parts of India and in some other Asiatic countries the ore was magnetic and well adapted to the manufacture of steel.

The celebrated Indian steel, or wootz, which is chiefly used for the manufacture of sword blades, is obtained at the present time by remelting pieces of native iron in small crucibles, which are about four inches high, containing finely-chopped wood, the crucibles being placed in a furnace heated with a blast supplied by bellows made usually of goat skins or bamboo cylinders. To reduce excessive carbonization, and to soften the steel so that it may be drawn into bars, the lumps or cakes of steel thus obtained are heated in a charcoal fire blown by a bellows, the current of air being made to play upon the cakes while they are turned over before it. Thousands of years ago the process was the same that it is now. China is said by Day, in his *Prehistoric Uses of Iron and Steel*, to have made steel long before the Christian era by immersing wrought iron in a bath of cast iron.

The manner in which the air was expelled from the goat-skin bellows of antiquity doubtless varied in different countries, but the pressure of the feet of one workman on two such bellows, attached to a common nozzle or tuyere, was probably the method in most general use. This method is still used in Africa. Wilkinson, in his *Manners and Customs of the Ancient Egyptians*, quoted by Day, mentions his discovery on the walls of a tomb built in the reign of Thothmes the Third, at Thebes, about fifteen centuries before the Christian era, of the picture of an Egyptian furnace and bellows, with two workmen engaged in expelling with their feet the air from as many pairs of bellows, "consisting of flexible bags formed of the skins of animals, and each provided with a cord which the operator holds in his hands. From each of these flexible bags a tube proceeds into the heap of fuel and ore, and the blast is produced by the operator transferring the weight of his body alternately from one foot to the other. The bags are inflated by pulling up the upper part by the cord, this upper part having a hole or valve therein for allowing the air to enter, and which is closed by the heel of the operator on his again transferring his weight to it."

The processes which have been briefly described, or modifications of them, were adopted in Europe when that continent commenced to make iron. The manufacture of iron in Belgium and in England without the aid of an artificial blast, about the time of the Christian era, has already been referred to. It is not known whether other European countries ever made iron in the same way. At Lustin, in Belgium, between Namur and Dinant, two ancient furnaces or bloomaries were discovered in 1870, on the top of a hill, with iron yet remaining in them. They consisted of simple oval excavations with rounded bottoms in a bed of clay, 12 feet long and 9 feet wide, with a depth in the middle of about 3 feet, the top being level with the surface of the surrounding soil. A channel excavated in the clay, but covered over with stones, conducted the wind into the lower portion of each furnace. The opening of this channel was turned in the direction of the prevailing wind, so that iron could only have been made on windy days. These bloomaries contained lumps of crude wrought iron. Mr. James Rock has given us an account of the Roman cinder heaps or mounds now to be seen in Sussex, England, and which are associated with the manufacture of iron without an artificial blast by smelting the ore either in heaps or in rude furnaces. By the heaping method the ore and charcoal were placed in alternate layers.

As no evidence exists that iron was ever made by the Romans in the south of Europe without the aid of an artificial blast, it may be fairly assumed that the Belgian furnaces above described and the methods of manufacture in Sussex which are described by Mr. Rock were of native origin. The Romans may for a time have continued the native practice, especially as the manufacture of iron in both Belgium and Britain would be mainly confined to the native inhabitants, but long before their withdrawal from these countries in the fifth century the superior practice of southern Europe would be introduced.

In the south of Europe the bellows was certainly used to produce a blast long before the Roman invasion of Britain. Homer, quoted by Fairbairn, "represents Hephæstus as throwing the materials from which the shield of Achilles was to be forged into a furnace urged by twenty pairs of bellows." The bellows first used by the Greeks were probably made of goat skins, but subsequently, as early as the third century before Christ, larger and more powerful bellows were made of ox hides, and larger furnaces or bloomaries were erected. These larger bellows were substantially the same as the common blacksmith's bellows of our day, and they would be used by the Greeks and Romans in smelting the ore as well as in refining and shaping the iron. Of their furnaces or forges we know but little. Virgil, who lived in the first century before Christ, gives us in the Fourth Georgic a view of a refinery forge as it doubtless existed among the Romans at his day, although located by the poet in a fabulous age.

As when the Cyclops, at th' almighty nod,
New thunder hasten for their angry god,
Subdued in fire the stubborn metal lies:
One brawny smith the puffing bellows plies,
And draws and blows reciprocating air:
Others to quench the hissing mass prepare:
With lifted arms they order every blow
And chime their sounding hammers in a row:
With labored anvils Etna groans below.
Strongly they strike; huge flakes of flames expire;
With tongs they turn the steel and vex it in the fire.

Diodorus of Sicily, quoted by Scrivenor, mentions the iron ores of Elba, "which the natives dig and cut out of the ground to melt, in order for the making of iron, much of which metal is in this sort of stone. The workmen employed first cut the stone in pieces, and then melt them in furnaces built and prepared for the purpose. In these furnaces the stones, by the violent heat of the fire, are melted into several pieces in form like great sponges, which the merchants buy by truck and exchange of other wares, and export them to Dicœarchea and other mart towns. Some of these merchants that buy of these wares cause them to be wrought by the coppersmiths, who beat and fashion them into all sorts of tools, instruments, and other shapes and fancies; some they neatly beat into the shape of birds, others into spades, hooks, and other sorts of utensils, all which are transported and carried about into several parts of the world by the merchants." This account was written in the first century before Christ.

Pliny describes the various kinds of iron and steel which were in use in his day, the first century after Christ, but gives us little insight into the methods by which they were produced. In the following obscure description he seems to have intended to show that both iron and steel were made in the same furnace, and that the quality of both these products varied greatly. He says: "There is a great difference, too, in the smelting, some kinds producing knurrs of metal, which are especially adapted for hardening into steel, or else, prepared in another manner, for making thick anvils or heads of hammers. But the main difference results from the quality of the water into which the red-hot metal is plunged from time to time. The water, which is in some places better for this purpose than in others, has quite ennobled some localities for the excellence of their iron, Bilbilis, for example, and Turiasso in Spain, and Comum in Italy, and this although there are no iron mines in these spots. It is a remarkable fact that when the ore is fused the metal becomes liquefied like water, and afterwards acquires a spongy, brittle texture. It is the practice to quench the smaller articles made of iron with oil, lest by being hardened in water they should be rendered brittle. Iron which has been acted upon by fire is spoiled unless it is forged with the hammer. It is not in a fit state for being hammered when it is red hot, nor, indeed, until it has begun to assume a white heat."

In Spain, as we have seen, iron and steel were made many centuries before Pliny's time, the Catalan forge, or a modification of it, being used, and the product being either wrought iron or steel. The Catalan forge differed in no essential particular from an ordinary blacksmith's fire. The Corsican forge, which also existed before the Christian era, was a modification of the Catalan forge. The blast for these forges is presumed to have been primarily furnished by bellows made of goat skins or the skins of other animals, but afterwards the improved Grecian and Roman bellows, the same as our blacksmith's bellows, were substituted. Bauerman cites Franquoy as authority for the statement that bellows with valves were introduced by the Romans into Gaul during the fourth century of the Christian era.

Percy copies the following description of an old Catalan forge in Spain: "In 1823, at Bielsa, in Aragon, in the Spanish Pyrenees, some charcoal burners discovered in a forest of silver firs a small circular iron furnace only 2 feet and 1.59 inches high. The lower part or hearth was cylindrical up to the height of about 11.81 inches and then terminated in an inverted truncated cone; its diameter was 14.25 inches at the lower and 1.69 inches at the upper part; it had two tuyere beds at 11.81 inches from the bottom. Near the furnace were found two crude lumps of iron in the state in which they appeared to have been taken out, and which weighed from 30.9 pounds to 35.3 pounds. According to tradition the blast in these furnaces was produced with bellows of skin worked by hand. Accumulations of ancient slags are met with at high elevations in the Pyrenees, far from any water-course, and which doubtless were urged by a blast produced by manual labor."

An analysis of the piece of iron found under the Egyptian obelisk which was recently removed to New York shows that it must have been made by the direct process, and probably in a Catalan forge. The analysis, which was made for Mr. A. L. Holley by Dr. August Wendel, of Troy, is here preserved.

Iron	98.738	Copper	0.102
Carbon	0.521	Calcium	0.218
Sulphur	0.009	Magnesium	0.028
Silicon	0.017	Aluminium	0.070
Phosphorus	0.048	Slag	0.150
Manganese	0.116		
Nickel Cobalt	0.079	Total	100.096

Mr. Holley says that a clean fracture of the iron was similar to that of puddled steel, and mentions the further fact that the small amount of slag, as well as the fine fracture, indicates frequent reworking.

Much light is thrown upon the methods of manufacturing iron which prevailed in the south of Europe at the beginning of the Christian era by the discovery in 1870 of two ancient bloomaries or melting hearths in the vicinity of Huttenberg, in Carinthia, on the Huttenberg railway. The place where these hearths were found is embraced within the limits of the ancient province of Noricum. Maw and Dredge thus describe these hearths:

> In the year 1870 a most interesting discovery was made during the construction of the Huttenberg railway. In a cutting a set of iron melting-hearths of Roman and Celtic times was found 6 feet below the present surface of the ground. These hearths consist of two holes or ditches, the upper one being supposed to have served as a calcining kiln, whilst the lower one represents the smelting furnace proper. These hearths were found near the mines of spathic ore in the neighborhood of Huttenberg.
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> The calcining hearth is fitted with a layer of charcoal 1½ inches thick, upon which a 10-inch layer of clay forms the inside lining of the hearth. This lining was found burnt by the action of the calcining fire to a depth of 4 inches. The depth of the hearth is 2 feet, and its diameter 5 feet. The second or smelting hearth is placed at a distance of 16 feet from the former, and is 3 feet deep and 4 feet wide. The lining consists of a layer of 6-inch clay, upon which a fire-brick mass, consisting of clay and quartz, is uniformly spread to a thickness of 12 inches. This lining is burnt and glazed to a depth of 3 inches at the inner side, thus recording the higher temperature in this hearth during the smelting operation.
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> Both hearths are filled with *debris* of burnt clay and slag crumbled down from the walls of the hearths, which seem to have been raised one foot above the surface of the ground. The space between the two hearths is paved with stones. The slag contains many unburnt pieces of charcoal. The analysis of the slag has proved that the yield of the spathic ore in use, containing from 50 to 60 per cent. of iron, was only 15 to 20 per cent. The blast seems to have been furnished by bellows from the top of the furnaces. A Roman cornice has been found near the smelting hearth.
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> These discoveries point out a very primitive process as compared with our present means of iron smelting; but centuries vanished before any real improvements were introduced. Nevertheless we find that the preparatory calcination of the ore previous to its being introduced in the smelting furnace is a very ancient mode of economizing labor and fuel.

It is not at all probable that the blast for these Norican hearths was supplied in any other way than by means of a leather bellows.

The various processes which have been referred to were all *direct* processes, the iron or steel being obtained directly from the ore. The furnaces, whether high or low, large or small, were all *bloomaries*, because the product derived from the heated ore was obtained in the form of a lump or bloom of malleable iron or steel. If cast iron was sometimes obtained by the Mediterranean nations, or by Asiatic and African ironworkers, very little evidence exists that it was run into moulds for the production of useful or ornamental castings. The weakness of the blast furnished by goat skins, bamboo, or the early blacksmith's bellows renders it highly improbable that much cast iron was ever obtained by any of the ancient processes. Aristotle, who lived in the fourth century before Christ, has left an account of the manner in which the Greeks of his day converted wrought iron into steel, which furnishes some evidence that they were also familiar with cast iron. He is quoted by Day as follows: "Wrought iron itself may be cast so as to be made liquid and to harden again; and thus it is they are wont to make steel; for the scoria of iron subsides and is purged off by the bottom; and when it is often defecated and made clean this is steel. But this they do not often because of the great waste and because it loses much weight in refining; but iron is so much the more excellent the less recrement it has." The quotation from Pliny on the preceding page contains the most direct evidence we have of the making of cast iron by the Romans. But, if the Mediterranean nations, and particularly the Greeks and Romans, knew how to make and utilize cast iron, this knowledge became one of the lost arts, for there is no authentic mention of cast iron having been made in the northern and western parts of Europe until about five hundred years ago, and if the Chinese, Japanese, and the people of India possessed the art they kept it to themselves and made but little use of it.

From the first to the eighth century of the Christian era the history of the manufacture of iron in all European countries is greatly obscured, and the processes which were in operation cannot be described. In Asia and Africa the art had previously received less and less attention through the gradual transfer of political power and of civilization to the northern shores of the Mediterranean. But Greece, which had received much of this power and had absorbed most of this civilization, had in turn surrendered her leadership to Rome, and in the fifth century after Christ Rome herself fell before the northern barbarians. Except in Spain, where the Visigoths established a powerful empire in the fifth century, under which the arts of ancient civilization were encouraged, the iron industry is nowhere throughout Europe known to have flourished from the period when Rome commenced her final struggle with the northern invaders down to about the beginning of the eighth century. At this time we begin to hear of the iron industry taking a fresh start in many European countries—experiencing what in modern phrase we term a revival. And with this revival we hear authentically for the first time of the wolf furnace, or *stückofen*, in Austria, Bohemia, Germany, and other Continental countries.

The wolf furnace, or *stückofen*, was a high bloomary, and as such was simply an enlargement of the primitive low bloomaries or forges. Percy says that the *stückofen* "is only a Catalan furnace extended upwards in the form of a quadrangular or circular shaft. The Germans call it *stück* or *wolf's ofen* because the large metallic mass which is extracted from the bottom is termed *stück* or *wolf*." Overman says that these furnaces or bloomaries, of which there yet remain a few in Hungary and Spain, are generally from 10 to 16 feet high, 2 feet wide at the top and bottom, and about 5 feet wide at the widest part. The early wolf furnaces were, however, not more than 10 feet high. An opening in the front, about 2 feet square, called the breast, was kept open until the furnace was heated, when, coincidently with the closing of the breast with brick, the ore and charcoal were thrown into the furnace and the blast was applied from "at least two bellows and nozzles, both on the same side." The product was a mass, or salamander, of mixed iron and steel, which was taken out of the breast and reduced under the tilt-hammer to blooms and under smaller hammers to bars and other forms. The salamander, which usually weighed from 400 to 700 pounds, was first cut into two nearly equal parts, which were called *stücke*. At Eisenerz, in Austria, as stated by Jars, quoted by Percy, "the lump was first cut half through in the center with hatchets by two men, each having one. It was afterwards completely divided by means of wedges and large hammers." The annual production of a wolf furnace was from 100 to 150 tons. Overman further says: "By this method good iron as well as steel is always furnished; in fact, the salamander consists of a mixture of iron and steel; of the latter skillful workmen may save a considerable amount. The blooms are a mixture of fibrous iron, steel, and cast iron. The latter flows into the bottom of the forge fire, in which the blooms are reheated, and is then converted into bar iron by the same method adopted to convert common pig iron. If the steel is not sufficiently separated it is worked along with the iron." At Solling, in Carinthia, a wolf furnace was erected in 1775 which was provided with two common bellows worked by water-wheels, each bellows being 8 feet long and 3¾ feet broad.

While there can be no doubt that the earliest wolf furnaces were blown with leather bellows, it is not known when water-power was first used as a substitute for manual labor in producing the blast. Water-power for grinding grain is said by Knight in his *Mechanical Dictionary* to have been used about the beginning of the Christian era. In Flower's *History of the Trade in Tin* will be found two very interesting illustrations of the manner in which the bellows and tilt-hammer were operated by water-power in France in 1714. Prior to the introduction of water-power, bellows were doubtless chiefly operated by the feet or hands. Horse-power has been used for the same purpose since the introduction of water-power, and was probably so used before that period.

The osmund furnace, which is said by Percy to have been intermediate between the Catalan forge and the *stückofen*, but which closely resembled the latter in all particulars, was formerly in use in Norway, Sweden, and other parts of Europe, principally for smelting bog or lake ore, and it is still used in Finland. It was abandoned in Sweden during the last century. It derived its name from the Swedish word *osmund*, "which was applied to the bloom produced in this kind of furnace." Percy reproduces from Swedish sources two drawings of an osmund furnace, from which it would appear that it was about 7 feet high, rectangular in shape, with an opening or breast near the bottom similar to that of the *stückofen*, and was blown through one tuyere with two ordinary blacksmith's bellows, worked with treadles by a woman's feet. The ore used in Sweden was first calcined before being placed in the furnace, wood being used for calcining and charcoal for smelting. The product was good malleable iron, which was taken out of the breast in a lump or *osmund*. Not more than 1½ tons of iron could be produced in this furnace in a week.

Percy says: "The transition from the old bloomary to the modern blast furnace was very gradual, and the *stückofen* is the final development of the furnaces in which iron in the malleable state was produced direct from the ore. By increasing the dimensions of the *stückofen*, especially its height, the conditions favorable to the formation of cast iron are obtained; and, indeed, in the *stückofen* cast iron was generally, if not always, produced in greater or less degree, to the annoyance of the smelter."

According to Percy the *stückofen* was gradually superseded by the modern blast furnace, the first furnace which replaced the *stückofen* being the *blauofen*, or blow oven. He says that "originally there was no essential difference between them, these names being applied according to the nature of the metal which they yielded, and not in consequence of difference of construction"—malleable iron being obtained with less charcoal than was used when cast iron was desired. "When the *blauofen* was used as a *stückofen* it was only necessary to make an opening in the fore part of the hearth large enough for the extraction of the lump. One essential condition in working the furnace as a *stückofen* was to allow the slag free escape during the process, so that the lump of iron accumulating in the hearth might never be covered with slag, and so be protected from the action of the blast." Cast iron was first regularly made in a *stückofen* or *blauofen* about the beginning of the fourteenth century. The *flussofen* was the same furnace as the *blauofen*. "Blast furnace" may properly be substituted for either term.

The Continental nations of Europe are entitled to the credit of having fully developed the blast furnace from the primitive method of producing iron by the bloomary or Catalan forge. The virtual perfection of the blast furnace by the Germans, the Belgians, and the French in the fifteenth and sixteenth centuries marked a great advance in the art of manufacturing iron, and greatly enlarged the uses to which it could be applied. The nations which have been mentioned were also the first among modern nations to cast iron in moulds, Germany and France being especially noted at an early day for the artistic excellence of their iron castings.

The Catalan forge, with its modifications, continued to be used during the periods covered by the development of the blast furnace, and, as has already been stated, it is still in use in many countries, it being especially adapted to the conversion of pure ores into malleable iron of superior quality. A modification of the Catalan forge, called the German bloomary, consisting more, however, in the treatment of the ore than in the construction of the hearth and its connections, was long very popular in Germany and in the United States, but it has now been almost entirely abandoned in both countries. After the commencement of the manufacture of cast or pig iron, refinery forges suited to the conversion of this product into wrought iron became necessary, but they did not differ in any essential details of construction or application from the ordinary Catalan forge. Refinery forges have sometimes been called bloomaries, because pig iron is by them first reduced to a bloom before it is still further refined; but properly speaking a bloomary is a forge that converts ore into wrought iron by the direct process. The word "bloomary" is of Anglo-Saxon origin, the Anglo-Saxon word *bloma*, from which it is derived, meaning a mass, or lump. In *Doomsday-Book* the expression *bloma ferri* occurs several times.

In *The Forest of Dean* Nicholls quotes a most interesting description of the blast furnaces and refinery forges of England in the latter part of the seventeenth century. It has already been mentioned that the blast furnace was introduced into England from the Continent about the beginning of the fifteenth century. The author, after recording events which occurred on April 27, 1680, exactly two hundred years ago, says: "The mode then in use of operating upon the iron ore as described in MS. by Dr. Parsons will be found in Appendix No. 5." This description is as follows:

> After they have provided their ore their first work is to calcine it, which is done in kilns, much after the fashion of our ordinary lime kilns; these they fill up to the top with coal and ore until it be full, and so, putting fire to the bottom, they let it burn till the coal be wasted, and then renew the kilns with fresh ore and coal. This is done without any infusion of mettal, and serves to consume the more drossy part of the ore, and to make it fryable, supplying the beating and washing, which are to no other mettals; from hence they carry it to their furnaces, which are built of brick and stone, about 24 foot square on the outside, and near 30 foot in height within, and not over 8 or 10 foot over where it is the widest, which is about the middle, the top and bottom having a narrow compass, much like the form of an egg. Behind the furnace are placed two high pair of bellows, whose noses meet at a little hole near the bottom; these are compressed together by certain buttons placed on the axis of a very large wheel, which is turned round by water, in the manner of an overshot mill. As soon as these buttons are slid off the bellows are raised again by a counterpoise of weights, whereby they are made to play alternately, the one giving its blast while the other is rising.
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> At first they fill these furnaces with ore and cinder intermixt with fuel, which in these works is always charcoal, laying them hollow,

at the bottom, that they may the more easily take fire; but after they are once kindled the materials run together into an hard cake or lump, which is sustained by the furnace, and through this the mettal as it runs trickles down the receivers, which are placed at the bottom, where there is a passage open, by which they take away the scum and dross, and let out their mettal as they see occasion. Before the mouth of the furnace lyeth a great bed of sand, where they make furrows of the fashion they desire to cast their iron. Into these, when the receivers are full, they let in their mettal, which is made so very fluid by the violence of the fire that it not only runs to a considerable distance, but stands afterwards boiling a great while. After these furnaces are once at work they keep them constantly employed for many months together, never suffering the fire to slacken night or day, but still supplying the waste of fuel and other materials with fresh, poured in at the top.

Several attempts have been made to bring in the use of the sea coal in these workes instead of charcoal; the former being to be had at an easy rate, the latter not without a great expence, but hitherto they have proved ineffectual, the workmen finding by experience that a sea coal fire, how vehement soever, will not penetrate the most fixed parts of the ore, by which means they leave much of the mettal behind them unmelted.

From these furnaces they bring the sows and piggs of iron, as they call them, to their forges; these are two sorts, though they stood together under the same roof; one they call their finery, and the other chafers; both of them are upon hearths, upon which they place great heaps of sea coal, and behind them bellows like those of the furnaces, but nothing near so large.

In such finerys they first put their piggs of iron, placing three or four of them together behind the fire, with a little of one end thrust into it, where softening by degrees they stir and work them with long barrs of iron till the mettal runs together in a round masse or lump, which they call an half bloome: this they take out, and, giving it a few strokes with their sledges, they carry it to a great weighty hammer, raised likewise by the motion of a water-wheel, where, applying it dexterously to the blows, they presently beat it into a thick short square; this they put into the finery again, and, heating it red hot, they work it under the same hammer till it comes to the shape of a bar in the middle, with two square knobs in the ends; last of all they give it other heatings in the chaffers, and more workings under the hammer, till they have brought their iron into barrs of several shapes, in which fashion they expose them to sale.

All their principal iron undergoes the aforementioned preparations, yet for several other purposes, as for backs of chimneys, hearths of ovens, and the like, they have a sort of cast iron, which they take out of the receivers of the furnace, so soon as it is melted, in great ladles, and pour it into the moulds of fine sand in like manner as they do cast brass and softer mettals; but this sort of iron is so very brittle that, being heated, with one blow of the hammer it breaks all to pieces.

John Ray, the naturalist, writing a little earlier, in 1674, has also fully described the blast furnaces and forges which existed in England two hundred years ago. In speaking of the forges he says that "the bloom was a four-square mass, two feet long, prepared by beating a loop, or mass of metal weighing about three-fourths cwt., with iron sledges upon an iron plate, and afterwards with the forge-hammer worked by water. This was called shingling the loop. After two or three more heats at the finery the mass was brought to an ancony, the middle of which was a square bar of the desired size, and the two ends of rough square lumps. At the chafery the bar was completed by reducing the ends to a uniform size with the middle portion. A man and boy at the finery would make two tons of iron per week, and two men at the chafery would make five or six tons a week." John Houghton, in his *Husbandry and Trade Improved*, printed in 1697, calls the thick square first made a half bloom, and the bar with the two knobs a bloom, the greater end being called the mocket head, and the smaller the ancony end. At the fourth heat, of which there were five in all, the mocket head, and at the fifth the ancony end, was reduced to the state of a bar.

Wooden bellows, or "tubs," as a substitute for leather bellows in connection with blast furnaces, do not appear to have been used in England at the close of the seventeenth century, although said to have been invented by Hans Lobsinger in 1550. They were certainly used in Germany eighty years later, in 1630, and in various parts of Great Britain in the eighteenth century. In 1750 leather bellows were used to blow the charcoal furnaces in Monmouthshire. As late as 1809 leather bellows, 22 feet long and having oak planks two inches thick, were still used in blowing some Scotch furnaces.

The *trompe*, or water-blast, is said to have been invented in Italy in 1640. Its use has been almost entirely confined to the Catalan forges of France, Spain, and Italy. Although now generally abandoned, as have been the Catalan forges which called it into existence, it may still be found supplying the blast for a few forges in Europe and in the southern part of the United States. Professor J. P. Lesley thus described, in 1858, the water-blast which was then in use in the southern states in connection with Catalan forges, or bloomaries:

The use of the water-blast is all but universal. It consists of a box, say 5 by 2½ by 1½ feet deep, nearly immersed in the stream, directly underneath the forebay or flume. The water rushes down into its upper end from the forebay through a wooden pipe, say 8 inches square, separated in two by a space of an inch or two, as if the two joints of a stove-pipe had parted that much. Into this slit air is sucked by the falling water and driven out through another 3-inch tube at the lower end. Inside the box, and parallel with its lid, a plank called the "spatter-board" is set a few inches below the first tube. The water escapes from a hole under the water-level at the lower end of the box. This apparatus gives a cold, damp blast, with a great waste of water, but one that is very uniform.

The origin of the rolling mill for rolling iron into bars or plates seems to be involved in obscurity. Scrivenor, quoting from *Coxe's Tour in Monmouthshire*, says that "in the early part of the eighteenth century John Hanbury invented the method of rolling iron plates by means of cylinders." Flower, in his *History of the Trade in Tin*, alluding to the establishment of the manufacture of tin plates at Pontypool, says that "the discovery of sheet-iron rolling followed in 1728, an invention claimed alike by John Payne and by Major Hanbury, and it was in a great measure owing to this improvement that we were enabled to turn the tables upon Germany. The tinmen were greatly delighted with the English plates; the color was better, and the rolled plates were found to be more pliable than the foreign ones which were hammered." The following statement is taken from Ure's *Dictionary of the Arts*: "In 1728 John Payne invented a process for rolling iron. This seems to have at once led to the use of the flat or sheet rolls for the manufacture of iron for tin plates; but it is very remarkable that no further progress was made in this discovery of rolling iron until 1783, when Henry Cort introduced the grooved rolls." Percy says: "With respect to the invention of grooved rolls it has been maintained that Cort's claim is invalidated by the old patent granted to John Payne in 1728." It is certain, however, that even plain rolls did not come into general use until the rolling mill had been perfected by Cort—the refinery fire, the leather bellows, the tilting-hammer, and the water-wheel still holding their place in the manufacture of finished iron on the Continent and in England.

Dr. Johnson, in the diary of his tour in Wales and Monmouthshire in 1774, says that at an iron works he saw "round bars formed by a notched hammer and anvil," and that at a copper works he saw "a plate of copper put hot between steel rollers and spread thin." The whole passage in the diary is as follows:

> Wednesday, August 3 [1774]. * * * We went in the coach to Holywell. * * * We there saw a brass work, where the *lapis calaminaris* is gathered, broken, washed from the earth and the lead, though how the lead was separated I did not see; then calcined, afterwards ground fine, and then mixed by fire with copper. We saw several strong fires with melting pots, but the construction of the fire-places I did not learn. At a copper work, which receives its pigs of copper, I think, from Warrington, we saw a plate of copper put hot between steel rollers and spread thin. I know not whether the upper roller was set to a certain distance, as I suppose, or acted only by its weight. At an iron works I saw round bars formed by a notched hammer and anvil. There I saw a bar of about half an inch or more square cut with shears worked by water, and then beaten hot into a thinner bar. The hammers, all worked as they were by water, acting upon small bodies, moved very quickly, as quick as by the hand. I then saw wire drawn and gave a shilling.

We find that, on November 21, 1728, John Payne, an Englishman, obtained a patent for various improvements in the manufacture of iron, which consisted in part in the application of certain ashes, salt, etc., to pig or sow iron while in the refinery fire, "which will render the same into a state of malleability, as to bear the stroke of the hammer, to draw it into barrs or other forms at the pleasure of the workman, and those or other barrs being treated in the said melted ingredients in a long hott arch or cavern, as hereafter is described; and those or other barrs are to pass between two large mettall rowlers (which have proper notches or furrows upon their surfass), by the force of my engine hereafter described, or other power, into such shapes and forms as shall be required."

Other patents were subsequently granted in England for the invention of rolls of various forms for rolling bar iron. In 1759 a patent was granted to Thomas Blockley for rolls which "are to be turned and formed of the requisite shape so as to shape the article as intended." In 1779 a patent was granted to William Bell for rolls which "have designs sunk in their surfaces." Cort, however, is entitled to the credit of so improving upon all previous suggestions that the rolling mill in his hands became a successful invention.

In John Houghton's *Husbandry and Trade Improved*, printed in 1697, he speaks of slitting and rolling mills as *a new invention*. This is the earliest reference we have found to a rolling mill in connection with a slitting mill. Such use of a rolling mill undoubtedly preceded its use for any other purpose in connection with the manufacture of iron. In Flower's *History of the Trade in Tin* the manufacture of tin plates at Mansvaux, in Alsace, in 1714, is fully described, and it is noticeable that the sheet iron then used was hammered. This description, which is illustrated, sustains the claim that John Payne or Major Hanbury was the first person to roll sheet iron fourteen years later, in 1728—an innovation which probably grew out of the use of the rolling mill in the manufacture of nail plates as early as 1697, as recorded by John Houghton.

A letter of inquiry to Professor Richard Akerman, of the Stockholm School of Mines, Sweden, requesting such information as might be in his possession concerning the origin of the slitting mill and the rolling mill, was answered as follows:

> That slitting mills were in use before rolling mills is most probable and nearly certain. At the beginning of this century there could still be found slitting mills in which hammered but not rolled iron was slit. But all slitting mills were not made on the principle of rolling mills; many of them more resembled scissors.
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> The first publication about rolling mills in this country which I have seen or know about is *De Ferro*, by Emanuel Swedenborg, which was printed in 1734. Swedenborg speaks both about slitting machines on the principle of scissors, cutting three rods at a time, and about slitting mills in connection with rolling mills. He describes slitting mills in Sweden, in the Liège district of Belgium, in Germany, and in England; but he does not say a single word about where he thinks they originated. *Swedenborg does not say anything about grooved rolls.* In fact, he only describes rolling mills in connection with slitting mills. On page 253 he speaks about Swedish rolling mills at Wedewag, Avesta, and Stjernsund.
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> On the contrary, Christopher Polhem, in his *Patriotiska Testamente*, which was printed in 1761, ten years after his death, when he was 90 years old, speaks about rolling mills as such, both for plates and bar iron. He says, in chapter 14, "much time and labor can be saved by good rolling mills, because a rolling mill can produce 10 to 20 and still more bars at the same time which is wanted to tilt only one bar with the hammer. Thus very thin bar iron can be made which is useful for hoops and mountings of several kinds. Steel also can be rolled out for knife blades, etc., which easily can be finished by the blacksmith. The rolls can be so made that the knife-steel becomes broad and thin on both sides, or gets the same shape as blades of common swords, and these can be cut lengthwise in two parts, thus giving suitable material for knives, etc. Rolls also can be made for producing quadrangular, round, and half round bars, not only for iron but also for steel, as for all kinds of files which easily can be finished by the blacksmith."
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> In the next chapter Polhem describes the manner of making wrought-iron rolls covered with steel. Further on in the same chapter he speaks of rolls for rolling sheets: "As such rolls commonly have a length of three quarters, it follows that their diameter must be rather large; but, as thick rolls in comparison with slender ones have only a small effect in stretching, broad sheets cannot be rolled. If not, two slender wrought-iron rolls are put between the two thick cast-iron rolls, which prevent the slender rolls from yielding. Such rolls I have put up at Stjernsund after having tried their effect by experiments on a small scale." After mentioning economical difficulties, in consequence of which he was obliged to leave unused both this and other expensive machines, he concludes with the following words: "Yet I willingly grant to others, who perhaps will live during more happy times, what I have not got opportunity to use for myself."

Polhem says nothing about the time when he put up the said rolling mill, but, if you remember that he was born 1661 and died 1751, it seems probable that it must have been during the first decades of the eighteenth century. Christopher Polhem was the greatest mechanical genius Sweden has ever produced, but whether he was the very first inventor of rolling mills it is impossible for me to say. At any rate he ought to be mentioned among the inventors of rolling mills. In fact, Polhem must be said to be the real inventor of what you call the Lauth rolling mill. The only difference is that Polhem used four rolls above each other, two small between two large ones.

Gabriel Polhem, a son of Christopher Polhem, in the *Transactions of the Royal Swedish Academy of Sciences* for 1740, gives a description of a rolling mill, "the invention of my father," which he (Gabriel Polhem) put up at the mint in Cassel, Germany. He says that the officers of the mint did not believe that a rolling mill could be of any use for the mint, but he was in 1733 ordered by King Frederic to put it up, and it proved most useful for getting more uniform thickness and weight of the coins. From this and other expressions in the description it is quite clear that the said rolling mill was the very first put up at any mint, but not long afterwards a rolling mill also was put up at the Swedish mint.

The methods of producing steel which were in use before Huntsman succeeded in making crucible steel near Sheffield, about 1750, were substantially only three in number. The first method, variously modified, was either closely allied to or wholly identical with the direct or Catalan process for producing iron, the product being either natural or German steel. The second method was the Indian process for manufacturing small cakes of steel in crucibles, the product being wootz, or Indian steel. The third method was the cementation process, in which bars of the best iron were carbonized by being heated in contact with charcoal, blistered steel being the result. All of these methods are yet in use. Since Huntsman's invention there have been many other improvements in the manufacture of steel, and more recently there has been a very great relative increase in its production and use as compared with iron, until it has become a hackneyed expression that this is the age of steel. While this is true in the sense that steel is replacing iron, it is well to remember that the ancients made steel of excellent quality, and that the art of manufacturing it was never lost and has never been neglected. The swords of Damascus and the blades of Toledo bear witness to the skill in the manufacture of steel which was possessed by the older nations of both Asia and Europe. German steel was celebrated for its excellence during the Middle Ages, and steel of the same name and made by the same processes still occupies an honorable place among metallurgical products. Even Huntsman's invention of the art of making the finest quality of steel in crucibles, while meritorious in itself, was but the reproduction in a modern age of a process for manufacturing steel of equal quality which was known to the people of India thousands of years ago.

With the exception of the blast furnace, which was slowly developed from the high bloomary, no important improvement in the manufacture of iron and steel occurred from the revival of the iron industry in Europe, about the beginning of the seventh century, until the perfection of the rolling mill in the eighteenth century.

The ancient and the early European processes for the manufacture of both iron and steel do not compare unfavorably with those of modern times in the quality of the products they yielded. Modern processes excel those which they have replaced more in the uniformity and quantity of their products than in their quality. The Germans once had a furnace for making small quantities of iron by laborious manual labor, the name of which, *bauernofen*, indicates that it was used by farmers when they were not engaged in cultivating or securing their crops. In the present age mechanical skill of the highest order unites with the subtle operations of the chemist to produce iron and steel in such quantities and with such uniformity of product as to amaze not only the modern farmer but also the student of history, the political economist, the practical statesman, and the man of all wisdom.

FIRST ATTEMPT BY EUROPEANS TO MANUFACTURE IRON IN THE UNITED STATES.

Having traced in preceding pages, as briefly as the importance of the subject would permit, the early history of the iron manufacture in the older countries of the world, especially in Great Britain, our mother country in this great industry as well as in national life, and in language, laws, literature, and religion, we now cross the Atlantic to the shores of the New World, and to that part of it which comprises the United States. In no other part of the American continent has the manufacture of iron ever risen to the dignity of a national industry; and only in Canada, of all the political divisions of North or South America outside of the United States, has a serious effort ever been made to develop native iron resources. This is a remarkable fact, the explanation of which is found mainly in a study of national characteristics, the gift of iron ore and of fuel to smelt it having been denied to very few of our territorial neighbors.

It would not be profitable to inquire minutely whether the mound-builders or other aboriginal inhabitants of the United States, or the aboriginal inhabitants of any other part of the American continent, possessed a knowledge of the use and consequently of the manufacture of iron. It may be assumed that it has not been proved that they possessed this knowledge. Antiquarians have not neglected a subject of such importance, but thus far their researches have been fruitless of decisive results. Rude hatchets and other small implements of iron have been found in situations which give color to the theory that they may have been of aboriginal origin, but the weight of much concurrent testimony is strongly against this supposition. Prescott expressly says that the inhabitants of Mexico and Peru, who were, at the time of the conquest, the most advanced in all the arts of civilization of the immediate predecessors of the white race in North and South America, were unacquainted with the use of iron, copper serving them as a substitute. Our North American Indians were certainly unacquainted with the use of iron when the English, the Dutch, and other Europeans first landed on the Atlantic coast.

In the absence of conclusive information concerning the use of iron by any of the aboriginal inhabitants of America, the interesting fact may be parenthetically stated that iron is now made in Cherokee county, in the western part of North Carolina, by some members of the remnant of a band of Cherokee Indians. They use the primitive Catalan forge, which was introduced into North Carolina by the early white settlers.

North Carolina first gave to Europeans the knowledge that iron ore existed within the limits of the United States. The discovery was made in 1585 by the expedition fitted out by Sir Walter Raleigh, and commanded by Ralph Lane, which made in that year, on Roanoke Island, the first attempt to plant an English settlement on the Atlantic coast. Bishop, in his *History of American Manufactures*, says that "Lane and his men explored the country along the Roanoke and on both sides from Elizabeth river to the Neuse." Thomas Hariot, the historian of the colony, and servant to Sir Walter Raleigh, says that, "in two places of the countrey specially, one about foure-score and the other sixe score miles from the fort or place where wee dwelt, wee founde neere the water side the ground to be rockie, which, by the triall of a minerall man, was founde to hold iron richly. It is founde in manie places of the countrey else. I know nothing to the contrarie but that it maie bee allowed for a good marchantable commoditie, considering there the small charge for the labour and feeding of men; the infinite store of wood; the want of wood and decrenesse thereof in England; and the necessity of ballasting of shippes." But no attempt was made to utilize this discovery, as the colonists were in search of gold and not iron. In 1586 they quarreled with the Indians and returned to England. A permanent settlement in North Carolina was not effected until many years afterward. Iron ore was not mined in North Carolina nor was iron made within its boundaries until after many of the other colonies had commenced to make iron.

In 1607 the first permanent English colony in the New World was founded at Jamestown, in Virginia, by the Virginia Company of London, and on the 10th of April in the following year, 1608, the company's ship, commanded by Captain Christopher Newport, sailed from Jamestown, loaded with iron ore, sassafras, cedar posts, and walnut boards, and on the 20th of May it arrived in England. From Neill's history of the company we learn that the iron ore was smelted, and "seventeen tons of metal were sold at £4 per ton to the East India Company." This was undoubtedly the first iron made by Europeans from American ore. In 1610 Sir Thomas Gates, who had spent some time in Virginia, testified before the council of the company, at London, that there were divers minerals, especially "iron oare," in Virginia, lying upon the surface of the ground, some of which ore, having been sent home, had been found to yield as good iron as any in Europe. The iron here referred to was that which had been sold to the East India Company.

In 1619 the Virginia Company sent to Virginia a number of persons who were skilled in the manufacture of iron, to "set up three iron works" in the colony. The enterprise was undertaken in that year, and was located on Falling creek, a tributary of the James river, which it enters on its right or southern bank in Chesterfield county, about seven miles below Richmond, and about sixty-six miles above Jamestown. In 1620, as stated by Beverley in his *History of Virginia*, "an iron work at Falling creek, in James river," was set up, "where they made proof of good iron oar, and brought the whole work so near a perfection that they writ word to the company in London that they did not doubt but to finish the work and have plentiful provision of iron for them by the next Easter"—in the spring of 1621. But neither "plentiful provision" nor any other provision of iron was made on Falling creek in 1621, owing to the death of three of the master workmen who had the enterprise in charge. In July of that year the company sent over Mr. John Berkley, "formerly of Beverstone Castle, Gloucester, a gentleman of an honorable family," to take charge of the work. He was accompanied by his son Maurice and twenty experienced workmen. In a letter from the company to the colonial authorities, dated July 25, 1621, it was stated that "the advancement of the iron works we esteeme to be most necessarie, by perfecting whereof we esteeme the plantation is gainer. We therefore require all possible assistance be given to Mr. Berkley now sent, and all furtherance to his ship, especially good entertainment at their landinge." On the 12th of August of the same year the company, in a communication to the authorities, wrote respecting the iron works and the saw-mills which had been projected: "We pray your assistance in the perfectinge of these two workes; the profitt will redound to the whole collony, and therefore it is necessary that you extend your authoritie to the utmost lymitts to enforce such as shall refuse the help to a business so much tending to the generall good." On the 5th of December, 1621, the company again wrote, enjoining "all possible dilligence and industrious care to further and accomplish those great and many designes of salte, sawinge mills, and iron." In January, 1622, the authorities wrote to the company that "the care we have taken of the iron workes we reserve to be reported by Mr. Thresurer and Mr. Barkley himself." On June 10th the company wrote of "the good enterance w^{ch} we have understood you have made in the iron works, and other staple comodities," and added, "let us have at least by the next returnes some good quantitie of iron and wyne." But before this letter was written the colony had been visited by the Indian massacre of the 22d of March, 1622, in which John Berkley and all his workmen were slain and the iron works were destroyed. The works were not rebuilt. Beverley, writing in 1705, says the project of iron works on Falling creek "has never been set on foot since, till of late; but it has not had its full trial." In 1624 the charter of the Virginia Company was revoked. And thus ended disastrously the first attempt by Europeans to make iron in America.

The "good enterance" mentioned in the company's letter of June 10th doubtless referred to satisfactory progress in the construction of the works, but there is no positive evidence that iron was ever made on Falling creek. Letters from Mr. John Berkley had promised that "the company might relye upon good quantities of iron made by him" by Whitsuntide of 1622, but the massacre occurred before that time. Beverley, however, in referring to the Falling creek enterprise, says that "the iron proved reasonably good; but before they got into the body of the mine the people were cut off in that fatal massacre." The ore on Falling creek is described as having been brown in color. Mr. Berkley declared that "a more fit place for iron workes than in Virginia, both for woods, water, mynes, and stone," was not to be found; and Mr. George Sandys wrote to the company on the 3d of March, 1622, that Falling creek was fitted for ironmaking "as if Nature had applyed herselfe to the wish and dictation of the workeman; where also were great stones, hardly seene elsewhere in Virginia, lying on the place, as though they had beene brought thither to advance the erection of those workes."

We have failed to discover whether the works on Falling creek embraced a blast furnace and refinery or a bloomary only, but the frequent references to building stone in connection with the works, and the length of time and the number of workmen occupied in their erection, lead to the inference that a furnace formed a part of the enterprise.

No further attempt to make iron in Virginia appears to have been made for many years after the failure on Falling creek. In a pamphlet entitled *A Perfect Description of Virginia*, published at London in 1649, it is stated that "an iron work erected would be as much as a silver mine." In 1650 another pamphlet, quoted by Bishop, says of iron ore in Virginia: "Neither does Virginia yield to any other province whatsoever in excellency and plenty of this oare." In 1687, and again in 1696, Col. William Byrd, the first of the name in Virginia, set on foot the project of reviving the works on Falling creek, but it was not carried into execution. This is the project referred to by Beverley in 1705 as not having had "its full trial."

To encourage manufactures in Virginia the exportation of hides, wool, and iron from the colony was forbidden by an act of the assembly in 1662, on penalty of one thousand pounds of tobacco for every hide exported, fifty pounds of tobacco for every pound of wool exported, and ten pounds of tobacco for every pound of iron exported. The restriction was removed in 1671, "no successe answering the conceived hopes and apparent losses accrueing to all inhabitants by the refusall of those concerned to buy the comodityes aforesaid," but it was re-enacted in 1682. We cannot learn that during all the time covered by these enactments, and down to the beginning of the eighteenth century, there was a single pound of iron manufactured in Virginia. Notwithstanding the wise encouragement given by the Virginia Company and by some succeeding colonial authorities to the establishment of manufactures, the Virginia settlers for a hundred years after the settlement at Jamestown devoted themselves almost entirely to the raising of tobacco and other agricultural products.

R. A. Brock, Esq., of Richmond, a gentleman who has devoted much time to historical researches concerning Virginia, and who is at present corresponding secretary and librarian of the Virginia Historical Society, has recently published an account of some of the iron enterprises in the colony in the eighteenth century, from which the following interesting reference to the site of the iron works on Falling creek is taken:

> The Falling creek tract fell to the possession of Col. Archibald Cary some time prior to the Revolutionary war. Upon it he erected his well-known seat, the name of which became in the records of the period a part and parcel of his personal designation as Archibald Cary of Ampthill. He erected new iron works on Falling creek. "He purchased pigs of iron from Rappahannock, Patowmack, and Maryland. Of these he made bar iron. The profits, however, were so small that he abandoned his forge and converted his pond to the use of a grist mill about 1760. Nobody then knew of any iron mine convenient to Falling creek."
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> Falling creek is about a mile below Ampthill. Its waters still furnish motive power to a grist mill owned by Mr. H. Carrington Watkins, and known as the Ampthill mill. The creek is but an insignificant rivulet above the mill, but some twenty yards below it widens into a handsome little lake, and some quarter of a mile thence empties into James river.
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> About sixty yards from the mill, on the western bank of the creek and nearing the river, the writer picked up several small pieces of furnace cinder, presumptive relics of the iron works of 1622. The bluff adjacent and incumbent has, it is evident, from repeated washings of the soil, nearly covered the exact original site.
>
> On the opposite side of the creek, and to the east of the mill, is clearly indicated the site of the forge of Archibald Cary. Here we found numerous pieces of slag or cinder, some of them fully a hundred pounds in weight, and an irregular area, an acre or more in extent, covered with finely-broken or comminuted charcoal to the depth of fully two feet; a memorial of the fuel used.
>
> We were informed that about half a mile below Falling creek, near James river, there is a low piece of ground known to this day as Iron Bottom, where may be found plentifully what is known as bog iron on the surface. It will be recollected that the iron ore already cited as being mentioned by Sir Thomas Gates was described as "lying on the surface of the ground." We have also learned since our visit to Falling creek that at a point upon its banks, distant inward about two miles from the site of the iron works, there are numerous pits some five or six feet in depth, which it is evident, from the mineral character of their surroundings, furnished the crude ore for the original and ill-starred works.

In the eighteenth century Virginia became very prominent in the manufacture of iron, fulfilling in an eminent degree, although at a late day, the expectations which had been entertained of its iron-producing capabilities by the enterprising but ill-fated Virginia Company of London.

BEGINNING OF THE MANUFACTURE OF IRON IN THE NEW ENGLAND COLONIES.

Although iron ore in this country was first discovered in North Carolina, and the manufacture of iron was first undertaken in Virginia, the first successful iron works were established in the province of Massachusetts Bay. In 1632 mention is made by Morton of the existence of "iron stone" in New England, and in November, 1637, the general court of Massachusetts granted to Abraham Shaw one-half of the benefit of any "coles or yron stone w^{ch} shal be found in any comon ground w^{ch} is in the countryes disposeing." Iron ore had also been found in small lakes or ponds on the western bank of the Saugus river, near Lynn, soon after its settlement in 1629, and in 1642 specimens of it were taken to London by Robert Bridges, in the hope that a company might be formed for the manufacture of iron. This hope was realized in the formation of "The Company of Undertakers for the Iron Works," consisting of eleven English gentlemen, who advanced £1,000 to establish the works. John Winthrop, Jr., had previously gone to England, and he appears to have assisted Mr. Bridges to secure the organization of the company. He became a member of the company, as did others among the colonists. Thomas Dexter and Robert Bridges, both of Lynn, were among the original promoters of the enterprise. Alonzo Lewis, in his *History of Lynn*, published in 1844, says that in 1643 "Mr. John Winthrop, Jr., came from England with workmen and stock to the amount of one thousand pounds, for commencing the work. A foundry was erected on the western bank of Saugus river. . . The village at the foundry was called Hammersmith by some of the principal workmen who came from a place of that name in England." In Newhall's revision of Lewis's history, published in 1865, the iron works are said to have been located near the site of the present woolen factories in Saugus Centre, a suburb of Lynn, where large heaps of scoria are still to be seen. "This iron foundry at Lynn," says Lewis, "was the first which was established in America." Lynn is about ten miles northeast of Boston.

In 1644, and subsequently, as stated by Lewis, the general court granted many special privileges to the company. On March 7, 1644, it was granted three miles square of land at each of six places it might occupy in the prosecution of its business. On November 13, 1644, it was allowed three years "for y^{e} perfecting of their worke and furnishing of y^{e} country with all sorts of barr iron." The citizens were granted liberty to take stock in the enterprise "if they would complete the finery and forge, as well as the furnace, which is already set up." On the 14th of May, 1645, the general court passed an order declaring that "y^{e} iron worke is very successfull (both in y^{e} richnes of y^{e} ore and y^{e} goodnes of y^{e} iron)," and that between £1,200 and £1,500 had already been disbursed, "with which y^{e} furnace is built, with that which belongeth to it, . . and some tuns of sowe iron cast . . in readines for y^{e} forge. . . There will be neede of some £1,500 to finish y^{e} forge." On the 14th of October of the same year the company was granted still further privileges by the general court, on the condition "that the inhabitants of this jurisdiction be furnished with barr iron of all sorts for their use, not exceeding twentye pounds per tunn," and that the grants of land already made should be used "for the building and seting up of six forges, or furnaces, and not bloomaries onely." The grant was confirmed to the company of the free use of all materials "for making or moulding any manner of gunnes, potts, and all other cast-iron ware." On the 6th of May, 1646, Mr. Richard Leader, the general agent of the company, who is described as a man of superior ability, purchased "some of the country's gunnes to melt over at the foundery." On August 4, 1648, Governor Winthrop wrote from Boston to his son, who had removed to Pequod, Connecticut, that "the iron work goeth on with more hope. It yields now about 7 tons per week." On September 30th he writes again: "The furnace runs 8 tons per week, and their bar iron is as good as Spanish." Newhall quotes from a Lynn account book for 1651 the following entry: "James Leonnarde, 15 days worke about finnerey chimneye and other worke in y^{e} forge, 1: 13: 0. To ditto Leonard for dressing his bellows 3 times, 1: 10: 0." Edward Johnson, of Woburn, in describing Lynn in 1651, in his *Wonder Working Providence*, printed in that year, says: "There is also an iron mill in constant use;" and Mr. Lewis states that, prior to 1671, "the iron works for several years were carried on with vigor, and furnished most of the iron used in the colony." After 1671 they passed under a cloud, and about 1688 they appear to have finally ceased operations. Their owners were harassed after 1651 with frequent lawsuits, arising from the overflow of the water in the dam. The fear that the works would create a scarcity of timber also appears to have added to their unpopularity. Hubbard, writing about 1677, says that "a work was set up at Lynn upon a very commodious stream, which was very much promoted and strenuously carried on for some time, but at length, instead of drawing out bars of iron for the country's use, there was hammered out nothing but contentions and lawsuits."

From the foregoing details it is plainly established that the enterprise at Lynn embraced a blast furnace or "foundery" and a refinery forge. The term "foundery" was long a synonym for "furnace," castings being made directly from the furnace, as has been previously stated. This practice continued in this country down to almost the middle of the present century, and is still followed in many European countries. That the furnace was in operation in May, 1645, is certain, and that the forge was in operation in September, 1648, is equally certain. These dates may be accepted as definitely determining, respectively, the first successful attempts in this country to make "sowe iron" and other castings in a blast furnace and to make "barr iron" in a refinery forge from "sowe iron."

Joseph Jenks was a machinist at the Lynn iron works, who had come from Hammersmith in England, and was a man of much skill and inventive genius. He prepared the molds for the first castings that were made at Lynn.

REPORT

ON THE

COTTON MANUFACTURES OF THE UNITED STATES.

BY

EDWARD ATKINSON,
SPECIAL AGENT.

LETTER OF TRANSMITTAL.

BOSTON, MASS., *January* 1, 1883.

Hon. C. W. SEATON,
Superintendent of Census.

SIR: I have the honor to submit herewith a report upon the cotton manufactures of the United States.

Very respectfully,

EDWARD ATKINSON,
Special Agent.

THE COTTON MANUFACTURE.

It may be suitable to begin a general report, to be submitted with the census statistics, of the present condition of the cotton manufacture by repeating the last paragraph of the special report containing the statistics, as follows:

> At the Atlanta cotton exposition of 1881 were to be found five women from the mountain section of Georgia spinning and weaving coarse cotton fabrics by the use of the hand-card, the spinning-wheel, and the hand-loom. They were representatives of a large section of the United States and of a very considerable population, variously estimated at from 200,000 to 300,000 in number, who have not been reached until lately by the railroad, or been able to avail themselves of modern arts to any extent. At the measure of their work, two carders, two spinners, and one weaver could produce eight yards of coarse cotton cloth in a day of ten hours. The same number of persons employed in the modern cotton factories can, by the use of machinery, with far less arduous labor, produce 800 yards of the same cloth, or one hundredfold as much.
>
> Of the whole force engaged in the specific cotton manufactures of this country, numbering 172,000, about 160,000 are employed in making woven goods and yarns for our home consumption. It would take 16,000,000 persons to make the same number of yards by means of hand work, and the cloth would be of a far different kind: more durable, it is true, but coarse and unsightly. When it is remembered that the larger portion of the present population of the globe is now clothed in cotton fabrics made by hand, and that even those who use machine-made fabrics are served as yet with only one-quarter to half as much cloth as the people of this country average in a year, the future field for industry and for commerce in this department may be imagined, but cannot be proved by statistics or by any deductions from the census data.

The modern cotton factory has been developed within a century, having been made possible by the inventions of Arkwright, Crompton, and Cartwright, and by the application of steam to the working of the factory. The progress of a century might be observed within a two days' journey from Washington. The hand machines of which the carders, spinners, and weavers of the mountain section are still making use, although prehistoric in their kind, are yet of the same type as those which are now used in China, and which have been used there for more centuries than the record of history yet covers; they are the same as those in use in the rest of Asia, by means of which the people, numbered by hundreds of millions, are served; they are the same as those pictured upon the walls of the pyramids, and like what are now used in Africa for her unnumbered hordes; they are the same as those which may be found in all parts of South and Central America.

The world uses at this time probably about the equivalent of 12,000,000 bales of cotton of American weight, of which the United States produce one-half, and Egypt, South America, and India almost all the rest. The portion of this crop which is listed in the commercial tables, and which is worked upon modern machinery, numbers a little over 7,000,000 bales; the rest is never counted in commercial tables, and is worked on hand machines, such as have been described.

Various tables have been made giving approximate estimates of the consumption of cotton per head of population, notably in some of the English statistical reports. In one, compiled a few years since, the estimate reached 3 pounds per head, on an assumed population of 1,400,000,000; it cannot exceed 4 pounds. In this country it is over 15 pounds per head.

The actual annual cotton crop of the world cannot be ascertained with precision, but an approximate estimate can be made. The commercial crop, or what may be called the portion which is worked by complex machinery contained in the factories of Europe and America, is accurately known. The most complete estimate is contained in the annual statement of Thomas Ellison, of Liverpool, from whose most recent report of spindles the following data are taken. A considerable increase of spindles has been added since this report was made:

> In the following statement we give an approximate account of the quantity of cotton consumed in each country in Europe and the various groups of countries in Asia, Africa, America, and Australia. The population figures represent thousands (86,260 = 86,260,000); the quantities of cotton and cotton goods represent millions of pounds (142.5=142,500,000 pounds). There are three columns of quantities: First, the raw cotton spun in each country; second, the weight of goods and yarns imported into each country from Great Britain; and, third, the total of these two. The table also shows the per capita consumption in each country of raw cotton, of goods, etc., imported from England, and the aggregate of both. The population of Russia includes that of Asiatic Russia. In the column of "Goods, etc., imported from Great Britain" there is a blank opposite Switzerland, because the shipments are sent via other countries. A large part of

the Swiss production goes to Turkey and to various continental countries. Part of the production of Holland goes to Java, and part passes to Germany, Switzerland, etc. Belgium also forwards largely to the interior of the continent. The exceptionally large consumption of cotton in the United States is owing to the smaller per capita consumption of wool and flax compared with Europe. Moreover, the figures include goods imported.

Countries.	Population.	Raw cotton consumed.		Goods imported from Great Britain.		Total consumption.	
		Pounds.	Per head.	Pounds.	Per head.	Pounds.	Per head.
The world	1,403,396	3,163.6	2.26	1,041.7	0.74	4,205.3	2.98
Russia	86,260	142.5	1.65	2.6	0.03	145.1	1.68
Sweden and Norway	6,291	24.8	3.94	8.0	1.27	32.8	5.21
Denmark	2,023	....	....	5.0	2.47	5.0	2.47
Germany	42,727	249.1	5.83	65.2	1.52	314.3	7.35
Austria	37,331	101.3	2.71	7.9	0.21	109.2	2.92
Holland	4,130	13.8	3.34	43.0	10.41	56.8	13.75
Belgium	5,336	43.2	8.09	17.4	3.26	60.6	11.35
Switzerland	2,776	42.5	15.30	....	....	42.5	15.30
France	36,906	230.0	6.23	19.9	0.54	249.9	6.77
Spain and Portugal	21,275	79.9	3.75	25.7	1.21	105.6	4.96
Italy and Malta	26,948	52.8	1.96	51.1	1.59	103.9	3.85
Greece	1,450	....	....	6.9	4.75	6.9	4.75
Turkey, Roumania, etc	15,353	....	....	27.0	2.40	37.0	2.40
	288,806	979.9	3.39	289.7	0.99	1,269.6	4.38
Russia	86,260	142.5	1.65	2.6	0.03	145.1	1.68
Rest of continent	202,546	837.4	4.11	287.1	1.41	1,124.5	5.52
Great Britain	34,180	195.7	5.72	....	....	195.7	5.72
Total Europe	322,986	1,175.6	3.63	289.7	0.89	1,465.3	4.52
Turkey, Persia, etc	24,540	....	....	38.0	1.54	38.0	1.54
India	250,000	295.0	1.18	330.0	1.32	625.0	2.50
China	435,000	1,000.0	2.29	100.0	0.23	1,100.0	2.52
Japan	33,620	65.0	1.98	20.0	0.59	85.0	2.52
Siam, Java, etc	12,500	....	....	30.0	2.40	30.0	2.40
Total Asia	755,660	1,360.0	1.79	518.0	0.69	1,878.0	2.48
Egypt and North Africa	17,000	....	....	34.0	2.00	34.0	2.00
West, South, and East Africa	13,000	....	....	28.0	2.15	28.0	2.15
Interior of Africa	200,000	....	....	....	....	....	....
Total Africa	230,000	....	....	62.0	0.26	62.0	0.26
United States and Canada	48,850	628.0	12.85	22.0	0.45	650.0	13.30
Central and South America and West Indies	43,250	....	....	135.0	3.12	135.0	3.12
Total America	92,100	628.0	6.82	157.0	1.70	785.0	8.52
Australia	2,650	....	....	15.0	5.66	15.0	5.66

Official reports show that the consumption of cotton goods in India is about 2½ pounds per head per annum. We have assumed that a similar rate of consumption obtains in China and Japan. Russia imports some cotton from her Asiatic possessions. The quantity varies considerably. In 1861 it was only 150,000 poods of 36 pounds each; during the American war it rose to 750,000 poods; since then it has fallen off. Some cotton is grown and manufactured in the interior of Africa, but it is impossible to say how much. We cannot take the population as a basis, as estimates of that range from 150,000,000 to 400,000,000. We have adopted 200,000,000 in addition to the estimate of the number of inhabitants on what may be termed the margin of the continent. Some native cotton is also consumed in Turkey and in the various countries of South America. The entire production of cotton in the world may be estimated as follows:

	Pounds.
Imported into and consumed in Europe	2,217,000,000
Consumed in the United States	628,000,000
Native consumption in India, China, etc	1,360,000,000
Total as above	4,205,000,000
Native consumption in Turkey	20,000,000
Native consumption in Africa, one pound per head	200,000,000
Native consumption in South America, etc	40,000,000
Received by Persia from Bokhara, etc	15,000,000
Total crop of the world	4,480,000,000
Equal to bales of 400 pounds	11,200,000

of which about one-half is grown in the United States, and one-half of the whole is spun in Europe.

I would not fully accept Mr. Ellison's estimate, especially in reference to China, a country of which a large and densely-populated portion is in a temperate zone where the winters are severe. Hence the estimate of only 2½ pounds per head would be quite insufficient, as this is the average consumption of India, where a breech-cloth constitutes the entire dress of by far the largest part of the population. Gentlemen who have long dwelt in China—one holding high official position—concur in my estimate of 5 pounds per head.

Since the foregoing computation of the spindles of the world was made a considerable increase has been added. I am therefore of the opinion that at the rate of 5 pounds per head for the Chinese, with increased consumption elsewhere, the present consumption of the world would be nearly or quite 12,000,000 bales of the American commercial weight of 480 pounds each, of which the United States now produce about one-half. At the present average per acre the cotton of the world could be produced in this country on less than 25,000,000 acres, or upon a trifle over 40,000 square miles; but this would be at the rate of less than half a bale to the acre. Improved methods and intelligence applied to farming are bringing the uplands of the United States up to an average practically of one, two, and even three bales to the acre at less cost than was ever before known, while other improvements in method and social order are bringing the bottom lands of the Mississippi and of other parts of the South to more than an average of a bale to the acre. The seventeen crops of cotton which have been grown since the end of our civil war outnumber the seventeen ante-war crops by almost 17,000,000 bales, or at the rate of 1,000,000 bales a year increase. When the same intelligence which is now being applied in many places shall be widely extended, and the intensive system of farming shall have been generally adopted, our whole present crop of 6,000,000 bales may be grown upon only one acre in one hundred of the area of the cotton states; and the whole crop of the world might then be grown upon only two acres in one hundred of the same area.

What is cotton; why does it spin; and who can compete with us in the production of the fiber? Cotton is the wing of the seed of one of the plants belonging to a variety of which the Hibiscus and Mallow are well-known specimens growing elsewhere. It is indigenous in many parts of the world, both in tropical and temperate regions, but the useful sorts are those which grow in the southern parts of the temperate zone.

A tree cotton is found in the tropics, producing a fiber very silky in appearance, resembling in structure the fiber of the Asclepias, but useless, like the latter, for spinning purposes, for want of the form and structure which make it possible to spin the cotton of commerce. A vine cotton may be found in some of the West India islands. In China and Japan are found varieties producing a short, clean, and very white staple, practically useless except it be spun and woven by hand. In India many varieties are to be found, commonly known as "Surats", a name which belongs to a district, but which is often applied to all East Indian cotton. East Indian cotton is, as a rule, short in fiber and rough in its character, adhering closely by it send to the seed, and is therefore difficult to remove, except with great waste. There is, however, one exception to this rule: in the Dacca province a long and fine staple is grown, which is produced by a class of people with whom its cultivation is an hereditary employment, and from which the fine muslin known as "woven wind" is manufactured.

In Africa are to be found several varieties; but the only kind known to commerce is the cotton of Egypt, next in quality to our sea-island staple. Aside from this the cotton of Africa is short and woolly. There are large areas of land, formerly irrigated, but now desert, upon which a million or more bales of the most valuable cotton could be annually grown if Egypt were well governed and labor had its true reward.

In Brazil a considerable quantity of useful cotton is now produced, but slavery stands in the way of any great increase or improvement of the staple. There are vast tracts of land on the Paraguay and Parana rivers capable of producing the best varieties; but as yet these places lack good government and that security to property which can alone assure adequate labor and good cultivation. The same may for the present be said of Mexico; but the conditions are so rapidly changing in that country that Mexico may yet become an important factor in the cultivation of the cotton crop of the world.

Cotton has been raised in Asia Minor, Turkey, Italy, and the islands of the Pacific; in fact, the area of land adapted to its growth in some degree is practically unlimited; but the area which produces the most useful varieties is at present substantially limited to the southern portion of the United States.

No treatment of the manufacture of cotton can rightly begin without giving the reason why cotton spins.

Nature begins to twist each fiber upon its own axis, else man could make no use of it. It is the only fiber, either vegetable or animal, with the exception of silk, which can be worked without any preparation or machine just as it comes from the boll or fleece. It can be imagined how some Indian woman in central Asia first gathered the fiber as it hung from the boll, twisted it with her fingers into a strand, as one may now do; then, holding it by the middle with her teeth, doubled it and made a strong, rough cord; and then, making a bobbin of a bit of bamboo reed, and tying the ends of the cord to other reeds, interlaced them, and made the first web of cotton cloth. Any one can do this to-day with cotton, and it would be difficult or impossible to perform this work with any other fiber.

The next step in the process might have been the one which is even now practiced in making the finest fabric ever spun and woven in the world—the Dacca muslin, previously referred to, and known as the "woven wind".

The cotton is separated from the seed by a hand machine known as the *churka*, of which the modern roller gin is but a modification; and no invention has ever yet displaced the roller gin in the treatment of the finest fiber, like that of Dacca and the sea-island cotton of America.

Next may have been the application of the fish-bone to the carding of the fiber, which is still in use, and of which the modern card is but a modification. Twisting upon a distaff, in the same way as the cotton is spun in India and flax in Italy, may be the next step in the progress of the art, and at last the weaver may have constructed such a loom of reeds as is pictured upon the walls of Babylon, while the weaver, sitting under a palm-tree, as she does to-day in India, and weaving only in the early morning, when the dew makes the handling of the fiber possible, may have brought the art slowly and gradually to the perfection of the "woven wind".

In the whole treatment of cotton as it is now practiced in the finest factory of modern kind there is but one original invention; all else is but a change or modification of these pre-historic methods. That one invention was the one which Sir Richard Arkwright borrowed from a previous inventor and put in use about a century ago, namely, the extension of the strand prior to the twisting by the spindle. This was accomplished by the use of several pairs of rollers, one placed in front of the other, and those in front working at a higher speed than those behind. Yet Sir Richard Arkwright's invention itself is imperfect; and whoever discovers a substitute for the leather covering of the top rolls which are used in this process may add from 5 to 10 per cent. to the capacity of every spindle and loom now in use in the world.

It has been said that nature begins to twist the fiber in the boll. In its immature condition it is a simple cylinder folded and *not* twisted, containing watery sap, and held in place by the outer covering, or boll, until it matures; and when the seed is mature the watery sap dries up or condenses upon the walls of the cell, gives to it a twist or convolution like a corkscrew or a shaving as it comes from the plane, and imparts to it such elasticity that it bursts the outer shell, or boll, and hangs with the seed attached to it, ready for the wind to scatter it in the field.

The only other original invention ever applied to the cotton fiber was that of Eli Whitney, whose saw gin, afterward improved and developed by Carver, made the preparation of cotton for the spinner quick and at the lowest cost. It may be said of this invention that while it gave the world at the lowest cost a supply of the cheapest fiber yet applied to the use of man, it perpetuated slavery by nearly a century, caused the greatest civil war ever known in modern times, but is still an unscientific method of treatment, justified only by the quantity rather than by the quality of its work.

The process of what is called manufacturing the cotton fiber into yarn and cloth begins with the process of ginning, which must of necessity be carried on near the field where the cotton is grown. It is the most important department in the whole series of operations to which the cotton fiber must be subjected; and as yet there has been less of science and art and less of the modern system of division of labor applied to this department than to any other. Under the former system of labor cotton was grown mainly upon large plantations, each of which contained within itself all the tools and implements necessary to put the cotton into a bale. The "cotton-gins", as these engines were called, by which the fiber is separated from the seed, were a part of the tools of the farmer and of the planter. Great changes have occurred since the end of our civil war. The present condition of the art may be described as follows, being the result of an investigation lately made for me by an agent, with a view to business enterprises:

> In describing the various ginning establishments as they exist at present we shall divide them into three general classes, according to the source of power used to operate them, viz:
>
> 1. Ginneries run by horse- or mule-power.
> 2. Ginneries run by steam.
> 3. Ginneries run by water-power.
>
> We shall only deal with the first two classes, as the third class is far from common.
>
> Class 1 is the commonest of all, and is universally used when the farmer does the ginning only for himself and one or two neighbors. With the larger planter the gin is used simply as any other tool in the preparation of his crop, and he does not attempt to make it a source of profit. This, however, is only the case on the large plantations of the South and Southwest. Among a community of small farmers—that is, farmers who raise not over 30 bales of cotton each in a season—there are always a number of public ginneries, which gin for anybody who comes along. These ginneries are not usually farther apart than a mile or two on the average, and they gin only a few hundred bales in a season. Ginneries of this kind are almost invariably of the first kind, *i. e.*, operated by horse- or mule-power. This class of ginning establishments may be divided, as to its arrangements, into three parts:
>
> 1. The gin-house.
> 2. The lint-room.
> 3. The press, or "screw", as it is invariably called.
>
> The gin-house is a common two-story, gable-roofed frame building, of very rough construction. The lower story is open on all sides, forming a sort of shed for the reception of farming implements during the summer or other months when the running-gear is idle. The upper story is inclosed on the sides, and contains only the gin or gins, the rest of the floor space being used for the cotton in the seed and for the seed itself. The cotton in the seed is brought from the field in wagons and unloaded into the upper story by being carried up an outside ladder in baskets. It is then piled up on the floor until fed to the gin, which is done by hand. In the times of slavery every gin-house had in front of the door a large platform, on which wet cotton, or cotton picked early in the morning, was spread to dry. Unfortunately these platforms for drying cotton are no longer to be found. The seed as it comes from the gin is piled up in another part of the floor until it is desired to remove it.
>
> The power is derived from the motion of four mules, one being attached to each one of four levers seen projecting beyond a large crown wheel. This motion is communicated by means of a small gear wheel to a horizontal shaft, and thence by means of a belt to the

gin on the floor above. All the parts of this contrivance are of wood, except the teeth of the gears, and are of very rude construction. This is the usual form of running-gear used at all the gin-houses throughout the country, where the ginning is not done by steam- or water-power, and is the most common of all.

The lint-room varies in size from one-third to the full length of the end of the gin-house to which it is attached. The lint cotton is thrown by the brush cylinder of the gin through a flue into this room. Strange to say, the lint-rooms are not brushed or swept out from one season to another, or from one decade to another, for that matter. The dirt may accumulate an inch in depth on the floor and walls, but no broom is ever carried into this room from year to year. What encouragement is there, therefore, to be careful in picking cotton when it is to be ginned in such places?

The ordinary type of press used is known as the old "buzzard-wing" press. The box is made of rough, unplaned boards, the screw is of wood, rudely chiseled out, and the whole construction is of the rudest and most primitive kind. The power is applied by means of long levers, which extend on either side. To these levers mules are hitched and slowly driven around in a circle, thus forcing the huge follower block down upon the cotton until the required pressure is obtained. The press-box is filled with cotton by carrying it from the lint-room in baskets, a negro standing in the box and trampling it down as it is put in. The small roof at the top moves with the whole, and frequently there is another roof lower down, forming a sort of little shed, in which is the box. Under this shed in *ante bellum* times the baled cotton was stored until shipped. The press usually stands about 50 feet from the lint-room of the gin-house, and all the lint has to be carried to the press at this distance, through mud and dirt, in all weathers.

Such is a fair account of the buildings and machinery for preparing cotton for the factory, formerly used almost exclusively throughout the South, and still the kind most frequently met with. More crude and wasteful devices for the manipulation of cotton in the first instance, considering the importance of the work to be done, could not be found in India or China.

The stages through which ginneries of this class passed to the improved steam ginnery, like one in Montgomery, Alabama, are interesting to note. The rudest part is the buzzard-wing screw, standing 50 feet from the lint-room. This was the first to go under the new *régime*, and an improved press was put inside the gin-house. The invention of the condenser next made the lint-room unnecessary, and when steam-power was applied the old clumsy running-gear was thrown away.

These improvements bring us to the second class of ginneries, those operated by steam.

Among the second class of ginneries we find those public ginneries which are run solely for the profits of the business, and which are generally placed in some little village in the neighborhood of a trade center.

These ginneries handle from 400 to 1,000 bales in a season, and the cotton is frequently hauled to them from considerable distances. Connected with the ginnery and run by the same engine is frequently a flour-mill or grist-mill, which serves for a business for that portion of the year during which no ginning is done. At centers where large quantities of cotton are shipped to factors ginneries find it profitable to have a picker-room, where poorly packed and injured cotton is unpacked, assorted, and repacked in new bagging and ties—a profitable branch of the work. In establishments of this class the presses used are always of an improved kind, of which a very large variety are in use. They all depend for their action either upon a screw or screws, or upon a combination of levers, with the exception of the press in use at Keplinger's steam ginnery in Montgomery, which was operated entirely by means of gear wheels and a rack. Most of these improved presses are run by hand, a few only being operated by steam. The buildings of these establishments are great improvements on the old plantation gin-houses; the machinery is better and more carefully attended, and altogether the methods of and facilities for handling the cotton are vastly superior to those in vogue upon the farms.

Whether the cotton is turned out in any better condition in the end is a matter of doubt. The facts and circumstances seem to indicate that while the cotton in being ground and packed is handled with more expedition, the application of steam-power to gins *has really injured the staple.* During the ginning season the public ginneries are always crowded, each man desiring to have his cotton ginned immediately and to return home. The proprietor of the ginnery is interested in getting a large number of bales to gin, and hence works his machinery with a view to accommodating his customers rather than with any idea of turning out good and uninjured staple, which his customers do not appreciate.

The ginner, therefore, runs his machinery at the highest possible speed, and also gins the seed as closely as possible, in order to make a large yield of lint. If the truth were known, all "nepped" and overginned cotton could most probably be traced to steam ginneries.

In these steam ginneries the type of engine used varies considerably, being either portable, semi-portable, or stationary. In the portable and semi-portable engines we find the engine and boiler all in one, the engine surmounting the boiler. The capacity of this type of engine is limited to about ten horse-power, so that for establishments which require more power a small stationary engine is used. These engines are of cheap construction, and are most commonly placed alongside of the boiler in an open or partly open shed attached to the gin-house. The boiler is frequently entirely uncovered, the only setting being to put it up on some brick supports a few inches above the ground.

The steam-pipes and all conveyors or reservoirs of steam are entirely unprotected by sheathing or otherwise, and indeed there is but small incentive to the economical use of steam in a region where fuel is so plenty and so cheap.

The improved steam ginnery of to-day has, then, neither the buzzard-wing press nor the lint-room. In place of these an improved press is put in the gin-house, and the condenser has done away with the lint-room.

The seed-room, into which the seed is carried by a mechanical device, occupies a position similar to that of the old lint-room. The old, clumsy running-gear and mules are gone, and are replaced by the expeditious little steam-engine. Add to these feeders for the gins and cleaners for the seed-cotton, and we have the latest and best-appointed ginnery, but *only one containing all these improvements has been seen by us.*

The kinds of gins used are so various that it has not been possible for us to classify them as to merits. The gins seen most often were the Carver, Pratt, and Gullett. In ginneries of the first class there is usually one gin, turning out from 2 to 3 bales a day, and it is generally either a 40 or 60 saw gin. In ginneries of the second class there are generally two 60-saw gins, turning out from 12 to 18 bales a day.

In conclusion, we may say that it appears to us that all the improvements have been in the direction of handling the cotton more easily and expeditiously in and about the ginneries. *The idea of improving the staple by scientific ginning has not been seized upon to any perceptible extent. On the contrary, there is reason to believe that better staple comes from the old plantation ginnery than from the improved steam ginnery.*

Beside what we have already said upon this point, the persons who operate the engine and other machinery in connection with the steam ginnery are, as a rule, unaccustomed to running machinery, and can see no advantage in steam-power except that ginning could be done with it much faster. In the old ginneries there was no occasion for hurry. It was known that the capacity of a 40-saw gin was about 2 bales a day, and whether more or less was ginned made no material difference.

This was, however, the record of the census year, and is already out of date. Since that time great changes have occurred, and vast progress has been made in this most important department. Machines for cleaning the cotton in the seed and preparing it for the cotton-gin, which had hardly been heard of before the Atlanta cotton exposition of 1881, have been introduced and sold in large numbers. Cotton-ginning establishments, in which as much art and science have been applied as in those of Egypt, established by English capitalists, have been set up in several places, and the old methods, by which the cotton has been depreciated after it had been picked, are rapidly going out of use. Cotton is also in a great measure becoming the product of intelligent farmers dwelling upon healthy uplands, and by improvements which have been introduced during the last few years its cultivation has been carried farther north in latitude and higher up on hill and mountain slopes than was ever thought to be possible in former days.

The great Appalachian chain of mountains, extending from the northeast to the southwest, marks a line on which the moisture brought in by the great Gulf Stream is condensed, falling in frequent showers, but seldom in heavy storms, over the Carolinas, Georgia, and Alabama, on whose uplands healthy homes for white cotton farmers are being established almost without limit. To the west of this chain the great valley of the Mississippi and its tributaries, bordered by bottom-lands of untold fertility, offers the boon of great crops to compensate for the less healthy conditions of climate; and to these rich river bottoms colored laborers, who are more free from danger of malaria, are trending in ever-increasing numbers.

In Texas the melting snows of the far-distant Rocky mountains, flowing into the arid regions of the northern part of the state, burst forth from the ground as rivers fully grown, lending moisture to the soil over vast areas, even before the rivers appear in great springs. Throughout this vast area, fitted for the cultivation of the cotton-plant, the soil is filled with the shells of minute infusoria, that serve in part as the source of the inorganic material which is needed in very great quantity to produce the cotton-plant. Over all this vast area is found a climate which is not tropical, and in the largest part of this area white men, as well as blacks, can live in comfort and health. The mean summer temperature of the upland cotton country is not as high as that of the lower parts of Philadelphia or other parts of Pennsylvania, while the extremes of heat in Saint Louis, Missouri, are greater than in New Orleans, Louisiana.

To Italians, French, Spanish, and the inhabitants of southern Germany, who are accustomed to the climate of warm countries, these portions of the South offer homes and work where a comfortable subsistence can be gained more quickly than elsewhere in this country, and where there is more than the average opportunity to create wealth.

The use of the seed is adding profit to the production of the fiber; but this does not form a part of the work now in hand.

In the departments of manufacture which must be found near the field—ginning, baling, and pressing cotton—there is yet a vast field for invention and improvement, in which but a beginning has been made. In the treatment of the seed, the extraction of the oil, and the conversion of the remainder into food, great improvements have been made. There is yet another field for profit in the conversion of the plant itself to purposes of food for animals, and the investigation of this subject has just begun. The fiber takes from the soil for each bale of 500 pounds only 5 pounds of inorganic elements. The oil may also be removed, and yet the fertility of the soil will not be touched. But not only in the cottonseed cake, but in the root, stalk, stem, and burr and hull of the plant, there is 5 per cent. of the phosphates of potash and lime, magnesia, and other inorganic materials—200 to 225 pounds to each bale of cotton are to be found in the plants from which the bale is made, or about 40 per cent. of its weight.

When all the parts of the plants are worked, as they may be, either into fodder or directly into fertilizers, the cotton-field may become richer every year; and land which has only produced one bale to eight acres, like Farish Furman's farm in Georgia, will be brought in a few short years to two or three bales to the acre.

We may next treat the subject of the cotton manufacture in the factory.

The cotton manufacture of the United States may be now considered more firmly established than ever before. The method on which the business is conducted in the United States varies greatly from that of any other country; and this difference arises mainly from a difference not only in the habits and customs of the people, but also in their condition and intelligence.

The home market is the most important one, and may long continue to be so, although the export demand for our fabrics now takes from 7 to 8 per cent. of our annual product, and is likely to increase.

In contrast with the cotton manufacturer of Great Britain, our principal rival, we are therefore called upon to meet the demands of an intelligent class of customers living under substantially uniform conditions and varying but little in their requirements. Hence we are not called upon for the great variety of fabrics that must be supplied by Great Britain. In consequence of this demand for a great variety of fabrics the work of the cotton manufacture of England is much more divided than with us. With the exception of a few large establishments, working mainly to supply the home market, few goods are known in England by the name of the factory in which they are made, nor are they sold under the name of the manufacturer; but to a very large extent the yarn is spun in one establishment, woven in another, and finished in a third. The gray cloth is sold to the warehouseman, or to the merchant, to be stamped and packed by him, or to be dyed, bleached, or printed under his direction. If English goods had been sold under the name and stamp of the manufacturer, as cotton goods are in the United States, perhaps the substitution of clay for cotton might not have been carried to so great an extent. In the United States cotton goods are spun and woven in the same factory, and, whether sold in the gray or bleached, they are almost all stamped and marketed under the name of the factory in which they are made. Each factory, therefore, has its reputation to sustain, and whether the fabric be coarse or fine it is the effort of every one to make it good of its kind.

The same rule applies to printed calicoes. These are marketed under the name of the works in which they have been printed, and the reputation and permanent existence of these works rest upon uniformity in quality, excellence in color and style, and constant progress in the art of design.

We may not claim to be more honest than our rivals, but it is a great error to suppose that it is permanently profitable to make an article that is not what it purports to be. A cotton fabric may be of a low grade, and may be intended to sell at a low price, but yet it is not profitable to substitute clay for cotton; the fabric, whatever it is, has its name and reputation, and must be true to them, or else the demand for it will sooner or later cease. Even goods that are made for linings, and that need to be starched and stiffened in order to be used, must have a uniform quality in the fabric itself to hold a permanent place in our market. Dyed goods that require to be woven on heavily-sized warps cannot, except by rule, be loaded with sizing. If an attempt is made to introduce an article in which clay has been added to make it heavier, it is immediately detected, because the use of sewing-machines is almost universal, and the clay in the fabric heats the needle and exposes the fraud.

In stating those conditions under which the manufacture of cotton is conducted in the United States for the home demand it is not intended to imply that the use of a foreign substance to give additional weight to a cotton fabric is, of necessity, a fraud. For instance, there is a very large demand in China for materials for the grave-clothes of corpses, and for this use "earth to earth, and dust to dust" may be considered a legitimate rule, even if the earth is conveyed in the fabric which is nominally made of cotton. Some of the finest cotton fabrics yet made in the United States, which closely resemble silk, are used mainly for lining coffins.

The principal market for our own fabrics is found among the thrifty working people, who constitute the great mass of our population.

It has therefore happened that, although we have not until recently undertaken the manufacture of very fine fabrics, the average quality of the fabrics that we do make is better than that of any other nation, with the possible exception of France. It is for the wants of the million that our cotton factories are mainly worked, and we have ceased to import staple goods, and shall never be likely to resume their import. On the other hand, we may for a long period continue to import the finer goods that depend mainly on fashion and style for their use, and that are purely articles of luxury. As has been stated, the substantial fabrics that constitute the main part of our cotton manufacture, and that are used by the masses of the people, are of the best of their kind, with the possible exception of those made in France. The French peasantry are a sagacious and truly economical race, and will not buy a poor fabric if they can get a good one; hence the cotton fabrics for their use are of a very substantial kind, and are much more free from adulteration than those of any other country in Europe. The common cotton fabrics of England, Belgium, and Germany could hardly be sold in the United States at any price.

The finest printed calicoes of France and England may be the best of their kind; but the printed calicoes for the use of the multitude, and which constitute the really important branch of this department of the manufacture, are of much better quality in the United States than in Europe, and are also of finer colors and of more varied styles.

In fact, one of the chief obstacles that it has been necessary to overcome in the introduction of unbleached American cotton fabrics in the English market, and in other markets heretofore supplied by England, has been their apparently open texture, owing to the absence of heavy sizing. In the United States the sizing used upon the warp, and which is necessary in order to weave it, is made from corn or potato starch, free from any substance intended to make it heavier. In the gray cloth the sizing, therefore, constitutes only 2½ to 5 per cent. of the weight, and when the fabric is washed it shrinks more in measure than it loses in weight; hence a square yard washed and dried without stretching will be heavier than a square yard taken directly from the loom.

In England, on the other hand, even the pure sizing is made from wheat-flour, which is very glutinous; and the fabrics thus woven, even where no adulteration is intended, lose from 10 to 12 per cent. of their weight on the first washing. These pure goods are, however, made chiefly for the home consumption of the richer classes of England. The greater part of the English cotton fabrics exported or used by the working classes are loaded with from 10 to 40 per cent. of clay and other substances. The art of sizing has been highly perfected in England, and has been made the subject of very numerous patents; and, as the use of clay and flour to the extent of 100 pounds to each 100 pounds of cotton-warp yarn involves great danger of mildew, many ingenious chemical applications have also been patented to serve as antiseptics, such as chloride of zinc, chloride of calcium, common salt, white vitriol, etc. These various antiseptics are compounded with flour, gypsum, soapstone, china clay, and other heavy substances in various ways. The English text-books upon the art of sizing are instructive and suggestive, especially in respect to the rules for the purchase of the most glutinous kinds of flour and for the detection of adulteration in the flour, it being obvious that unless the flour is pure and well adapted to the purpose it would be necessary to use cotton instead of clay to make up the weight of the fabric.

It will, of course, take a good deal of time to accustom buyers to the more open texture of cotton fabrics in which no clay is used; but as time passes American fabrics are being steadily substituted for those previously used by foreign nations, especially in China.

Since the year 1860 the cotton manufacture of the United States has been exposed to greater vicissitudes than any other important branch of national industry, and the wonder is not that there should have been some disasters, but that it should have survived at all in the hands of its original owners. In 1860 the whole number of spindles in the United States was 5,235,000. From 1857 to 1860 the cost of constructing a spinning and weaving factory on medium fabrics woven of No. 25 yarn was from $16 to $20 per spindle (the number designates the number of skeins of 840 yards of yarn each in one pound). The value of a bale of cotton of 480 pounds was from $40 to $50. Then came the combined effects of war, paper money, and scarcity of cotton. At one period more than two-thirds of the cotton machinery of the United States was stopped; the value of a bale of cotton rose to over $900, and the price of some kinds of goods was seven to eight times the present price. A little later new mills were constructed which cost from $30 to $40 per spindle.

At the date of the census the number of spindles operated in the specific manufacture of cotton fabrics was 10,653,435; but the spindle has changed in its productive power, and each spindle of 1880 was much more effective than that of 1860. The value of the bale of cotton was again from $40 to $50; the standard printing-cloth, which reached 33 cents a yard during the war, was worth 4 cents; the No. 25 mill for spinning and weaving could be built for from $14 to $18 per spindle; our export of cotton fabrics was more in value and much more in quantity than in 1860, and the only check to its steady and profitable increase was the renewal of the home demand. Such have been the changes and fluctuations; yet, despite them all, not one spindle in ten has passed from the ownership of the person, firm, or corporation in whose possession it was in 1860, except in the regular process of bequest or voluntary sale.

During the period of inflation or of great vicissitude the attention of the managers of the property was of necessity devoted to other matters than the improvements and minute savings in which the profit of the business now consists; but during the last few years very great improvements have been made, and the lesson of economy and saving has been learned. The best example that can be cited may be found in the record of one great factory working upon coarse and substantial fabrics, and consuming more than 20,000 bales of cotton a year. Sixty per cent. of its product is sold for export to various parts of the world. The proportion of operatives to each 1,000 spindles has been decreased 43 per cent., or from 26½ to 15. The wages of women, who constitute more than two-thirds of the operatives, has been increased 33 per cent. The cost of making the cloth, aside from the material used, has been decreased 21 per cent.

In 1860 the average product of one operative, working one year, was 5,317 pounds; in 1880, 7,928 pounds of drill, such as is exported to China. Assuming 5 pounds, or about 16 yards, as the annual requirement of a Chinaman for dress, in 1860 one Lowell operative, working one year, clothed 1,063 Chinese; in 1880 one could supply 1,586. It will be obvious that no hand spinning and weaving can compete with this product of machinery; yet the machine-made fabrics of Europe and America combined have as yet reached only six or eight in a hundred of the Chinese. How soon the rest will be clothed in cotton fabrics made by machinery from American cotton, therefore, depends but little on whether the wages of the Lowell factory girl be $4 or $6 per week, but rather on what exchangeable products the Chinese can produce better or cheaper than we can. The more tea, silk, sugar, and other commodities we buy from them, the more cotton fabrics and other products in which we excel will they buy from us.

It has been held that the cotton of America must be more and more used, both in America and elsewhere, and that, as time goes on, almost every other kind, with the exception of the cotton of Egypt, must give place to it. To what extent may the same pre-eminence be secured for the cotton fabrics of the United States in the markets of the world that we have secured in respect to the cotton fiber?

In the consideration of this branch of the subject our attention must be given to the present condition of competition between the mills of the middle and eastern states with the mills of Great Britain.

In respect to the eastern states, the cotton factories of Lowell, in Massachusetts, Manchester, in New Hampshire, Biddeford and Lewiston, in Maine, may be considered in their relation to the factories of Manchester, Stockport, Preston, and Bolton, in England. For the purposes of this comparison it may be assumed that there can be no permanent advantage of one set of mills over the other in respect to the quality and perfection of the machinery. At any given time some advantage may be claimed and admitted on either side in some special department of the mill; but every invention or improvement will sooner or later be adopted on both sides, and the supremacy in the art of converting cotton into cloth must ultimately fall to that country or section which possesses the advantage in respect to the conditions offered to the operatives and in proximity to the source of the raw material.

The best conditions of life for the operatives, and the best prospect of improving their condition and that of their children, are of the gravest importance. The factors in this problem are education, shelter, subsistence, and opportunity for other kinds of work. In respect to education, the common-school system of the United States assures a thorough training free of cost, and in the principal towns and cities free education is carried to the point of preparing the pupil to enter a university.

In respect to subsistence, the factories of New England are 3,000 miles nearer the wheat-fields and grazing grounds of the West than those of Lancashire; and, so long as Europe buys food of America, our own mills must have the advantage of proximity to the western prairies. In respect to the rents of dwelling-houses, there cannot long be any difference, if there is any at present, because the materials for construction are most abundant in America. Opportunity for other work than that of the factory must continue for many generations, and until this continent is peopled.

In comparing our power to compete with England we may claim advantages of one kind, and in comparing with the nations of continental Europe we may claim advantages of another kind, in some respects of a different order. In competition with England it is often claimed that our chief advantage lies in a certain alleged versatility and power of adapting means to ends, and in great quickness of perception on the part of working people in respect to the advantages to be gained by the adoption of new processes or inventions. If we have this advantage, there must be special causes for it in the influences that are brought to bear upon the operatives and artisans who do the work; for a very large proportion of them are foreign-born, or are the children of foreign immigrants. Why should they work with any more zeal or judgment here than in the countries whence they have come? Why are Irish and French-Canadian factory hands to be relied on for more steady work, larger product, better discipline, and more cleanly and wholesome conditions of life than the operatives of England, Belgium, and Germany? To me it appears evident that these advantages, so far as they exist, are due mainly to the following circumstances:

First. Our system of common and purely secular schools, attended by the children of rich and poor alike.

Second. Manhood suffrage.

Third. The easy acquisition of land.

Fourth. The habit of saving small sums, induced by the establishment of savings-banks throughout the manufacturing states.

Fifth. The absence of a standing army, and the application of the revenue derived from taxes on the whole to useful purposes.

In respect to the first of these influences, the public-school system, the foreign observer generally takes notice only of the quality of the instruction given, and, though he may find something to praise, he finds also much to blame. He finds in many cases the instruction bad and the subjects often ill-chosen, and he wonders at the misdirection of a force that might be so much more wisely applied. What he fails to notice is that the school itself, entirely apart from its instruction, is the great educator of the children who attend it. The school is, first of all, no respecter of persons: the stupid son of a rich man, led in every class by the son of a mechanic, cannot in after-life look down on him as an inferior, whatever the conventional position of the two may be; or, if the rich man's son has brains as well as fortune, the poor man's son can never attribute to fortune only the lead that he may take in after-life. The school is thoroughly democratic, and each pupil learns in it that it depends on himself alone what place he may take in after-life, and that, although society may be divided into planes, there is no system of caste and no barrier in the way of social success, except the want of character and ability to attain it. The associations of the common school utterly prevent anything like servility in the relation of classes in after-life; and although it is sometimes made a little too manifest that "one man is as good as another, and a little better", on the part of those who are more eager than discreet in their effort to rise, yet, on the whole, the relation of the various classes, which must in the nature of things always and everywhere exist, is that of mutual respect, and anything like the old-world distinctions of caste and rank would seem about as absurd to one as to the other. The common school is the solvent of race, creed, nationality, and condition.

In another way the discipline of the school affects the processes of manufacture. In the schools, cleanliness, order, and regular habits are enforced, with deference to the teachers and respect for authority; and, in these later years, this is coupled with the teaching of music and drawing in all the principal towns and cities. When children thus trained are removed to the mill or the workshop habits of order and cleanliness, with some esthetic taste, are already established. Nothing strikes an American manufacturer with so much surprise as the extreme untidiness of the large textile mills of England and the dreariness of the factory towns. In this respect, however, it must be confessed that the managers of the New England mills are greatly aided by the absence of smoke, the coal commonly used being anthracite. Much surprise is often expressed by our foreign visitors at the amount of decoration permitted in the fitting of stationary and locomotive engines and in much of our machinery; but, bad as the taste displayed may sometimes be, it is nevertheless a fact that such engines or machines are better cared for and kept in better repair than where no individuality, so to speak, is permitted. On one of our great railways the attempt was not long since made to dispatch the locomotives as they happened to arrive at the central station, sometimes with one and sometimes with another engine-driver; but the immediate and great increase in the repair account caused the corporation to return very soon to the customary plan of giving each driver a particular locomotive, with which he may be identified.

The instruction of the school also gives every pupil a superficial knowledge, if no more, of the geography and resources of the country, which the universal habit of reading newspapers keeps up. Hence comes the almost entire absence of any fixed character in the labor of the country: every boy believes that he can achieve success somewhere else, if not at home. No congestion of labor can last long. The war and the succeeding railway mania combined concentrated population at certain points to a greater extent than ever happened before, and it has taken more than five years to overcome the difficulty; but within these five years a million or more new inhabitants in Texas, half a million or more in Kansas, and probably two or three millions added to the population of Nebraska, Colorado, Minnesota, and the far Northwest, indicate that the evil has already found a remedy.

It is already apparent that a very slight increase in the demand for skilled workmen in certain branches of employment would not easily be met in the eastern states except by drawing upon England and Germany. During the years of depression, the cessation of railway building and the use of the excess of railway plant existing in 1873 has caused the dispersion of a large portion of the trained mechanics and artisans who then did the work of supplying this demand, but these are not the men who have crowded the eastern cities and caused the apparent excess of laborers out of work. Such men have gone back to the land, or in the new states and territories have found other ways in which to apply their skill and energy, and they will not return. It may be that the greatest danger to the manufacturers of England will not be in our competition in the sale of goods in neutral markets, but in our competition for the skilled workmen and artisans who make these goods when we offer them equal or higher wages and better conditions of life in the work that will very soon need to be done to supply the increasing demand in our own country.

The patent system may here be cited also as a factor in our industrial system. It has been carried to an almost absurd extreme, so that it is not safe for any one to adopt a new method, machine, or part of a machine and attempt to use it quietly and without taking out a patent lest some sharp person, seeing it in use and not published, shall himself secure a patent and come back to the real inventor with a claim for royalty.

Manhood suffrage, subject as it is to great abuses, and difficult as it has made the problem of the self-government of great cities, where voters do not meet each other, as in the town-meeting, face to face, but where the powers of government are of necessity delegated to men of whom the voters can have little personal knowledge, yet works distinctly in the direction of the safety, stability, and order of the community. Outside of two or three of the very largest cities, where there are concentrated great masses of illiterate citizens, it would be difficult to find a case of serious abuse of the power of taxation, except in the South, since the war, and even there the evil is now mainly abated.

The easy acquisition of land throughout the country, under simple forms of conveyance, registered in every county, gives a motive to economy, and induces habits of saving that are of supreme importance in their effect on society. In the town in which I live—and in which I can remember the coming of the first Irishman who became a land-owner—out of about one thousand owners of real estate over two hundred are of Irish birth or extraction. The richest one among them came from Ireland, in 1846, a steerage passenger. He now pays taxes on property of the value of $50,000, almost all in real estate. His son is superintendent of the repairs of highways, and is one of the most efficient members of the school committee.

During the last thirty years the factory population of New England has passed through three phases. First came the sons and daughters of the New England farmer; but as the sewing-machine and other inventions opened new demands for women's work, women of American birth passed out to easier or better paid employments, while the men took up other branches requiring more individual skill. These places were taken mainly by Irish, with a few Germans and English. But as the Irish saved their earnings, and as the New England yeomen emigrated to the richer lands of the great West, they passed out of the mills to buy up the deserted farms of the poorer northeastern states, where, by their persistent industry and manual labor, they achieved success and gained a position which satisfied them, but with which the native New Englander is no longer contented. Their places in the mills are now being more and more taken by the French Canadians, who, in their new conditions and surroundings, show little of the stolid and unprogressive character which has kept them so long contented on their little strips of land on the Saint Lawrence river. In the very air they breathe they seem to imbibe a new and restless energy, while the intelligence shown by their children in the schools augurs well for their future progress. On the whole, the simplicity of our system of land tenure, and the ease with which small parcels may be obtained, must be rated among the most important factors in considering our possible advantage over other countries.

Next in our list comes the savings-bank. In 1875, out of the 1,652,000 inhabitants of Massachusetts, 720,000 were depositors in savings-banks to the amount of $238,000,000. During the late years of depression the deposit has decreased somewhat in amount, but the decrease has been chiefly owing to the withdrawal of money for other investment, especially in United States bonds. There have been some failures of banks and some losses, as might well have been expected, but they have been less than in any other branch of business; and the savings-bank system stands firmly based on well-earned confidence, and offers an easy means of saving the smallest sums to every man, woman, and child in the state. At the present time the deposits in the savings-banks of Massachusetts amount to about $240,000,000, owned by about 750,000 persons.

To these causes of quick adaptation to any conditions that may arise, or to any necessity for the application of new methods or devices, may be added the custom, which has almost the force of law, of an equal distribution of estates among the children of the testator. *Tools to him who can use them* is the unwritten law; and neither land nor capital can remain long in the possession of him who cannot direct or use them wisely. Liberty to distribute is esteemed as important a factor in our body-politic as liberty to accumulate, even though the liberty may sometimes lead to the apparent waste of great fortunes.

Finally, it must be held that our freedom from the blood-tax of a standing army, and the fact that the proceeds of taxation are, on the whole, usefully and productively expended, are among our greatest advantages; and this is asserted with confidence, notwithstanding the misgovernment of some great cities and of several of the southern states. What are these failures but proofs of the general confidence of the people in local self-government? Great frauds and great abuses can only happen where integrity is the common rule; and where each man distrusts his neighbor, or each town, city, or state distrusts the next, the opportunity for fraud or breach of trust cannot occur. The use of inconvertible paper money during many years has not been without its necessary malign result upon the character of the people, and the newspapers are filled with the fraud and corruption that have come to light; but no newspaper has ever yet recorded one fact that offsets many frauds: In the great Boston fire, one of the Boston banks lost not only every book of account, but every security and note that was in its vaults, amounting to over $1,250,000. On the morning after the fire its officers had no evidence or record by which any of the persons or corporators who owed it money could be held to their contracts; yet, within a very short time, duplicate notes were voluntarily brought in by its debtors, many of whom knew not whether they could ever pay them, because the fire had destroyed their own property, and the known ultimate loss of that bank from the burning of its books and securities was less than $10,000.

Our army is but a border police. Although its officers are held in honor and esteem, military life is not a career that very many seek, and as time goes on it will become an occupation less and less to be desired. Thus we are spared not only the tax for its support, but the worse tax of the withdrawal of its members from useful and productive pursuits. It is in this respect that we claim our greatest advantage over the nations of continental Europe. What have we to fear from the competition of Germany, if we really undertake to beat her in the neutral markets, which we can reach as readily as she can? For a little while the better instruction of the merchants in her technical and commercial schools may give her advantage, but that can be overcome in a single generation, or as soon as the need is felt with us, as it is now beginning to be felt. After we shall have supplied our present want of technical education, the mere difference between the presence of a great army on her soil and its necessary support and the absence of such a tax on us will constitute the difference on which modern commerce turns. When the traffic of the world turns on half a cent a yard, a cent a bushel, or a half-penny a pound on the great staples, no nation can long succeed in holding a traffic that is handicapped with a standing army. The protection of Germany from our competition in neutral markets may be offset in our yet more dangerous competition for men. The German already knows Texas, and in the one block of 60,000 square miles of land by which the state of Texas exceeds the area of the German empire we offer room and healthy conditions of life for millions of immigrants; and if they come in sufficient numbers, they can raise on that single square of land as much cotton as is now raised in the whole South, that is to say, 5,000,000 bales; and as much wheat as is now raised in the whole North, that is to say, 400,000,000 bushels, and yet subsist themselves beside on what is left of this little patch that will not be needed for these two crops.

It will be obvious that even the least imaginative cannot but be moved by the influences that have been designated, and that versatility and readiness to adopt every labor-saving device will not only be promoted, but will be absolutely forced into action, when such vast areas are to be occupied, and when even the dullest boy is educated in the belief that he also is to be one of those who are to build up this nation to the full measure of its high calling. We may not dare to boast, in view of all we have passed through; but we know that slavery has been destroyed, and that the nation lives stronger, truer, and more vigorous than ever before. We know that it has been reserved for a democratic republic to be the first among nations that, having issued government notes and made them a legal tender, has resumed payment in coin without repudiation or reduction of the promise. We know that we have paid nearly a half of our great national debt already, and that the rest is now mainly held by our own citizens. We believe that within the lives of men of middle age now living the nation will number one hundred millions, and that, in whatever else we may be found wanting, we cannot long be kept back in our career of material prosperity, which shall be shared with absolute certainty by every one who brings to the work health, integrity, and energy.

If there is any force in this reasoning, our competition with other manufacturing countries, in the supplying of neutral markets with manufactured goods, will not be compassed by the low rates of wages paid to our factory operatives or to the working people engaged in our metal works and other occupations, but first by obtaining and keeping such an advanced position in the application and use of improved tools and machinery as shall make high wages consistent with a low cost of production; secondly, by our ability to obtain the raw materials at low cost. Every employer knows that among employés who are paid by the piece it is the operative that gains the largest earnings whose production costs the least, because under the control of such operatives the machinery is most effectively guided during working hours. As it is with single operatives, so it is with large masses; if well instructed, and working under the incentives to industry and frugality that have been named, their large product will earn for them ample wages, and yet result in a low cost of labor to the employer. Such workmen never have any "blue Monday". The workman who in this country habitually becomes intoxicated is soon discharged, and his place is filled by one who respects himself and values his place too much to risk his position in dissipation.

Competition with England in supplying the markets of Asia, Africa, and South America with cotton goods is now perhaps the best criterion by which to gauge our ability to compete in other branches of manufacture. It has been often assumed in England that the increasing shipments of cotton goods from this country have been forced by necessity, and merely consisted of lots sold below cost, as a means of obtaining ready money; but there is no ground whatever for this general assumption, even though some small shipments may have been made at first with this view. Our export of cotton fabrics amounts as yet to but 7 or 8 per cent. of our production, and is but a trifle compared to that of Great Britain; but it is not made at a loss, and it constitutes a most important element in the returning prosperity of our cotton-mills. The goods exported are mostly made by strong and prosperous corporations, paying regular dividends, and consist mainly of coarse sheetings and drills, which are sold by the manufacturers to merchants, who send them to China, Africa, and South America in payment for tea, silk, ivory, sugar, gums, hides, and wool. They are not made by operatives who earn less than the recent or present rates of wages in England, but in most departments of the mills by those who earn equal wages, or even more. This competition had been fairly begun before the late war in this country, but it is now continued under better conditions. The mills of New England, owing to through connections by rail, are now relatively much nearer the cotton-fields than they were then. Prior to 1860 substantially all the cotton went to the seaports of the cotton states, and from there the cost of moving it to the North or to Liverpool varied but little; but at the present day a large and annually-increasing portion of the cotton used in the North is bought in the interior markets, and is carried in covered cars directly to the mills, where the bales are delivered clean, and much more free from damage and waste than those which are carried down the southern rivers on boats and barges, dumped upon the wharves, and then compressed to the utmost for shipment by sea.

In proof that this advantage is an actual one, the following example may be cited: A contract has just been made for the transportation of a large quantity of cotton from Texas to Liverpool at the rate of $1 10 per 100 pounds, the proportion assigned to the land carriage being 70 cents, to transshipment in Boston and to the steamship 40 cents; the rate of marine insurance is three-eighths of 1 per cent., and the cost of handling in Liverpool, and transportation to Manchester, not less than a quarter of a cent per pound. Bargains may be made to bring cotton from the same point in Texas to the principal factory cities of New England at the rate assigned to the land carriage, namely, 70 cents per 100 pounds. This cotton is brought from the interior towns of Texas to Boston, and cannot be carried to Liverpool by way of Galveston or New Orleans so cheaply, else it would not come this way. Assuming the bale to weigh 500 pounds, at 10 cents a pound we have the following comparative cost:

	Per bale.	Per cwt.
LOWELL.		
Cost of cotton in Texas, 500 pounds, at 10 cents, including all local charges	$50 00	
Freight to Lowell in a covered locked car, in which the cotton is protected from rain, mud, and other causes of waste, at 70 cents per 100 pounds	3 50	
Total	53 50	$10 70
LANCASHIRE.		
500 pounds, at 10 cents, including all local charges	$50 00	
Freight from Texas to Liverpool, at $1 10 per 100 pounds	5 50	
Insurance at three-eighths of 1 per cent. on $56	21	
Transshipment in Liverpool, and freight to Lancashire, one-fourth of a cent	1 25	
Total	56 96	$11 39
Advantage of Lowell over Lancashire	3 46	69

There may be changes in the rates, but it does not seem probable that the relation of the land to the ocean rate can be much changed, and it would therefore appear that the New England manufacturer will have a permanent advantage in the price of American cotton of any given grade, varying from 6 to 8 per cent. as the price of cotton may vary from 12 to 9 cents per pound; and this advantage may be equal to 15 or 25 per cent. in ability to pay wages, as the cost of labor varies from a quarter to a third in the total cost of coarse and medium goods, such as constitute the chief part of the demand of the world.

It may be said that this proves too much, and that the cotton spinners of the southern states will have the same relative advantage over New England. Let this be freely admitted: We are treating the question of the future supremacy of the United States in the manufacture as well as in the growth of cotton, and if the future changes in population, wealth, and condition of the different sections of this country shall in the future cause the increase of spindles, especially in coarse fabrics, to be planted in the healthy hill country of northern Georgia, eastern Tennessee, and the Carolinas, it will simply be the greater evidence that natural laws are paramount. If Georgia has twice the advantage over Lancashire that New England now possesses, it will only be the fault of the people of Georgia if they do not reap the benefit of it.

It has been stated that our present rates of wages in our cotton factories are higher than they were in 1860, and with our increasing prosperity they will tend to advance; but at the same time the cost of the labor in the finished fabric *has been reduced by the greater productive power of the machinery.* The fabrics upon which by far the largest part of the spindles and looms of the country are operated may be divided substantially into the following classes:

1. The printing-cloth, 28 inches wide and 7 yards to the pound. The cost of mill labor in making this fabric, including the salaries, wages, or earnings of every one employed, is now less than one cent, or a half-penny, a yard.
2. The heavy sheeting, 36 inches wide, and the heavy drill, 30 inches wide, each weighing from 2¾ to 3 yards to the pound. The cost of mill labor in making these fabrics is about 1¼ cents per yard.
3. Shirtings and sheetings, 30 to 36 inches wide, Nos. 20 to 30 yarns, each weighing from 3 to 4 yards to the pound. The cost of mill labor in these goods is from 1½ to 2 cents per yard.
4. The fine sheeting or shirting, from 30 to 40 inches wide, Nos. 30 to 40 yarns, weighing from 3 to 4 yards to the pound. The cost of mill labor in these goods is from 1½ to 3 cents per yard.
5. Fabrics of a similar kind to the above, from 1 to 3 yards wide.
6. Heavy cotton duck, cotton grain-bags, cotton hose, and other special articles.
7. Blue denims, stripes, tickings, brown denims and duck, and other heavy colored goods, substantial ginghams, cottonades, and other fancy woven fabrics of medium or heavy weight.

These seven classes comprise more than 95 per cent. of our cotton fabrics in weight; to them are to be added lawns, woven fabric of light weight for dresses, and spool-cotton.

In respect of one-half of these fabrics, being those of the heavier grade, our proximity to the cotton-field, computed at not less than half a cent per pound, oftener three-quarters, will enable the New England manufacturer to pay from 15 to 20 per cent. higher wages and yet to make the goods, other things being equal, at the same cost as his competitor in Lancashire. On a large portion of the other kinds this advantage in the cost of cotton would be from 10 to 15 per cent.

The natural advantages cannot work immediate results; the ways and means of a great commerce cannot be improvised in a year, hardly in a generation. Much depends on the wisdom of our legislators in framing the acts under which our taxes are collected, whether customs or excise, and yet more upon our adherence to a specie basis in our currency; but in the long run the only reason why we shall not assume a constantly-increasing share in the cotton manufacture of the world will be the free choice that our country offers for other occupations of a more profitable or more desirable kind.

Reference has been made to the small proportion of fine spinning in the United States. Within the last few years great progress has been made in spinning and weaving fabrics of Nos. 60 to 100, such as lawns and fine dress goods, and also in spinning fine yarn for spool-cotton. In the latter direction yarns as fine as No. 120 are now spun on the ring spinning frame, a machine invented in this country and more used than any other for warp spinning, and now being adopted in Europe. Yarns as fine as 550 are spun on mules for three-cord sewing-cotton, and for experiment much finer counts have been reached. It has often been alleged that fine yarns could not be as well spun in the United States as in England, owing to the dry and electrical conditions of the atmosphere during a considerable part of the year. This difficulty has existed in some degree, although not so as to preclude fine work if it had been profitable to undertake it; but as far as this difficulty existed it has lately been entirely removed by the invention of a very simple and inexpensive apparatus for moistening the air with the finest spray of pure cold water, by which method the air of a spinning- or weaving-room may be kept at any desired degree of humidity in the driest day, so that the adverse effect of electricity is entirely overcome.

Whenever the condition and extension of our market will warrant the undertaking, there is now no obstacle to our manufacturing any variety of cotton fabric that is in demand, either coarse or fine.

While it may not be worth while to give historical statistics in relation to the cotton manufacture of this country in the present report, a few words may well be devoted to changes in the work, which have conduced not only to the welfare of the people, but to the welfare of the operatives also.

When the cotton manufacture was first established in the United States water-power was considered essential to the work, and as a rule the location of mills was limited to narrow valleys, or places where there was room only for mills of several stories in height. The first mills built were very considerable structures for their time, but they were low-studded, badly lighted, and were heated by stoves; and in these mills the operatives were compelled to work under arduous conditions (owing to the imperfection of the machinery) thirteen to fourteen hours a day. These narrow structures were in some places built seven stories in height. All the plans were made with reference to this form of structure, whether the mill was to be operated by water-power or by steam, until quite a recent period. In 1860 the "normal" cotton-mill (so to speak) had become a factory four or five stories high, about 60 feet wide, varying in length according to the amount of machinery, high-studded, well lighted, thoroughly well ventilated, and heated by radiation from steam-pipes.

In 1866 the machine for sizing yarn, known as the "slasher", was first imported, displacing the machine known as the "dresser". In the use of the slasher one man and a boy working in a thoroughly well-ventilated room, at a moderate degree of heat, took the place of seven or eight men who had been previously employed in the same work in a room which was of necessity kept at over 100° F., the atmosphere saturated with sour starch. This change removed the only really objectionable kind of work from the cotton factory. In the earlier mills the apparatus for the removal of dust from the factory was very imperfect, but to-day every room, even including those in which the cotton is opened, is substantially free from dust; and it happens that the degree of heat and of humidity required for the best work of the cotton factory is one which conduces in great measure to the health of the operative, perhaps a little warmer than may be desirable.

At the present time another change is in progress. The use of water-power is becoming less, its development for the purposes of sale having never proved profitable. The power thus developed has been a valuable auxiliary in the working of the factory, but as a matter of investment the development of land and water power together have almost without exception failed to be profitable.

The great progress in the construction of the steam-engine and in the economy of fuel is steadily working toward a change to steam as the principal motive power for the cotton factory. An incidental advantage in this change is that the factory may be placed nearer to the principal markets, where it can be more conveniently supervised and more easily reached. The use of steam also renders a choice of location perfectly feasible; and the model factory, one or two stories high, may be placed upon a level plain, and can be more easily lighted and ventilated and more economically operated than when any other form of building is used. Under these new conditions better dwellings for the operatives, less crowded, can also be provided, and in every respect the work can be conducted under better conditions.

At the present time the hours of labor in New England, where most of the cotton manufacturing is done, vary from ten to eleven hours per day. This great change has been brought about by a gradual comprehension of the best conditions both for the laborer and for the capitalist, and without much regard to legislation. It is probable that ere long ten hours will be the limit of factory work throughout New England, either by process of legislation or through the conviction on the part of employers that any longer hours are not profitable—a conclusion to which many have already come.

A great change has also in the progress of time been effected in the dwellings in which the factory operatives live, in part tending toward better conditions, in part to worse conditions. On the whole, there has been less average progress in this direction than in the construction and operation of the mills themselves. The choice of position, however, which is now given by the greater use of steam gives better opportunities for scattering the dwelling-houses over a wider area at little cost.

A more abundant supply and choice of food has been effected in this as in all other branches of work, to the great benefit of the operatives, by the consolidation and more effective service of railroads. The average work of a male operative over sixteen years of age in a textile factory will earn enough in a day to pay for the transportation of meat and bread for one year one thousand miles, or from Chicago to Lowell, Lawrence, or Fall River. So far as cost is concerned, the great fields of the West and the factories of the East are in closer proximity than if the factory depended for its food upon its own immediate neighborhood when served only by wagon-roads. The same changes which have so greatly reduced the railway charges between east and west are now taking place between north and south. The charge for moving cotton is becoming less year by year, and it will soon matter little where the cotton factory is placed, so far as distance between the field and the factory is concerned. The choice may be made so as to secure the stimulus of a moderately cold climate in which indoor labor is more to be desired than outdoor, in which the humidity of the atmosphere is measurably uniform or is not subject to extremes, and where the facilities for repairs on machinery are close at hand, and the population is sufficiently dense to assure an adequate and constant supply of operatives—mills which are much isolated always working at a disadvantage.

Great changes of a beneficial kind can now be foreseen in the application of electricity to the lighting of the factory. The developments in this direction are also such that, whatever the relative cost of the electric light as compared to gas may be, it is yet so beneficial in other respects that no factory manager can well afford to dispense with it, not only because of the more perfect work which its use assures, but because the choice of the operative in selecting the place in which to work will render the use of the electric light almost a matter of necessity.

In conclusion, it may be said that the progress in the art of manufacturing cotton fabrics in the last forty years has been very great, distinctly sustaining the rule which affects all the arts to which modern machinery can be applied, namely, that, in proportion to the effectiveness of capital in the form of machinery and the freedom with which it may be applied, the cost of production is lessened and the consumer is served more cheaply; while, on the other hand, the wages of the operative are increased, the conditions of work made better, and the identity of interests between labor and capital are established.

It may be said that in the absence of any artificial obstructions to traffic between states or nations the truest guide to the place where the lowest cost of production is compassed may be found by ascertaining where the wages of labor are the highest and the conditions of life the best; that at that point the lowest cost of production must be found, for this reason: both wages and profits are derived from the sale of the thing produced; hence it follows that where the natural conditions of production are best, the machinery most effective, and the labor the most intelligent and skillful, the product will be largest at the least effort to those who do the work, and when the division of this product is made under the conditions of absolutely free competition the relative proportion which capital can secure to itself will be least, even though its absolute share be greater and greater as the years go on; but the share which the laborer will receive will increase year by year, both absolutely and relatively. As capital increases the absolute sum of profits is greater, but the relative share of the product secured by capital becomes less. The increase of capital and its effective use by skilled laborers assure a larger production, and the workman obtains a larger share of a larger product measured in kind or in wages paid in money. In the cotton-mill, as well as in many other arts, special skill is required, but perhaps less general intelligence; therefore a lower grade of operatives may be employed from time to time as the machinery becomes more automatic, but at a steadily-increasing rate of wages. Invention may, therefore, be said to enable all conditions of men to attain a higher plane of material welfare, and as one class passes from the factory to other occupations which offer better conditions of life new improvements enable those who could not do the factory work before to undertake and carry it on. Thus it has been in the past, since the farmers' daughters of New England left the factory in which, with much longer hours of work, they earned only about one-half the wages now paid; but those who have succeeded them could not then have been capable of doing the work at all which they now so easily accomplish.

TABLE I.—STATISTICS OF SPECIFIC COTTON MANUFACTURES.

States.	No. of establishments.	Capital.	Number of spindles.	Number of looms.	Average number of yarn.	NUMBER OF EMPLOYÉS.											Wages of operatives.
						Total.	Operatives.				Mechanics, watchmen, and laborers.		Officers and clerks.				
							Male.		Female.		Male.		Male.		Female.		
							16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	16 and over.	Under 16.	15 and over.	Under 15.	
The United States	756	$208,280,346	10, 653, 435	225, 759	......	a174,659	49, 748	15, 042	84, 539	13, 213	9, 937	65	2, 075	17	19	4	$42, 040, 510
EASTERN STATES.																	
Maine	24	15, 292, 078	695, 924	15, 971	24	11, 864	3, 149	820	6, 481	600	709	......	104	1	......	......	2, 936, 640
New Hampshire	36	19, 877, 084	944, 053	24, 299	26	16, 529	3, 917	838	9, 594	839	1, 187	......	131	1	2	......	4, 290, 960
Vermont	7	936, 096	55, 081	1, 180	28	735	176	84	350	87	24	......	14	......	......	......	161, 748
Massachusetts	175	72, 291, 601	4, 236, 084	95, 321	28	61, 844	18, 700	4, 346	31, 496	3, 213	3, 480	11	594	3	1	......	15, 828, 571
Rhode Island	115	28, 047, 331	1, 764, 569	29, 669	36	21, 474	6, 690	2, 244	9, 199	1, 683	1, 355	3	299	1	......	......	5, 320, 303
Connecticut	82	20, 310, 500	936, 376	18, 261	37	14, 739	5, 363	1, 678	5, 434	1, 231	771	7	234	6	11	4	3, 632, 639
Total	439	156, 754, 690	8, 632, 087	184, 701	......	127, 185	37, 995	10, 030	62, 554	7, 653	7, 526	21	1, 376	12	14	4	32, 170, 861
MIDDLE STATES.																	
New York	36	11, 399, 638	561, 658	12, 403	33	9, 305	2, 414	937	4, 201	1, 148	523	4	75	3	......	......	1, 994, 755
New Jersey	17	3, 807, 750	232, 221	3, 180	32	4, 222	1, 006	374	2, 291	329	174	5	43	......	......	......	1, 156, 961
Pennsylvania	59	10, 331, 985	425, 391	8, 488	17	9, 957	2, 918	1, 104	4, 454	971	421	11	74	1	3	......	2, 502, 688
Delaware	8	874, 570	46, 188	822	20	797	210	109	362	83	27	......	6	......	......	......	192, 727
Maryland	19	4, 600, 816	125, 706	2, 425	10	4, 086	1, 035	476	1, 877	463	191	......	44	......	......	......	766, 129
Total	139	31, 014, 759	1, 391, 164	27, 318	......	28, 367	7, 583	3, 000	13, 185	2, 994	1, 336	20	242	4	3	......	6, 613, 260
SOUTHERN STATES.																	
Virginia	8	1, 190, 100	44, 340	1, 322	16	1, 112	235	146	530	135	39	......	27	......	......	......	169, 789
North Carolina	49	2, 855, 800	92, 385	1, 790	14	3, 343	657	304	1, 727	429	107	8	111	......	......	......	439, 659
South Carolina	14	2, 776, 100	82, 334	1, 676	11	2, 053	503	148	772	437	158	......	35	......	......	......	380, 844
Georgia	40	6, 348, 657	198, 656	4, 493	14	6, 349	1, 437	655	2, 951	748	416	8	134	......	......	......	1, 135, 184
Florida	1	11, 000	816	......	10	33	15	10	2	......	4	......	2	......	......	......	5, 000
Alabama	16	1, 246, 500	49, 432	863	11	1, 490	299	198	631	235	85	......	42	......	......	......	239, 998
Mississippi	8	1, 122, 140	18, 568	644	12	722	132	85	313	120	44	1	27	......	......	......	133, 214
Louisiana	2	195, 000	6, 096	120	8	108	30	14	41	10	9	......	4	......	......	......	12, 572
Texas	2	50, 000	2, 648	71	8	71	33	7	10	9	7	......	5	......	......	......	2, 466
Kentucky	3	360, 000	9, 022	73	9	352	104	72	91	61	20	......	4	......	......	......	63, 850
Tennessee	16	1, 145, 600	35, 736	818	13	1, 044	214	94	502	129	69	7	28	1	......	......	161, 071
Arkansas	2	75, 000	2, 015	28	10	64	12	13	17	14	4	......	4	......	......	......	7, 339
Total	161	17, 375, 897	542, 048	11, 898	......	16, 741	3, 671	1, 746	7, 587	2, 327	962	24	423	1	......	......	2, 750, 986
WESTERN STATES.																	
Ohio	4	670, 000	13, 328	42	8	484	106	26	320	11	18	......	2	......	1	......	104, 500
Indiana	4	1, 090, 000	33, 396	776	15	720	151	60	391	64	42	......	12	......	......	......	162, 829
Illinois	2	240, 000	4, 860	24	8	237	51	44	88	38	9	......	6	......	1	......	47, 885
Missouri	3	890, 000	19, 312	431	12	515	95	93	207	88	25	......	7	......	......	......	97, 680
Michigan	1	20, 000	5, 100	131	20	88	29	8	38	6	5	......	2	......	......	......	16, 800
Wisconsin	1	200, 000	10, 000	400	19	271	53	34	149	22	8	......	5	......	......	......	67, 209
Minnesota	1	5, 000	1, 708	24	......	22	2	......	12	6	2	......	......	......	......	......	6, 400
Utah	1	20, 000	432	14	11	29	12	1	8	4	4	......	......	......	......	......	2, 100
Total	17	3, 135, 000	88, 136	1, 842	......	2, 366	499	266	1, 213	239	113	......	34	......	2	......	505, 403

a From this number deduct 2,115 officers and clerks whose salaries are not computed in wages. This leaves a total of 172,544 operatives, of which 59,685 are men, 15,107 boys, 84,539 women, and 13,213 girls.

TABLE I.—STATISTICS OF SPECIFIC COTTON MANUFACTURES—Continued.

States.	MATERIALS.				PRODUCTS.		
	Cotton consumed.			Value of all materials.	Goods manufactured.		Value of products.
	Bales.	Pounds.	Cost.		Pounds. (a)	Yards. (a)	
The United States	1, 570, 344	750, 343, 981	$86, 945, 725	$102, 206, 347	607, 264, 241	2, 273, 278, 025	$192, 090, 110
EASTERN STATES.							
Maine	112, 381	54, 185, 061	6, 234, 901	7, 320, 152	44, 352, 698	144, 368, 675	13, 319, 363
New Hampshire	157, 673	76, 386, 499	8, 629, 063	10, 146, 904	63, 881, 540	244, 145, 533	17, 953, 403
Vermont	7, 404	3, 562, 088	458, 607	508, 297	2, 159, 108	16, 166, 245	855, 864
Massachusetts	574, 857	273, 718, 889	31, 107, 154	35, 994, 109	219, 160, 105	971, 118, 234	72, 289, 518
Rhode Island	167, 480	81, 137, 172	10, 457, 770	12, 291, 437	60, 905, 642	264, 355, 613	22, 875, 111
Connecticut	109, 703	52, 384, 171	6, 281, 939	8, 029, 127	42, 285, 517	173, 324, 667	16, 069, 771
Total	1, 129, 498	541, 373, 880	63, 169, 434	74, 290, 026	432, 744, 610	1, 813, 478, 967	143, 363, 030
MIDDLE STATES.							
New York	64, 614	31, 656, 594	3, 981, 106	4, 652, 745	25, 649, 456	136, 336, 871	8, 266, 836
New Jersey	21, 069	9, 950, 609	1, 319, 422	2, 018, 175	8, 275, 260	32, 980, 737	4, 548, 275
Pennsylvania	83, 997	40, 311, 809	4, 749, 428	6, 105, 700	34, 457, 323	82, 346, 813	11, 021, 054
Delaware	7, 512	3, 236, 184	427, 855	527, 205	2, 867, 969	8, 644, 028	871, 007
Maryland	51, 537	24, 166, 232	2, 780, 715	2, 887, 933	22, 324, 511	29, 453, 807	4, 682, 114
Total	228, 729	109, 321, 428	13, 258, 526	16, 191, 758	93, 574, 519	289, 762, 256	29, 389, 286
SOUTHERN STATES.							
Virginia	11, 461	5, 087, 519	601, 796	640, 391	4, 339, 476	15, 704, 126	1, 040, 962
North Carolina	27, 642	11, 832, 641	1, 125, 984	1, 463, 645	9, 646, 380	15, 027, 745	2, 554, 482
South Carolina	33, 624	15, 601, 005	1, 723, 187	1, 808, 300	12, 251, 272	29, 982, 440	2, 895, 769
Georgia	71, 389	33, 757, 199	3, 591, 554	4, 019, 673	27, 733, 153	60, 540, 712	6, 481, 894
Florida	350	166, 250	16, 000	18, 095	134, 000	....	25, 000
Alabama	14, 702	7, 271, 791	729, 202	783, 711	6, 154, 470	9, 957, 519	1, 228, 019
Mississippi	6, 411	2, 881, 853	301, 226	337, 149	2, 481, 022	6, 163, 916	679, 093
Louisiana	1, 358	644, 000	68, 018	72, 470	166, 496	749, 536	86, 776
Texas	246	119, 986	11, 280	14, 827	99, 880	42, 000	21, 600
Kentucky	4, 050	1, 882, 234	188, 856	253, 818	1, 722, 500	....	418, 286
Tennessee	10, 436	4, 944, 279	508, 305	553, 761	3, 874, 616	9, 890, 681	874, 717
Arkansas	680	340, 000	25, 000	33, 305	255, 000	....	50, 000
Total	182, 349	84, 528, 757	8, 890, 408	9, 999, 145	68, 858, 265	148, 058, 675	16, 356, 598
WESTERN STATES.							
Ohio	5, 323	2, 506, 182	258, 198	286, 692	1, 993, 182	....	637, 000
Indiana	11, 558	6, 364, 887	679, 911	651, 434	5, 238, 020	11, 060, 887	1, 155, 029
Illinois	2, 261	1, 099, 130	110, 969	142, 183	917, 634	....	219, 861
Missouri	6, 399	3, 082, 132	336, 984	376, 081	2, 200, 027	4, 702, 623	522, 980
Michigan	600	300, 000	36, 000	41, 000	250, 000	1, 000, 000	70, 000
Wisconsin	3, 173	1, 541, 797	180, 072	194, 536	1, 314, 864	5, 189, 014	328, 389
Minnesota	400	200, 000	22, 000	30, 000	160, 000	....	40, 000
Utah	54	25, 788	3, 223	3, 472	13, 120	25, 603	7, 937
Total	29, 768	15, 119, 916	1, 627, 357	1, 725, 418	12, 086, 847	21, 978, 127	2, 981, 196

a In the consideration of the footings of the aggregate yards and pounds of cotton fabrics, whether considered by counties or by states, it must be remembered that while all specific cotton fabrics may be rated by the pound, it by no means follows that there will in all cases be a statement of yards to correspond to that number of pounds, for the reason that very large quantities of yarn and thread are made which are sold by the pound and never bought or considered by the unit of the yard. Hence the footing of pounds may be considered as the resultant of the use of the given quantity of cotton; the footing of yards merely of that part of the cotton manufacture which is woven and sold by the measure of the yard.

TABLE II.—STATISTICS OF SPECIAL MILLS.

[Mills employed in working raw cotton, waste, or cotton yarn into hose, webbing, tapes, fancy fabrics, or mixed goods, or other fabrics, which are not sold as specific manufactures either of cotton or wool. Some work both fibers, but belong more in the class of cotton manufactures than in the class of wool manufactures.]

Sections.	No. of establishments.	Capital.	Number of spindles.	Number of looms.	Number of operatives.	COTTON CONSUMED.		Wages and salaries of operatives.	Value of production. (a)
						Bales.	Cost.		
Eastern states	70	$3, 970, 803	15, 348	897	3, 169	9, 006	$518, 745	$877, 067	$5, 539, 192
Middle states	161	6, 616, 645	34, 922	2, 894	9, 271	27, 784	1, 600, 358	2, 598, 931	12, 760, 128
Southern states	11	381, 500	9, 972	234	317	693	39, 916	63, 024	235, 295
Western states	7	255, 500	....	....	171	3, 114	179, 366	34, 947	325, 658
Total	249	11, 224, 448	60, 242	4, 025	12, 928	40, 597	2, 338, 385	3, 573, 909	18, 860, 273

a The excess of value of product above ordinary manufactures of cotton is to be attributed mainly to the fact that the cotton used forms but a small part of the material in many cases.

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REPORT

ON

WOOL MANUFACTURE IN ALL ITS BRANCHES.

BY

GEO. WM. BOND,

SPECIAL AGENT.

LETTER OF TRANSMITTAL.

BOSTON, MASS., *September* 22, 1882.

Hon. C. W. SEATON,
Superintendent of Census.

SIR: I have the honor herewith to present the tables giving the statistics of the wool manufacture for the census year ending May 31, 1880.

Yours, very respectfully,

GEO. WM. BOND,
Special Agent on Wool Manufacture.

REPORT ON WOOL MANUFACTURE.

The accompanying tables embrace the statistics (1) of the manufacture of wool alone, or of wool mixed with other materials, by the use of wool-carding machinery; (2) of the manufacture of the same by the combing process, known as the worsted manufacture; (3) of the manufacture of textile fabrics by the felting process; (4) of the manufacture of carpets; (5) of the manufacture of wool hats; (6) of the manufacture of hosiery and other knit goods of wool or other materials.

The number of establishments reported in all these industries is 2,689, viz: On woolen goods, 1,990; on felted fabrics, which in 1870 were reported with the woolen goods, 26; on worsted goods, 76; on carpets, 195; on wool hats, 43; and on hosiery and knit goods, 359.

In 1870 returns were given from 2,891 woolen-mills. For 1880 the returns, as before stated, were only 2,016 mills on woolen and felt goods.

After diligent search there were found 814 establishments, almost all of which were reported in 1870, that were either out of existence or for some cause were not running during the census year of 1880.

Of late years the manufacture of woolen goods has been a very close business, and has required the best appliances and the closest attention to make it profitable. Formerly, many small establishments were scattered over the country, mostly in the wool-growing regions, of which a large portion ran only a part of the year, with poor machinery, perhaps making several kinds of goods on the same sets of machinery; but these could not compete with well-appointed factories, devoted to their several specialties.

There are also included in the returns of the 1,990 establishments on woolen goods, 570 which were only carding-mills, 233 others which use not over 5,000 pounds of wool or other fibrous materials, and 188 which used from 5,000 to 10,000 pounds per annum. The entire consumption of these 991 establishments for the year was but 4,549,348 pounds.

The majority of the 814 mills before referred to were of this character, but there were among them many mills of larger capacity, which had been burned, changed into other departments of manufacture, or, for other reasons, were idle.

The census year of 1879–'80 was a year of varying prosperity in almost every branch of the woolen manufacture. It opened with a languid demand for products, but in the autumn the speculative spirit which then characterized transactions in almost all kinds of merchandise created an active demand for nearly all classes of goods. The stocks in market were soon exhausted, and contracts were largely made for goods of nearly all descriptions in advance of their manufacture. The stocks of wool were light and prices low in Europe. Large orders were sent abroad for wool, and there were also increased importations of woolens. Early in 1880 those who had contracted with the manufacturers found that the demand of the country for woolens was not up to their anticipations, and many are reported to have repudiated their contracts. By April the demand for wool, raw and manufactured, ceased almost entirely. Thus the wool machinery, which for the first quarter was but moderately run, for the next two quarters was pushed almost to its fullest capacity, and, at the close, was again slackened.

The demands of fashion make such changes in the styles of woolen goods from one decade to another that a close comparison of results is not practicable. Still, the returns show that, notwithstanding the reduced number of establishments, the products of manufacture have materially increased in every department.

The value in the aggregate, excluding wool hats, which were not reported with woolens in the previous census, was $258,736,344. In 1870 the value reported was $217,668,826, but as the dollar was then worth only 81½ cents, this amount was only equal to $177,400,093. All descriptions of woolen goods did not in 1880 bear values equivalent to the relative value of the dollar; some were as high for gold in 1880 as they were for currency in 1870, while for others the value in 1880 was lower by more than 30 per cent.

WORSTED GOODS.—In 1870 several concerns which are not now carried on were reported as being engaged in minor branches of this manufacture.

Carpets, other than rag.—The decrease in the number of establishments for the manufacture of carpets is attributed to a cause similar to that on woolen goods. The number of hand-loom manufacturers varies with the demands of trade, but they can only occasionally compete with those using the power-looms.

Hosiery and knit goods.—In addition to what is reported in the accompanying tables, there will be found in the tables given in the report on the cotton manufacture 4,047,075 dozen cotton hose and half-hose and 479,023 dozen cotton shirts and drawers, valued at $4,900,277, making the aggregate value of these goods $34,067,504. Even this large sum probably falls short of the whole manufacture, as much is done by single machines scattered over the country, which cannot easily be reached.

The total amount of raw material reported as consumed was (by pounds):

Description.	Domestic wool.	Foreign wool.	Camel's hair.	Mohair.	Buffalo hair.	Hair of other animals.	Cotton.	Shoddy.	Total raw materials.
Total of all industries	222, 991, 531	73, 200, 698	1, 583, 119	159, 678	671, 027	5, 664, 142	48, 000, 857	52, 163, 926	404, 434, 978
Woolen goods	177, 042, 288	20, 482, 667	1, 234, 064	84, 080	556, 601	3, 940, 923	24, 744, 964	46, 583, 983	274, 669, 570
Worsted goods	25, 461, 511	15, 687, 815	207, 065	31, 598	....	519	1, 757, 842	190, 800	43, 337, 150
Felt goods	4, 204, 806	709, 067	70, 000	....	71, 000	1, 657, 000	1, 181, 500	2, 406, 849	10, 360, 222
Wool hats	6, 107, 471	1, 864, 139	3, 911	....	7, 436	....	185, 400	1, 368, 562	9, 536, 919
Carpets, other than rag	2, 029, 318	34, 008, 252	46, 300	4, 000	30, 840	65, 700	....	90, 469	36, 274, 879
Hosiery and knit goods	8, 146, 137	448, 758	21, 779	40, 000	5, 150	....	20, 131, 151	1, 523, 263	30, 316, 238

The attempt was made to ascertain not only the amount of scoured wool consumed, or rather the amount of wool in condition to be carded, but also the weight of the same, both domestic and foreign, as it originally came to market. The figures, however, do not accurately represent the full quantity of either domestic or foreign, because many manufacturers purchased their wool scoured, and reported the same quantity in the column of scoured wool and in that of wool as purchased. It is estimated that from 10,000,000 to 15,000,000 pounds should be added to the quantity of domestic wool reported, and from 2,000,000 to 3,000,000 pounds to the foreign, to reach the true consumption.

SUMMARY OF THE MORE IMPORTANT RESULTS OF ALL WOOL MANUFACTURING INDUSTRIES.

Industries.	No. of establishments.	Capital.	Average number of hands employed.				Total amount paid in wages during the year.	Value of materials.	Value of products.
			Total.	Males above 16 years.	Females above 15 years.	Children and youths.			
Aggregate for all industries	2, 689	$159, 091, 869	161, 557	75, 459	66, 814	19, 284	$47, 389, 087	$164, 371, 551	$267, 252, 913
Woolen goods	1, 990	96, 095, 564	86, 504	46, 978	29, 372	10, 154	25, 836, 392	100, 845, 611	160, 606, 721
Worsted goods	76	20, 374, 043	18, 803	6, 435	9, 473	2, 895	5, 683, 027	22, 013, 628	33, 549, 942
Felt goods	26	1, 958, 254	1, 524	1, 203	233	88	439, 760	2, 530, 710	3, 619, 652
Wool hats	43	3, 615, 830	5, 470	3, 222	1, 459	789	1, 893, 215	4, 785, 774	8, 516, 569
Carpets, other than rag	195	21, 468, 587	20, 371	10, 104	8, 570	1, 697	6, 835, 218	18, 984, 877	31, 792, 802
Hosiery and knit goods	359	15, 579, 591	28, 885	7, 517	17, 707	3, 661	6, 701, 475	15, 210, 951	29, 167, 227

STATISTICS OF WOOL MANUFACTURE.

STATISTICS OF WOOL MANUFACTURE IN ALL ITS

WOOLEN GOODS.

	States and Territories.	Number of establishments.	Capital.	MACHINES.						LOOMS.							
				Number of sets of cards.	Daily capacity of same in pounds of scoured wool.	Number of combing-machines of foreign manufacture.	Daily capacity of same in pounds of scoured wool.	Number of combing-machines of American manufacture.	Daily capacity of same in pounds of scoured wool.	Number of broad looms on woolen goods.	Number of broad looms on worsted goods.	Number of narrow looms on woolen goods.	Number of narrow looms on worsted goods.	Number of hand-looms.	Number of Brussels power-looms.	Number of ingrain power-looms.	Number of knitting-looms.
	The United States	1, 990	$96, 095, 564	5, 961	764, 006	48	13, 500	24	6, 175	15, 046	629	17, 579	1, 767	528	2	49	34
1	Alabama	14	28, 900	15	1, 200							10					
2	Arkansas	25	85, 550	29	2, 860					7		34					
3	California	9	1, 676, 500	60	7, 240					201		26		3			
4	Connecticut	78	7, 907, 452	435	59, 055					1, 384	50	1, 228					
5	Delaware	5	352, 559	13	1, 700					26		99		1			
6	Georgia	32	180, 733	42	3, 713							88					
7	Illinois	53	1, 327, 553	106	10, 678					181		193					
8	Indiana	81	2, 273, 705	160	18, 445			1	75	150		660		4			
9	Iowa	34	553, 500	56	4, 420					51		108		7			
10	Kansas	5	131, 925	9	892					24		15		2			
11	Kentucky	98	890, 750	154	14, 737					15		493		5			
12	Maine	93	3, 876, 028	261	30, 530					1, 045		58					
13	Maryland	14	333, 760	30	2, 870					20		91		13			
14	Massachusetts	167	24, 680, 782	1, 356	175, 859	20	6, 600	20	5, 500	5, 202	162	2, 377	1, 765				
15	Michigan	39	558, 800	51	4, 680					41		126					
16	Minnesota	13	190, 500	21	2, 236					46		13					
17	Mississippi	8	331, 500	15	1, 635					5		116					
18	Missouri	98	726, 150	126	13, 275					42		149		2			
19	New Hampshire	58	4, 510, 271	293	37, 304					1, 186		320		28			
20	New Jersey	27	2, 530, 125	136	27, 065					609		444		98			
21	New York	159	8, 266, 878	483	50, 735	2	600	3	600	1, 158	68	591	2	39		26	
22	North Carolina	49	203, 100	57	5, 320					7		23					
23	Ohio	122	1, 316, 340	182	14, 000					126		412		34			
24	Oregon	10	566, 800	21	2, 225					53		3					
25	Pennsylvania	324	18, 780, 604	938	172, 468	10	4, 300			1, 485	88	7, 895		265	2	22	34
26	Rhode Island	50	8, 448, 700	432	54. 028	16	2, 000			1, 100	261	1, 313					
27	South Carolina	11	7. 900	11	790												
28	Tennessee	106	418, 664	98	8, 450					17		150					
29	Texas	1	97, 500	2	250					10		2					
30	Utah	11	382, 000	21	1, 560					22		91		1			
31	Vermont	44	2, 320, 161	145	16, 798					583		163					
32	Virginia	48	456, 750	54	5, 035					69		73		11		1	
33	Washington	1	40, 000	2	250					8		4					
34	West Virginia	55	293, 170	72	5, 313					30		134		15			
35	Wisconsin	48	1, 349, 954	75	6, 390					143		77					

BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

WOOLEN GOODS.

KNITTING- AND SEWING-MACHINES.		SPINDLES.		OPERATIVES.				MECHANICS, WATCHMEN, AND LABORERS.				OFFICERS AND CLERKS.						
				Male.		Female.		Male.		Female.		Male.		Female.				
Number of knitting-machines.	Number of sewing-machines.	Number of woolen spindles.	Number of worsted spindles.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.	Total number of employés.	Wages and salaries of all employed during the year.	
379	348	1, 720, 820	35, 926	42, 437	6, 496	29, 346	3, 624	3, 256	18	23	2	1, 285	14	3	......	86, 504	$25, 836, 392	
....	....	160	....	13	....	5	....	....	......	......	......	....	......	......	......	18	3, 037	1
1	....	1, 360	....	58	6	21	1	4	......	......	......	....	......	......	......	90	13, 226	2
138	16	18, 740	....	612	15	108	4	68	......	......	......	28	......	......	......	835	334, 318	3
8	11	152, 004	....	4, 024	454	1, 948	234	197	......	......	......	98	......	1	......	6, 956	2, 342, 935	4
....	....	4, 306	....	168	23	59	[illegible]	3	......	......	......	....	......	......	......	261	108, 504	5
....	....	2, 224	....	61	23	45	2	5	......	......	......	6	......	......	......	142	25, 070	6
2	....	20, 992	....	455	93	364	57	37	......	......	......	35	......	1	......	1, 042	296, 225	7
22	1	36, 886	....	756	208	587	99	51	......	......	......	39	1	......	......	1, 741	462, 681	8
12	....	11, 025	....	253	39	132	15	38	[illegible]	......	......	16	......	......	......	499	117, 792	9
4	....	2, 636	....	63	10	40	8	....	......	......	......	3	......	......	......	124	25, 825	10
3	2	14, 110	....	306	169	253	48	27	......	......	......	20	......	......	......	823	166, 489	11
1	22	68, 192	....	1, 523	186	1, 109	84	124	......	......	......	69	......	......	......	3, 095	1, 044, 606	12
....	....	6, 580	....	156	26	100	16	12	......	......	......	3	......	......	......	313	59, 491	13
7	110	461, 776	11, 696	11, 922	1, 368	8, 209	891	952	......	......	......	272	6	1	......	23, 621	7, 457, 115	14
15	....	10, 688	....	192	23	114	7	5	......	......	......	[illegible]	......	......	......	347	76, 240	15
1	7	3, 852	....	91	44	73	6	8	......	......	......	7	......	......	......	229	46, 108	16
....	2	3, 734	....	88	41	61	4	11	1	......	......	12	......	......	......	218	53, 100	17
15	2	12, 622	....	353	110	144	22	33	1	......	......	26	......	......	......	689	109, 877	18
24	49	126, 671	....	2, 057	245	1, 360	133	154	......	1	......	77	......	......	......	4, 027	1, 181, 738	19
[illegible]	14	31, 719	....	1, 649	299	996	239	134	......	1	......	44	1	......	......	3, 363	996, 384	20
2	36	141, 020	1, 968	2, 956	450	2, 121	236	272	5	7	......	83	......	......	......	6, 130	1, 774, 143	21
1	2	2, 374	....	106	14	50	1	9	......	......	......	5	......	......	......	185	23, 195	22
55	7	33, 950	....	638	129	413	58	46	2	......	......	38	......	......	......	1, 324	256, 214	23
9	2	4, 248	....	149	6	33	11	7	......	......	......	10	......	......	......	216	86, 088	24
45	54	295, 625	7, 142	7, 723	1, 635	6, 809	853	521	1	......	......	147	......	......	......	17, 689	5, 254, 328	25
2	4	160, 524	15, 120	3, 911	645	2, 637	506	298	2	11	2	103	6	......	......	8, 121	2, 480, 907	26
....	....	....	....	11	....	....	....	1	......	......	......	1	......	......	......	13	1, 173	27
....	....	6, 860	....	210	31	111	11	22	......	......	......	17	......	......	......	402	67, 063	28
....	....	600	....	25	....	8	....	3	......	......	......	....	......	......	......	36	25, 700	29
....	[illegible]	5, 422	....	117	30	79	18	10	......	......	......	23	......	......	......	277	68, 108	30
....	1	46, 264	....	997	99	780	31	154	......	3	......	20	......	......	......	2, 084	544, 138	31
....	....	8, 486	....	212	15	95	4	15	......	......	......	24	......	......	......	365	71, 720	32
....	....	400	....	17	2	8	1	....	......	......	......	1	......	......	......	29	4, 000	33
10	....	8, 081	....	194	21	96	10	19	......	......	......	13	......	......	......	353	44, 161	34
....	4	16, 689	....	371	37	378	6	16	......	......	......	39	......	......	......	847	214, 993	35

STATISTICS OF WOOL MANUFACTURE IN ALL ITS

WOOLEN GOODS—Continued.

	States and Territories.	MATERIALS.									
		Foreign wool in the condition purchased, consumed during the year.	Domestic wool in the condition purchased, consumed during the year.	Scoured wool (not including waste purchased and shoddy) consumed during the year.	Value at mill of foreign and domestic wool consumed.	Camels' hair and noils consumed.	Value.	Mohair and noils consumed.	Value.	Buffalo hair and noils consumed.	Value.
	The United States	*Pounds.* 20, 482, 667	*Pounds.* 177, 042, 288	*Pounds.* 109, 724, 213	$67, 380, 250	*Pounds.* 1, 234, 064	$332, 419	*Pounds.* 84, 080	$50, 837	*Pounds.* 556, 601	$25, 284
1	Alabama		135, 366	112, 866	46, 246						
2	Arkansas		189, 000	174, 000	70, 050						
3	California	20, 000	3, 554, 850	1, 384, 750	748, 750	5, 000	2, 000			20, 000	600
4	Connecticut	2, 069, 609	14, 370, 716	8, 501, 546	6, 383, 081	30, 017	13, 654				
5	Delaware	203, 206	633, 677	488, 278	291, 138	20, 084	11, 822				
6	Georgia		366, 274	310, 074	129, 990						
7	Illinois		3, 003, 740	1, 888, 989	1, 143, 210						
8	Indiana	10, 000	4, 350, 456	2, 904, 856	1, 381, 545						
9	Iowa		1, 407, 510	801, 360	384, 829						
10	Kansas		364, 000	188, 000	89, 720						
11	Kentucky		1, 688, 663	1, 230, 075	562, 662						
12	Maine	1, 040, 498	7, 907, 848	5, 026, 144	3, 113, 028	3, 500	1, 600	17, 304	5, 191	5, 161	338
13	Maryland		794, 050	505, 650	270, 652						
14	Massachusetts	7, 391, 993	48, 748, 041	28, 034, 931	18, 968, 327	678, 706	148, 251	29, 279	14, 266	966	81
15	Michigan		869, 025	556, 617	307, 703						
16	Minnesota	20, 000	537, 580	350, 000	131, 695						
17	Mississippi		494, 033	313, 881	157, 612						
18	Missouri		1, 811, 635	1, 327, 100	589, 080						
19	New Hampshire	838, 875	10, 980, 301	5, 638, 583	3, 690, 522	1, 500	300	32, 297	29, 220		
20	New Jersey	269, 761	5, 394, 377	3, 262, 450	2, 008, 063	24, 749	11, 175				
21	New York	1, 003, 324	11, 068, 899	7, 035, 683	4, 634, 876	140, 695	59, 308	4, 700	1, 410	40, 300	2, 748
22	North Carolina	80, 000	496, 145	466, 424	216, 650						
23	Ohio	165, 000	2, 380, 424	1, 680, 473	845, 992						
24	Oregon		985, 250	472, 200	197, 785						
25	Pennsylvania	5, 005, 271	28, 556, 097	22, 011, 974	11, 099, 912	163, 476	30, 917			487, 520	21, 152
26	Rhode Island	2, 198, 726	17, 151, 957	9, 520, 553	6, 886, 833	160, 337	52, 039	500	750	556	67
27	South Carolina		48, 950	46, 950	19, 120						
28	Tennessee		883, 338	805, 836	330, 761						
29	Texas		175, 000	70, 000	37, 500						
30	Utah		566, 900	313, 000	120, 715						
31	Vermont	161, 404	3, 441, 787	1, 719, 580	1, 170, 939	5, 500	1, 203			2, 098	298
32	Virginia	5, 000	857, 812	649, 175	326, 602						
33	Washington		160, 000	100, 000	40, 000						
34	West Virginia		602, 399	509, 403	213, 019						
35	Wisconsin		2, 066, 188	1, 322, 812	771, 643	500	150				

BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

WOOLEN GOODS—Continued.

MATERIALS—continued.														
Hair of other animals consumed.	Value.	Cotton used on cards.	Value.	Shoddy used, or waste, not including that made in mill.	Value.	Cotton warp used on woolen goods.	Value.	Cotton warp used on worsted goods.	Value.	Woolen yarn used, not made in mill.	Value.	Worsted yarn used, not made in mill.	Value.	
Pounds. 3, 940, 923	$212, 762	*Pounds.* 24, 744, 964	$3, 395, 569	*Pounds.* 46, 583, 983	$7, 014, 100	*Pounds.* 17, 55[illegible] 212	$4, 374, 985	*Pounds.* 3, 517, 580	$897, 211	*Pounds.* 1, 485, 999	$872, 023	*Pounds.* 2, 495, 050	$3, 139, 746	
....	....	....	....	....	....	10, 000	2, 000	....	....	....	....	....	....	1
....	....	8, 400	820	300	45	22, 200	7, 835	....	....	....	....	....	....	2
....	....	218, 526	31, 222	94, 150	12, 310	9, 500	2, 950	....	....	....	....	....	....	3
32, 700	2, 770	1, 516, 515	209, 199	6, 385, 103	1, 013, 757	1, 423, 992	403, 995	....	....	....	....	714, 860	947, 245	4
....	....	30, 100	3, 620	346, 778	77, 915	25, 000	5, 000	....	....	....	....	3, 026	4, 270	5
....	....	27, 918	2, 278	....	....	106, 500	24, 950	....	....	....	....	....	....	6
....	....	39, 341	4, 851	83, 007	24, 697	75, 190	25, 763	....	....	....	....	....	....	7
....	....	294, 629	37, 121	345, 656	76, 421	537, 147	101, 410	....	....	10, 000	5, 250	....	....	8
....	....	100	25	865	154	18, 497	4, 844	....	....	....	....	....	....	9
....	....	10, 000	1, 100	2, 000	300	13, 200	3, 225	....	....	....	....	....	....	10
....	....	288, 263	32, 820	117, 151	32, 430	379, 181	124, 996	....	....	....	....	....	....	11
371, 742	33, 484	569, 331	84, 447	1, 153, 144	296, 792	995, 131	240, 564	....	....	200	200	....	....	12
250	20	6, 000	700	255, 200	46, 200	11, 589	2, 418	....	....	....	....	....	....	13
273, 140	18, 610	4, 776, 690	505, 731	11, 197, 285	1, 975, 556	3, 144, 565	809, 995	1, 424, 371	375, 763	182, 461	130, 083	526, 272	686, 421	14
....	....	2, 100	369	37, 163	13, 766	3, 117	747	93	24	....	....	....	....	15
....	....	....	....	18, 000	5, 400	6, 365	2, 006	....	....	....	....	....	....	16
....	....	72, 148	7, 811	....	....	133, 748	32, 150	....	....	....	....	....	....	17
....	....	4, 100	418	4, 000	894	111, 127	28, 180	....	....	....	....	....	....	18
....	....	833, 104	97, 150	3, 105, 890	339, 360	831, 410	222, 478	....	....	....	....	21, 220	21, 387	19
110, 000	3, 700	557, 106	51, 894	2, 375, 856	361, 968	655, 396	146, 499	....	....	33, 000	32, 100	70, 000	89, 000	20
836, 065	43, 237	1, 439, 289	176, 649	1, 556, 767	252, 673	523, 497	53, 411	....	....	39, 422	16, 101	102, 575	179, 403	21
....	....	....	....	12, 444	1, 804	118, 464	25, 639	....	....	....	....	....	....	22
75, 000	11, 250	108, 000	15, 190	134, 063	37, 588	162, 824	44, 651	....	....	....	....	....	....	23
....	....	5, 000	1, 000	1, 000	400	1, 000	500	....	....	....	....	....	....	24
2, 241, 526	99, 591	11, 691, 450	1, 846, 156	14, 926, 242	1, 538, 070	6, 522, 579	1, 575, 747	2, 092, 116	521, 124	1, 155, 916	636, 289	964, 043	1, 094, 330	25
....	....	1, 809, 078	228, 268	1, 959, 782	437, 679	1, 135, 061	316, 385	1, 000	300	65, 000	52, 000	92, 445	117, 100	26
....	....	....	....	....	....	....	....	....	....	....	....	....	....	27
....	....	44, 000	4, 440	55, 433	18, 315	136, 416	37, 982	....	....	....	....	....	....	28
....	....	....	....	....	....	....	....	....	....	....	....	....	....	29
....	....	2, 390	496	1, 000	140	29, 397	7, 368	....	....	....	....	....	....	30
....	....	310, 261	38, 958	2, 286, 150	416, 324	330, 209	97, 055	....	....	....	....	609	590	31
500	100	57, 000	8, 784	60, 500	14, 230	47, 170	10, 972	....	....	....	....	....	....	32
....	....	....	....	....	....	....	....	....	....	....	....	....	....	33
....	....	3, 000	480	33, 819	8, 931	1, 000	400	....	....	....	....	....	....	34
....	....	21, 215	3, 572	35 235	9, 981	29, 740	12, 870	....	....	....	....	....	....	35

STATISTICS OF WOOL MANUFACTURE IN ALL ITS

WOOLEN GOODS—Continued.

	States and Territories.	MATERIALS—continued.						
		Value of chemicals and dyestuffs.	Cords of wood.	Value.	Coal.	Value.	Value of all other materials used.	Total value of all materials.
			Number.		*Tons.*			
	The United States	$4,758,498	142,250	$371,236	359,769	$1,461,467	$6,559,224	$100,845,611
1	Alabama	500	110	115			500	49,361
2	Arkansas	2,830	1,195	1,965			2,427	85,972
3	California	72,975	2,312	11,273	6,470	37,100	78,359	997,539
4	Connecticut	457,656	15,721	50,619	26,540	139,720	555,291	10,176,987
5	Delaware	13,130	360	864	1,033	4,553	35,964	448,285
6	Georgia	3,100	800	1,350			3,397	165,065
7	Illinois	59,329	3,049	5,952	10,608	21,609	47,387	1,332,798
8	Indiana	60,442	5,855	12,464	10,865	26,723	123,014	1,823,390
9	Iowa	23,677	1,349	3,766	2,861	8,775	9,677	435,747
10	Kansas	9,480	330	1,280	380	1,151	995	107,251
11	Kentucky	15,736	6,343	4,439	5,143	14,095	65,227	852,405
12	Maine	237,701	15,531	41,854	3,556	19,475	219,368	4,294,042
13	Maryland	15,455	242	610	736	3,686	9,983	349,724
14	Massachusetts	1,737,744	20,523	60,007	92,789	465,867	1,942,881	27,839,583
15	Michigan	14,823	3,931	6,246	800	2,673	10,263	356,614
16	Minnesota	5,195	1,055	2,202			9,369	155,867
17	Mississippi	8,660	2,202	3,015			2,398	211,646
18	Missouri	22,800	4,097	8,325	2,591	9,561	22,453	681,711
19	New Hampshire	200,470	16,178	49,028	7,048	39,193	304,601	4,993,709
20	New Jersey	180,165	351	817	20,753	64,071	213,503	3,162,955
21	New York	299,482	4,351	9,528	26,241	90,405	393,604	6,212,835
22	North Carolina	3,639	1,035	1,873			6,102	255,707
23	Ohio	52,704	4,425	8,805	7,703	21,413	46,730	1,084,323
24	Oregon	19,426	1,515	3,675			4,700	227,486
25	Pennsylvania	717,715	2,384	4,576	91,760	310,136	1,690,089	21,185,804
26	Rhode Island	354,331	10,373	35,093	30,510	140,054	517,530	9,138,429
27	South Carolina		300	300			35	19,455
28	Tennessee	11,904	3,279	5,436	280	2,046	12,170	423,054
29	Texas	2,475	653	1,960			2,500	44,435
30	Utah	8,206	388	2,371	174	1,300	6,630	147,226
31	Vermont	75,192	4,897	15,369	6,357	27,120	169,442	2,012,490
32	Virginia	11,366	1,456	3,351	154	688	6,987	383,080
33	Washington	5,500	100	350	20	150	6,000	52,000
34	West Virginia	13,628	750	1,276	2,259	3,188	4,921	245,843
35	Wisconsin	41,053	4,830	11,082	2,138	7,715	34,727	892,793

BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

WOOLEN GOODS—Continued.

Value of production at wholesale.	PRODUCTS.														
	Blankets.	Horse blankets.	Carriage robes.	Cloths, cassimeres, doeskins, diagonal, and suitings.	Beavers and overcoating.	Horse clothing.	Blanketing.	Cloaking.	Felted cloth.	Coverlets.	Flannels.	Jeans.	Kersey.	Linsey.	
	Pairs.	*Number.*	*Number*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Number.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	
$160, 606, 721	1, 083, 671	1, 114, 827	58, 485	73, 440, 525	7, 095, 924	616, 157	22, 393	1, 359, 296	129, 904	1, 330, 066	70, 923, 196	29, 538, 959	2, 579, 374	4, 781, 007	
63, 745												40, 000			1
127, 430	1, 125			7, 500							21, 500	113, 500		50, 000	2
1, 634, 858	77, 500	4, 300		558, 719	52, 792						1, 452, 757				3
16, 892, 284	4, 344			9, 013, 909	1, 530, 087					1, 300, 300	2, 007, 571	850, 000	157, 007	260, 000	4
665, 253				835, 140									8, 121		5
239, 390				45, 000								454, 588	8, 219	125, 000	6
1, 896, 460	18, 794			681, 013							1, 342, 050	163, 857		12, 000	7
2, 729, 347	6, 650			166, 505							2, 081, 331	2, 092, 568	106, 000	3, 429	8
679, 904	12, 405			149, 687							681, 108	75, 134	1, 000		9
211, 525	8, 800			18, 000							224, 000	46, 400			10
1, 264, 988	808			4, 225							11, 000	2, 456, 484		15, 200	11
6, 686, 073	146, 810	39, 715	17, 323	2, 828, 379	260, 259	70, 633		225, 000			3, 139, 730		4, 500		12
488, 308	905			157, 275					800		25, 703		659, 407	1, 587	13
45, 099, 203	185, 436	496, 000	29, 214	20, 989, 486	2, 052, 181	432, 000		705, 199	60, 000		30, 749, 892				14
481, 517	227			323. 566							160, 054	1, 200			15
253, 378	28, 647		3, 808	2, 132							64, 321	12, 400			16
299, 605	2, 000			647, 036								63, 606		11, 874	17
930, 961	17, 936		2, 000	39, 234							138, 208	352, 283		64, 980	18
8, 113, 839	310, 544	97, 000	1, 030	3, 156, 686	363, 962	61, 833		314, 126	2, 000		8, 564, 625				19
4, 984, 007	62, 868	71, 552		3, 414, 478	319, 668			14, 000			1, 178, 910	120, 000			20
9, 871, 973	43, 966	305, 500		4, 526, 721	163, 743	51, 691			12, 104		7, 256, 837		80, 000		21
303, 160				48, 000							1, 500	12, 000	208, 000	8, 000	22
1, 678, 189	10, 818			85, 509				50, 000	55, 000		462, 670	625, 673		700	23
549, 030	12, 992			134, 239			22, 393	612			162, 684				24
32, 341, 291	121, 120	100, 600		11, 869, 332	1, 468, 219			45, 000		29, 766	7, 453, 896	19, 143, 606	1, 243, 847	3, 491, 253	25
15, 410, 450				10, 965, 523	545, 579						1, 678, 506	2, 013, 320		530, 000	26
24, 075															27
620, 724	2, 387			8, 440							18, 450	644, 036		94, 493	28
80, 500				86, 000											29
279, 424	651			26, 095	300						203, 128	56, 998	3, 817	71, 609	30
3, 217, 807			5, 110	1, 516, 401	337, 504			359			1, 065, 269				31
577, 968	1, 488	60		412, 370	1, 430			5, 000			18, 979	81, 050	93, 856	17, 350	32
70, 000															33
356, 986	4, 057			46, 668							141, 317	103, 206	5, 600	22, 332	34
1, 480, 069	393	100		677, 257	200						617, 200	17, 050		1, 200	35

STATISTICS OF WOOL MANUFACTURE IN ALL ITS

WOOLEN GOODS—Continued.

	States and Territories.	PRODUCTS—continued.											
		Waterproof cloaking and repellants.	Satinets.	Tweeds.	Shawls.	Cashmerettes.	Balmorals.	Cotton yarn.	Woolen yarn.	Woolen rolls.	Cottonades.	Dress goods.	Cashmere.
		Yards.	*Yards.*	*Yards.*	*Number.*	*Yards.*	*Dozen.*	*Pounds.*	*Pounds.*	*Pounds.*	*Yards.*	*Yards.*	*Yards.*
	The United States	3, 838, 297	16, 629, 116	2, 035, 015	1, 242, 979	1, 557, 537	144, 900	1, 420, 968	25, 581, 217	3, 541, 429	1, 821, 600	4, 771, 140	2, 919, 050
1	Alabama									90, 990			
2	Arkansas			6, 000	100				5, 000	82, 000			
3	California			22, 086	13, 900				1, 000				
4	Connecticut	602, 571	2, 409, 067	817, 663					233, 947	11, 211			
5	Delaware								500	8, 000			
6	Georgia			20, 000					36, 000	96, 900			
7	Illinois		5, 249	28, 490	34, 842				377, 068	101, 787			
8	Indiana	1, 000	34, 817	17, 700					884, 001	55, 513			
9	Iowa	1, 200	13, 600	13, 267		1, 390			353, 629	30, 772			
10	Kansas		5, 000						15, 500				
11	Kentucky								179, 092	396, 073			
12	Maine	1, 681, 568	25, 062		30, 000				28, 975	299, 928			
13	Maryland		400			1, 913			9, 200	10, 900			
14	Massachusetts	375, 948	12, 449, 844	544, 935	222, 534				400, 262	1, 000			2, 919, 050
15	Michigan		4, 335						162, 899	87, 250			
16	Minnesota		1, 500						35, 000	70, 914			
17	Mississippi		2, 500	14, 724	2, 000				41, 085	19, 700			
18	Missouri	400	1, 400	500					510, 055	310, 933			
19	New Hampshire	375, 267	32, 000	182, 521		1, 301, 426			8, 350	46, 300			
20	New Jersey	275, 084	710						348, 562				
21	New York	76, 387	6, 600	871	379, 318				384, 219	224, 747			
22	North Carolina	10, 000							58, 650	214, 010			
23	Ohio		40, 637	5, 427		952	200		696, 166	89, 230			
24	Oregon				2, 648				6, 738	22, 000			
25	Pennsylvania	4, 013	28, 976	291, 824	392, 875	246, 106	141, 600	1, 420, 968	19, 421, 516	527, 996	1, 717, 600	4, 771, 140	
26	Rhode Island		200, 000		111, 712				769, 760		104, 000		
27	South Carolina									46, 950			
28	Tennessee		23, 300	3, 000	1, 000				159, 005	337, 961			
29	Texas												
30	Utah	21, 700		3, 200		2, 000			43, 484	24, 900			
31	Vermont	305, 000	1, 335, 300						30, 750	32, 772			
32	Virginia		4, 100						39, 819	112, 280			
33	Washington												
34	West Virginia	8, 243	3, 719	1, 350		3, 750			163, 539	104, 415			
35	Wisconsin	99, 826	1, 000	61, 457	52, 050		3, 100		177, 446	83, 997			

BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

WOOLEN GOODS—Continued.

PRODUCTS—continued.																
Worsted coatings.	Worsted overcoatings.	Worsted dress goods.	Alpaca.	Bunting.	Worsted suitings.	Worsted shawls.	Binding.	Worsted yarn.	Reps.	Lining.	Ingrain carpets, 2-ply.	Ingrain carpets, 3-ply.	Rag carpets.	Girthen carpets.	Value of all products not heretofore named.	
Yards.	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*No.*	*Yards.*	*Pounds.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*		
1, 082, 236	492, 331	11, 275, 884	3, 351, 701	355, 000	914, 587	83, 612	63, 520	2, 238, 076	1, 957, 650	50, 000	169, 555	700	6, 800	820	$3, 058, 616	
																1
																2
																3
					349, 375										32, 100	4
																5
																6
															87, 000	7
															213, 189	8
															16, 930	9
															19, 800	10
															98, 700	11
															24, 290	12
																13
315, 284	11, 631	*a* 10, 932, 898	3, 351, 701		343, 000			741, 076	1, 957, 650						152, 000	14
															5, 967	15
																16
																17
															38, 000	18
															127, 300	19
															24, 900	20
		700			126, 212	83, 612					112, 830				25, 575	21
																22
															252, 833	23
															50, 900	24
626, 500		342, 286		355, 000			63, 520	1, 058, 000		50, 000	56, 725	700	4, 800	820	1, 616, 888	25
140, 452	480, 700				96, 000			439, 000								26
																27
															3, 750	28
																29
															32, 000	30
															52, 000	31
													2, 000		85, 000	32
															70, 000	33
															24, 404	34
															5, 090	35

a Mixed woolen and worsted.

STATISTICS OF WOOL MANUFACTURE IN ALL ITS

WORSTED GOODS.

	States.	No. of establishments.	Capital.	MACHINES. Number of sets of cards.	Daily capacity of same in pounds of scoured wool.	Number of combing-machines of foreign manufacture.	Daily capacity of same in pounds of scoured wool.	Number of combing-machines of American manufacture.	Daily capacity of same in pounds of scoured wool.	LOOMS. Number of broad looms on woolen goods.	Number of broad looms on worsted goods.	Number of narrow looms on woolen goods.	Number of narrow looms on worsted goods.	Number of hand-looms.	Number of Brussels power-looms.	Number of knitting-looms.
	The United States ..	76	$20, 374, 043	259	55, 105	269	86, 761	19	5, 650	47	1, 963	58	7, 231	189	4, 905	18
1	Connecticut	3	232, 000	22	2, 700	6	1, 275	....	....	30	....	58	....	....	....	....
2	Massachusetts.........	23	6, 195, 247	96	22, 764	75	31, 850	11	2, 550	12	1, 296	....	3, 103	....	1, 200	....
3	New Hampshire	2	2, 628, 584	23	3, 400	17	7, 000	4	1, 800	....	....	....	1, 350	....	....	....
4	New Jersey	2	45, 000	5	1, 500	4	1, 200	....	....	....	....	....	....	30	....	....
5	New York	6	1, 679, 157	6	700	30	6, 130	1	400	....	24	....	962	....	150	....
6	Ohio	1	67, 000	....	....	2	500	....	....	....	....	....	66	....	....	....
7	Pennsylvania..........	28	4, 959, 639	44	11, 316	83	24, 406	1	200	....	486	....	650	159	550	2
8	Rhode Island	11	4, 567, 416	63	12, 725	52	14, 400	2	700	5	157	....	1, 100	....	3, 005	16

	States.	MATERIALS. Foreign wool in the condition purchased, consumed during the year.	Domestic wool in the conditon purchased, consumed during the year.	Scoured wool (not including waste purchased and shoddy) consumed during the year.	Value at mill of foreign and domestic wool consumed.	Camel's hair and noils consumed.	Value.	Mohair and noils consumed.	Value.	Hair of other animals consumed.	Value.	Cotton used on cards.	Value.	Shoddy used, or waste, not including that made in mill.	Value.
		Pounds.	*Pounds.*	*Pounds.*		*Pounds.*		*Pounds.*		*Lbs.*		*Pounds.*		*Pounds.*	
	The United States ..	15, 687, 815	25, 461, 511	26, 334, 635	$15, 235, 878	207, 065	$40, 341	31, 598	$19, 458	519	$237	1, 757, 842	$211, 293	190, 800	$31, 300
1	Connecticut	200, 000	1, 180, 000	690, 000	602, 000	....	....	....	....	....	....	....	....	100, 000	2, 000
2	Massachusetts	9, 376, 043	4, 811, 217	9, 758, 253	4, 143, 522	190, 000	36, 000	11, 598	6, 958	519	237	5, 400	1, 000	22, 800	6, 300
3	New Hampshire	1, 520, 700	1, 792, 961	2, 193, 861	941, 349	16, 565	4, 141	....	....	....	....	....	....	....	....
4	New Jersey	30, 000	35, 000	45, 000	30, 000	....	....	....	....	....	....	....	....	....	....
5	New York	875, 000	1, 862, 000	1, 788, 000	979, 899	....	....	2, 000	1, 000	....	....	....	....	....	....
6	Ohio	....	150, 000	120, 000	45, 000	....	....	5, 000	2, 500	....	....	....	....	....	....
7	Pennsylvania..........	1, 415, 710	10, 109, 404	7, 134, 876	5, 456, 104	....	....	8, 000	6, 000	....	....	500, 000	60, 000	....	....
8	Rhode Island	2, 270, 362	5, 520, 929	4, 604, 645	3, 038, 004	500	200	5, 000	3, 000	....	....	1, 252, 442	150, 293	68, 000	23, 000

	States.	Value of production at wholesale.	WOOLEN GOODS PRODUCTS. Cloths, cassimeres, and doeskins.	Woolen yarn made and sold, not used at mill.	WORSTED GOODS PRODUCTS. Coatings.	Dress goods.	Upholstery goods.	Alpaca.	Serges.	Picture cord.	Terry.
			Yards.	*Pounds.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Pieces.*	*Yards.*
	The United States ..	$33, 549, 942	200, 000	1, 540, 493	2, 875, 672	63, 833, 341	205, 000	1, 000, 000	530, 741	250, 000	214, 000
1	Connecticut	1, 597, 227	....	....	....	....	....	....	....	250, 000	....
2	Massachusetts.........	10, 466, 016	....	594, 177	997, 600	37, 333, 459	....	....	368, 524	....	....
3	New Hampshire	2, 694, 232	....	233, 210	....	15, 093, 805	....	....	....	....	....
4	New Jersey	119, 000	....	....	....	....	....	....	....	....	....
5	New York	2, 321, 990	....	....	281, 940	855, 400	....	1, 000, 000	135, 324	....	....
6	Ohio	101, 250	....	....	....	450, 000	....	....	....	....	....
7	Pennsylvania..........	10, 072, 473	200, 000	654, 106	656, 132	4, 072, 850	205, 000	....	....	....	214, 000
8	Rhode Island	6, 177, 754	....	59, 000	940, 000	6, 027, 827	....	....	26, 893	....	....

BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

WORSTED GOODS.

SEWING-MACHINES.	SPINDLES.		OPERATIVES.				MECHANICS, WATCHMEN, AND LABORERS.				OFFICERS AND CLERKS.				Total number of employés.	Wages and salaries of all employed during the year.	
			Male.		Female.		Male.		Female.		Male.		Female.				
Number of sewing-machines.	Number of woolen spindles.	Number of worsted spindles.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.			
57	20, 664	219, 454	5, 443	1, 086	9, 473	1, 800	829	8	....	....	163	1	....	....	18, 803	$5, 683, 027	
....	2, 600	5, 000	239	45	156	22	25	....	....	....	3	....	....	....	490	172, 256	1
12	4, 044	76, 647	1, 531	245	3, 340	385	232	....	....	....	50	....	....	....	5, 783	1, 870, 030	2
6	672	10, 880	343	33	919	74	143	....	....	....	19	....	....	....	1, 531	512, 881	3
....	....	2, 000	70	18	35	37	20	....	....	....	....	....	....	....	180	22, 200	4
3	....	20, 092	403	164	874	192	59	....	....	....	15	....	....	....	1, 707	385, 952	5
....	....	1, 250	44	21	32	4	4	....	....	....	3	....	....	....	108	23, 400	6
21	6, 080	58, 235	1, 492	307	2, 378	642	145	....	....	....	36	....	....	....	5, 000	1, 473, 958	7
15	7, 268	45, 350	1, 321	253	1, 739	444	201	8	....	....	37	1	....	....	4,004	1, 222, 350	8

MATERIALS—continued.

Cotton warp used on woolen goods.	Value.	Cotton warp used on worsted goods.	Value.	Woolen yarn used, not made in mill.	Value.	Worsted yarn used, not made in mill.	Value.	Value of chemicals and dyestuffs.	Cords of wood.	Value.	Coal.	Value.	Value of all other materials used. (a)	Total value of all materials.	
Pounds.		*Pounds.*		*Pounds.*		*Pounds.*			*No.*		*Tons.*				
262, 000	$80, 062	5, 086, 952	$1, 505, 989	416, 574	$271, 255	2, 100, 532	$2, 418, 086	$565, 660	2, 132	$6, 497	72, 779	$308, 421	$1, 319, 151	$22, 013, 628	
....	....	....	....	56, 000	5, 000	368, 000	560, 600	25, 080	900	2, 475	1, 500	9, 480	52, 020	1, 258, 655	1
20, 000	6, 000	2, 508, 549	860, 824	18, 000	10, 000	904, 887	925, 258	81, 528	168	713	14, 520	75, 285	311, 851	6, 465, 476	2
....	....	1, 207, 430	171, 599	....	....	2, 721	4, 536	214, 322	791	2, 430	4, 979	25, 781	218, 068	1, 582, 226	3
....	....	....	....	....	....	25, 000	40, 000	....	....	....	95	417	....	70, 417	4
....	....	299, 900	121, 090	....	....	50, 044	55, 555	30, 547	150	375	8, 778	29, 348	130, 562	1, 348, 376	5
....	....	40, 000	16, 000	....	....	....	....	2, 100	....	....	486	1, 506	2, 500	69, 606	6
102, 000	60, 062	495, 365	197, 689	312, 574	236, 255	604, 880	676, 637	101, 441	1	6	21, 649	70, 706	412, 589	7, 277, 489	7
50, 000	14, 000	535, 708	138, 787	30, 000	20, 000	145, 000	155, 500	110, 642	122	498	20, 772	95, 898	191, 561	3, 941, 383	8

WORSTED GOODS PRODUCTS—continued.

Bunting.	Suitings.	Worsted shawls.	Italian cloths.	Braiding or braids.	Rep.	Tapestry.	Elastic frills.	Worsted yarn made and sold not used at mill.	Lastings.	Noils, shorts, etc.	Cloaking.	Value of all products not heretofore named.	
Yards.	*Yards.*	*Number.*	*Yards.*	*Dozen.*	*Yards.*	*Yards.*	*Yards.*	*Pounds.*	*Yards.*	*Pounds.*	*Yards.*	*Dollars.*	
2, 230, 221	362, 168	574, 257	1, 357, 444	2, 612, 691	9, 000	329, 000	105, 000	9, 650, 000	910, 553	4, 238, 295	16, 107	$965, 512	
....	336, 000	....	....	....	....	....	....	360, 000	....	300, 000	....	....	1
962, 520	....	....	....	881, 188	....	....	....	3, 057, 999	....	1, 388, 863	....	63, 867	2
....	....	....	....	....	....	....	....	363, 135	....	503, 079	....	....	3
....	25, 000	....	....	....	....	....	....	30, 000	....	9, 000	....	....	4
1, 263, 318	....	....	835, 500	....	....	....	....	251, 571	445, 356	416, 066	....	....	5
....	....	....	....	....	....	....	....	....	....	....	....	....	6
4, 383	1, 168	574, 257	....	....	9, 000	329, 000	105, 000	4, 577, 846	....	899, 767	16, 107	8, 750	7
....	....	....	521, 944	1, 731, 503	....	....	....	1, 009, 449	465, 197	721, 520	....	892, 895	8

a Including 5,000 pounds silk yarn, value $23,500; 20,000 pounds shoddy yarn, value $10,000.

STATISTICS OF WOOL MANUFACTURE IN ALL ITS BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

FELT GOODS.

States.	Number of establishments.	Capital.	MACHINES.		OPERATIVES.				MECHANICS, WATCHMEN, AND LABORERS.				OFFICERS AND CLERKS.				Total number of employés.	Wages and salaries of all employed during the year.	MATERIALS.			
			Number of sets of cards.	Daily capacity of same in pounds of scoured wool.	Male.		Female.		Male.		Female.		Male.		Female.				Foreign wool in the condition purchased, consumed during the year.	Domestic wool in the condition purchased, consumed during the year.	Scoured wool (not including waste purchased and shoddy) consumed during the year.	Value at mill of foreign and domestic wool consumed.
					16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.						
		Dollars.																*Dollars.*	*Pounds.*	*Pounds.*	*Pounds.*	*Dollars.*
The United States	26	1, 958, 254	122	29, 160	1, 061	71	233	17	106	....	....	....	36	....	....	....	1, 524	439, 760	709, 067	4, 204, 806	2, 733, 796	1, 624, 871
Connecticut	2	405, 754	30	3, 500	116	....	39	....	11	....	....	....	8	....	....	....	174	53, 535	87, 177	365, 781	436, 896	224, 496
Maine	1	100, 000	3	1, 000	33	2	11	....	6	....	....	....	2	....	....	....	54	14, 326	40, 000	30, 000	54, 000	35, 000
Massachusetts	11	820, 000	53	14, 650	411	18	37	2	24	....	....	....	20	....	....	....	512	163, 440	340, 000	2, 056, 000	1, 321, 000	696, 500
New Hampshire	1	12, 000	1	250	18	18	4	1	....	....	....	....	....	....	....	....	41	7, 000	20, 000	20, 000	30, 000	20, 000
New Jersey	6	313, 000	15	5, 310	219	10	21	5	28	....	....	....	3	....	....	....	286	86, 170	131, 440	906, 000	478, 400	365, 450
New York	4	157, 500	12	1, 950	109	3	46	9	25	....	....	....	3	....	....	....	195	35, 289	90, 450	77, 025	113, 500	83, 425
Pennsylvania	1	150, 000	8	2, 500	155	20	75	....	12	....	....	....	....	....	....	....	262	80, 000	....	750, 000	300, 000	200, 000

MATERIALS—continued.

States.	Camels' hair and noils consumed.	Value.	Buffalo hair and noils consumed.	Value.	Hair of other animals consumed.	Value.	Cotton used on cards.	Value.	Shoddy used, or waste, not including that made in mill.	Value.	Value of chemicals and dye-stuffs.	Cords of wood.	Value.	Coal.	Value.	Value of all other materials used.	Total value of all materials.
	Pounds.	*Dolls.*	*Pounds.*	*Dolls.*	*Pounds.*	*Dolls.*	*Pounds.*	*Dollars.*	*Pounds.*	*Dollars.*	*Dollars.*	*No.*	*Dolls.*	*Tons.*	*Dolls.*	*Dollars.*	*Dollars.*
The United States	70, 000	7, 500	71, 000	5, 840	1, 657, 000	40, 010	1, 181, 500	114, 660	2, 406, 849	383, 267	150, 921	4, 624	13, 878	14, 915	63, 559	126, 204	2, 530, 710
Connecticut	....	....	....	....	....	....	....	....	359, 649	44, 689	14, 791	....	....	2, 355	8, 155	21, 194	313, 325
Maine	5, 000	1, 000	....	....	....	....	12, 000	1, 400	95, 000	19, 000	3, 676	714	2, 142	100	700	4, 620	67, 5[illegible]
Massachusetts	65, 000	6, 500	42, 000	2, 640	460, 000	6, 500	718, 000	69, 710	1, 617, 500	279, 875	57, 774	750	2, 581	5, 715	31, 009	45, 250	1, 198, 339
New Hampshire	....	....	....	....	....	....	....	....	10, 000	1, 500	4, 800	600	2, 400	....	....	720	29, 420
New Jersey	....	....	29, 000	3, 200	944, 000	27, 010	271, 000	21, 890	301, 000	36, 070	36, 800	55	625	4, 445	13, 230	11, 920	516, 195
New York	....	....	....	....	253, 000	6, 500	130, 500	15, 660	23, 700	2, 133	8, 080	2, 505	6. 130	1, 050	4, 215	29, 750	155, 893
Pennsylvania	....	....	....	....	....	....	50, 000	6, 000	....	....	25, 000	....	....	1, 250	6, 250	12, 750	250, 000

PRODUCTS.

States.	Value of production at wholesale.	Cloths, cassimeres, and doeskins.	Beavers and overcoatings.	Felt skirtings.	Rubber shoe linings.	Felt cloths.	Felt for ladies' hats.	Saddle felts.	Trimming and lining felts.	Table and piano covers.	Hair felting.	Value of all products not heretofore named.
		Yards.	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Feet.*	
The United States	$3, 619, 652	275, 000	336, 160	3, 093, 600	1, 688, 880	1, 642, 485	65, 800	23, 500	205, 208	60, 979	1, 262, 950	$258, 084
Connecticut	429, 496	....	33, 360	....	291, 880	203, 280	....	....	....	....	....	....
Maine	120, 000	....	16, 000	....	....	....	64, 000	4, 500	23, 000	4, 000	....	....
Massachusetts	1, 627, 320	275, 000	286, 800	1, 268, 000	1, 251, 000	420, 000	....	15, 000	68, 000	6, 400	600, 000	61, 000
New Hampshire	50, 000	....	....	....	....	....	....	....	....	....	....	50, 000
New Jersey	685, 386	....	....	650, 610	146, 000	54, 680	1, 800	4, 000	114, 208	14, 579	475, 750	93, 019
New York	257, 450	....	....	174, 990	....	14, 525	....	....	....	36, 000	187, 200	54, 065
Pennsylvania	450, 000	....	....	1, 000, 000	....	950, 000	....	....	....	....	....	....

STATISTICS OF WOOL MANUFACTURE IN ALL ITS BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

WOOL HATS.

States.	Number of establishments.	Capital.	Number of sets of cards.	Daily capacity of same in pounds of scoured wool.	Number of sewing-machines.	OPERATIVES.				MECHANICS, WATCHMEN, AND LABORERS.				OFFICERS AND CLERKS.				Total number of employés.	Wages and salaries of all employed during the year.
						Male.		Female.		Male.		Female.		Male.		Female.			
						16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.		
The United States	43	$3, 615, 830	362	19, 144	325	3, 050	512	1, 459	277	133	......	......	......	39	......	......	......	5, 470	$1, 893, 215
Connecticut	3	625, 000	31	2, 226	18	268	21	211	35	4	......	......	......	......	......	......	......	539	188, 292
Maine	1	40, 000	10	700	7	44	20	20	2	8	......	......	......	1	......	......	......	95	31, 596
Massachusetts	6	430, 325	43	3, 600	22	546	86	214	15	21	......	......	......	11	......	......	......	893	313, 935
New York	10	1, 723, 005	197	8, 100	215	1, 486	297	724	180	91	......	......	......	16	......	......	......	2, 794	1, 041, 405
Pennsylvania	23	797, 500	81	4, 518	63	706	88	290	45	9	......	......	......	11	......	......	......	1, 149	317, 987

States.	MATERIALS.									
	Foreign wool in the condition purchased, consumed during the year.	Domestic wool in the condition purchased, consumed during the year.	Scoured wool (not including waste purchased and shoddy) consumed during the year.	Value at mill of foreign and domestic wool consumed.	Camels' hair and noils consumed.	Value.	Buffalo hair and noils consumed.	Value.	Cotton used on cards.	Value.
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*	
The United States	1, 864, 139	6, 107, 471	3, 597, 279	$2, 644, 293	3, 911	$1, 875	7, 436	$3, 615	185, 400	$21, 870
Connecticut	110, 500	555, 817	291, 727	213, 534	......	......	......	......	......	......
Maine	5, 108	50, 557	41, 894	24, 363	......	......	......	......	......	......
Massachusetts	651, 400	1, 240, 100	815, 000	532, 000	......	......	......	......	......	......
New York	928, 131	2, 979, 880	1, 422, 768	1, 213, 162	3, 911	1, 875	7, 436	3, 615	185, 400	21, 870
Pennsylvania	169, 000	1, 281, 117	1, 025, 890	661, 234	......	......	......	......	......	......

States.	MATERIALS—continued.								
	Shoddy used, or waste, not including that made in mill.	Value.	Value of chemicals and dyestuffs.	Cords of wood.	Value.	Coal.	Value.	Value of all other materials used.	Total value of all materials.
	Pounds.			*Number.*		*Tons.*			
The United States	1, 368, 562	$370, 963	$173, 040	296	$1, 478	30, 227	$109, 507	$1, 459, 133	$4, 785, 774
Connecticut	54, 063	22, 526	12, 862	47	188	2, 663	12, 549	271, 317	532, 976
Maine	54, 645	20, 446	2. 789	93	279	835	1, 700	31, 248	80, 825
Massachusetts	179, 500	49, 200	34, 271	20	100	4, 070	17, 315	196, 214	829, 100
New York	584, 604	157, 771	99, 252	60	350	15, 780	55, 182	755, 144	2, 308, 221
Pennsylvania	495, 750	121, 020	23, 866	76	561	6, 879	22, 761	205, 210	1, 034, 652

States.	WOOLEN GOODS PRODUCTS.							
	Value of production at wholesale.	Cloths, cassimeres, and doeskins.	Wool hats.	Felt linings.	Saddle felt.	Felt skirts.	Straw hats.	Value of all products not heretofore named.
		Yards.	*Dozen.*	*Yards.*	*Yards.*	*Yards.*	*Dozen.*	
The United States	$8, 516, 569	699, 428	1, 391, 862	8, 194	109	3, 176	9, 358	$153, 218
Connecticut	1, 003, 892	......	143, 873	......	......	......	......	......
Maine	151, 730	......	......	......	......	......	......	151, 730
Massachusetts	1, 438, 041	......	146, 503	......	......	......	......	......
New York	4, 205, 080	699, 428	656, 836	8, 194	109	3, 176	9, 358	1, 488
Pennsylvania	1, 717, 826	......	444, 650	......	......	......	......	......

STATISTICS OF WOOL MANUFACTURE IN ALL ITS

CARPETS, OTHER THAN RAG.

	States.	Number of establishments.	Capital.	MACHINES.						LOOMS.					
				Number of sets of cards.	Daily capacity of same in pounds of scoured wool.	Number of combing-machines of foreign manufacture.	Daily capacity of same in pounds of scoured wool.	Number of combing-machines of American manufacture.	Daily capacity of same in pounds of scoured wool.	Number of broad looms on woolen goods.	Number of narrow looms on worsted goods.	Number of hand-looms.	Number of Brussels power-looms.	Number of ingrain power-looms.	Number of tapestry looms.
	The United States	195	$21, 468, 587	285	73, 275	64	30, 850	91	19, 950	6	75	3, 995	756	1, 873	547
1	Connecticut	2	3, 085, 000	25	7, 500	14	6, 000	1	200			10	84	295	
2	Maine	1	300												
3	Maryland	1	10, 000									12			
4	Massachusetts	7	4, 637, 646	74	16, 960	18	10, 550	46	9, 000		75		250	260	161
5	New Jersey	2	103, 000	5	1, 000			5	400	6		30	9	33	26
6	New York	10	6, 422, 158	132	32, 440	10	3, 500	34	9, 350			149	68	273	360
7	Pennsylvania	172	7, 210, 483	49	15, 375	22	10, 800	5	1, 000			3, 794	345	1, 012	

	States.	MATERIALS.											
		Foreign wool in the condition purchased, consumed during the year.	Domestic wool in the condition purchased, consumed during the year.	Scoured wool (not including waste purchased and shoddy) consumed during the year.	Value at mill of foreign and domestic wool consumed.	Camels' hair and noils consumed.	Value.	Mohair and noils consumed.	Value.	Buffalo hair and noils consumed.	Value.	Hair of other animals consumed.	Value.
		Pounds.	*Pounds.*	*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*	
	The United States	34, 008, 252	2, 029, 318	23, 563, 216	$6, 975, 129	46, 300	$8, 808	4, 000	$700	30, 840	$2, 354	65, 700	$5, 250
1	Connecticut	4, 901, 000	1, 362	3, 436, 636	907, 834								
2	Maine												
3	Maryland		28, 500	20, 000	11, 400								
4	Massachusetts	10, 252, 159	62, 845	6, 173, 475	1, 622, 630								
5	New Jersey	223, 800		175, 000	58, 188								
6	New York	10, 598, 254	504, 884	8, 098, 831	2, 399, 164	46, 300	8, 808	4, 000	700	30, 840	2, 354	25, 700	2, 850
7	Pennsylvania	8, 033, 039	1, 431, 727	5, 659, 274	1, 975, 913							40, 000	2, 400

	States.	PRODUCTS.								
		Value of production at wholesale.	Brussels carpet.	Ingrain carpet, 2-ply.	Ingrain carpet, 3-ply.	Venetian carpet.	Tapestry carpet.	Velvet carpet.	Wilton carpet.	Axminster carpet.
			Yards.	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*	*Yards.*
	The United States	$31, 792, 802	4, 077, 190	21, 986, 434	862, 394	1, 984, 201	9, 441, 195	60, 000	157, 629	303, 366
1	Connecticut	2, 500, 559	704, 783	1, 553, 047	296, 904				67, 845	18, 921
2	Maine	1, 200		1, 300						
3	Maryland	50, 000		68, 000						
4	Massachusetts	6, 337, 629	1, 884, 723	1, 579, 479	79, 530		1, 998, 634		50, 784	
5	New Jersey	179, 500		16, 000						
6	New York	8, 419, 254	568, 208	1, 514, 315	355, 000		5, 642, 561			196, 725
7	Pennsylvania	14, 304, 660	919, 476	17, 254, 293	130, 960	1, 984, 201	1, 800, 000	60, 000	39, 000	87, 720

BRANCHES FOR THE YEAR ENDING MAY 31, 1880.

CARPETS, OTHER THAN RAG.

SEWING-MACHINES.	SPINDLES.		OPERATIVES.				MECHANICS, WATCHMEN, AND LABORERS.				OFFICERS AND CLERKS.						
			Male.		Female.		Male.		Female.		Male.		Female.				
Number of sewing-machines.	Number of woolen spindles.	Number of worsted spindles.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.	16 and over.	Under 16.	15 and over.	Under 15.	Total number of employés.	Wages and salaries of all employed during the year.	
11	32, 853	82, 256	9, 177	910	8, 565	787	855		5		72				20, 371	$6, 835, 218	
	4, 256	12, 358	587	85	703	171	98				10				1, 654	565, 654	1
																	2
			75												75	9, 900	3
	7, 860	26, 918	1, 305	35	2, 259	18	261				30				3, 908	1, 223, 302	4
	840	1, 232	96	35	65	23	24								243	48, 000	5
8	8, 592	26, 748	1, 590	278	3, 154	278	280		5		17				5, 602	1, 952, 391	6
3	11, 305	15, 000	5, 524	477	2, 384	297	192				15				8, 889	3, 035, 971	7

MATERIALS—continued.

Shoddy used, or waste, not including that made in mill.	Value.	Cotton warp used.	Value.	Woolen yarn used, not made in mill.	Value.	Worsted yarn used, not made in mill.	Value.	Value of chemicals and dyestuffs.	Cords of wood.	Value.	Coal.	Value.	Value of all other materials used. (a)	Total value of all materials.	
Pounds.		*Pounds.*		*Pounds.*		*Pounds.*			*No.*		*Tons.*				
90, 469	$12, 442	9, 544, 214	$1, 799, 646	8, 985, 162	$2, 597, 182	4, 091, 115	$2, 858, 199	$1, 369, 439	767	$3, 899	60, 641	$259, 581	$3, 092, 248	$18, 984, 877	
5, 183	585	258, 035	54, 607	147, 000	43, 050	40, 500	24, 300	127, 283	253	1, 275	7, 804	37, 022	250, 243	1, 446, 199	1
				1, 000	350	300	250	150	3	15	3	20		785	2
42, 000	5, 000	20, 000	4, 000										11, 600	32, 000	3
		1, 106, 991	222, 405			1, 540, 076	1, 096, 866	251, 473	202	1, 241	12, 269	68, 128	687, 930	3, 950, 673	4
		76, 000	15, 500					10, 300	15	57	820	3, 280	22, 100	109, 425	5
1, 400	1, 000	1, 855, 427	342, 506	89, 300	21, 707	222, 450	132, 268	321, 644	151	737	18, 191	74, 186	1, 145, 486	4, 453, 410	6
41, 886	5, 857	6, 227, 761	1, 160, 628	8, 747, 862	2, 532, 075	2, 287, 789	1, 604, 515	658, 589	143	574	21, 554	76, 945	974, 889	8, 992, 385	7

PRODUCTS—continued.

Cottage carpet.	Dutch carpet.	Rag carpet.	Druggets.	Rugs.	Noils, shorts, etc.	Lastings.	Serges.	Worsted yarn made and sold, not used at mill.	Woolen yarn made and sold, not used at mill.	Value of all products not heretofore named.	
Yards.	*Yards.*	*Yards.*	*Number.*	*Number.*	*Pounds.*	*Yards.*	*Yards.*	*Pounds.*	*Pounds.*		
241, 220	12, 000	157, 005	40, 000	47, 530	288, 614	167, 452	55, 748	1, 134, 143	1, 265, 240	$334, 181	
											1
											2
											3
		10, 000			288, 614	167, 452	55, 748	586, 220		158, 086	4
			40, 000	27, 000							5
		38, 500		3, 130				327, 057		1, 095	6
241, 220	12, 000	108, 505		17, 400				220, 866	1, 265, 240	175, 000	7

[a] Including 6,559,550 pounds shoddy yarn, value $559,133.

STATISTICS OF WOOL MANUFACTURE IN ALL ITS

HOSIERY AND KNIT GOODS.

	States.	Number of establishments.	Capital.	MACHINES.				LOOMS.							KNITTING- AND SEWING-MACHINES.		SPINDLES.	
				Number of sets of cards.	Daily capacity of same in pounds of scoured wool.	Number of combing-machines of foreign manufactures.	Daily capacity of same in pounds of scoured wool.	Number of broad looms on woolen goods.	Number of broad looms on worsted goods.	Number of narrow looms on woolen goods.	Number of hand-looms.	Patent power-frames.	Seaming- and crocheting-machines.	Number of knitting-looms.	Number of knitting-machines.	Number of sewing-machines.	Number of woolen spindles.	Number of worsted spindles.
	The United States.	359	$15, 579, 591	592	94, 640	3	1, 100	89	20	96	64	16	55	1, 624	12, 659	4, 569	140, 733	2, 290
1	Connecticut	14	1, 966, 431	79	9, 590					1		16	55	317	720	340	15, 674	
2	Illinois	14	105, 800	3	450			1		4				6	433	48	680	
3	Indiana	5	45, 000												183	5		
4	Iowa	3	2, 200												7			
5	Maine	1	500															
6	Maryland	1	250															
7	Massachusetts	57	1, 467, 375	38	3, 500						6			539	813	257	9, 028	
8	Michigan	11	147, 389	4	600										521	9	920	
9	Minnesota	1	8, 000											1	10	2		
10	Missouri	4	29, 400												68			
11	New Hampshire	24	1, 224, 000	68	7, 830			1		18				128	992	118	17, 540	
12	New Jersey	8	804, 570	23	4, 170										343	75	6, 048	
13	New York	75	5, 334, 876	320	59, 975									103	1, 311	1, 953	71, 008	
14	Ohio	23	187, 000											30	368	4	60	
15	Pennsylvania	106	3, 743, 790	35	5, 600	3	1, 100	87	20	73	58			492	6, 769	1, 653	15, 970	2, 290
16	Rhode Island	1	6, 000											4	32	7		
17	Vermont	6	492, 000	22	2, 925										69	94	3, 805	
18	West Virginia	1	5, 000											4	1			
19	Wisconsin	4	10, 010												19	4		

	States.	MATERIALS—continued.											
		Mohair and noils consumed.	Value.	Buffalo hair and noils consumed.	Value.	Merino yarn used.	Value.	Cotton used on cards.	Value.	Shoddy used, or waste, not including that made in mill.	Value.	Cotton warp used.	Value.
	The United States.	*Pounds.* 40, 000	$16, 000	*Pounds.* 5, 150	$518	*Pounds.* 67, 561	$22, 970	*Pounds.* 20, 131, 151	$2, 489, 783	*Pounds.* 1, 523, 263	$233, 823	*Pounds.* 279, 950	$66, 025
1	Connecticut							1, 591, 207	192, 714	169, 418	29, 094	300	75
2	Illinois							6, 500	835			600	250
3	Indiana												
4	Iowa												
5	Maine												
6	Maryland												
7	Massachusetts							338, 000	39, 090	8, 000	2, 000	172, 000	41, 500
8	Michigan							40, 000	4, 800	10, 000	3, 000		
9	Minnesota												
10	Missouri												
11	New Hampshire			5, 000	500			1, 002, 798	135, 028	186, 900	55, 592	26, 050	6, 150
12	New Jersey			150	18			487, 026	64, 674	15, 553	2, 828		
13	New York	40, 000	16, 000					15, 625, 791	1, 929, 583	1, 062, 011	129, 603		
14	Ohio												
15	Pennsylvania					67, 561	22, 970	633, 290	73, 694	68, 856	10, 884	81, 000	18, 050
16	Rhode Island												
17	Vermont							406, 539	49, 365	2, 525	822		
18	West Virginia												
19	Wisconsin												

	States.	PRODUCTS											
		Value of production at wholesale.	Woolen half-hose.	Woolen hose.	Mixed half-hose.	Mixed hose.	Cotton hosiery.	Shirts and drawers.	Leggins.	Gloves.	Mittens.	Gaiters.	Hoods.
	The United States.	$29, 167, 227	*Dozens.* 288, 111	*Dozens.* 1, 216, 274	*Dozens.* 627, 234	*Dozens.* 2, 653, 099	*Dozens.* 2, 491, 243	*Dozens.* 2, 671, 712	*Dozens.* 41, 683	*Dozens.* 48, 462	*Dozens.* 199, 889	*Dozens.* 43, 310	*Dozens.* 64, 880
1	Connecticut	2, 432, 271			192, 000	15, 000		253, 275					
2	Illinois	484, 124	16, 904	122, 035			49, 650		620	100	207		
3	Indiana	158, 200	11, 550	41, 075			1, 500		2, 500				
4	Iowa	2, 908											
5	Maine	3, 000	730										
6	Maryland	720											
7	Massachusetts	2, 483, 596	29, 625	54, 622	3, 933	212, 960		31, 000	12, 700	26, 832	106, 298	6, 500	6, 550
8	Michigan	377, 249	39, 500	24, 500	47, 640			3, 000	1, 250		9, 750	150	300
9	Minnesota	10, 000											
10	Missouri	85, 000	26, 500	10, 500					25		300		
11	New Hampshire	2, 362, 779	78, 000	47, 500	253, 715	288, 295		29, 400		50	24, 700	36, 000	
12	New Jersey	861, 181		800	29, 296		10, 000	57, 455	4, 000		2, 500		
13	New York	9, 899, 540	34, 000	368			30, 000	2, 205, 385	19, 533		22, 539	118	732
14	Ohio	418, 825	25, 025	177, 247			900		50		4, 775		13, 050
15	Pennsylvania	8, 935, 147	8, 240	737, 069	100, 650	2, 136, 844	2, 399, 193	19, 577	1, 005	21, 480	28, 800	542	44, 198
16	Rhode Island	36, 000	18, 000										
17	Vermont	595, 270						71, 404					
18	West Virginia	2, 600		350									
19	Wisconsin	18, 817	37	208				1, 216			20		

BRANCHES, FOR THE YEAR ENDING MAY 31, 1880.

HOSIERY AND KNIT GOODS.

OPERATIVES. Male. 16 and over.	OPERATIVES. Male. Under 16.	OPERATIVES. Female. 15 and over.	OPERATIVES. Female. Under 15.	MECHANICS, WATCHMEN, AND LABORERS. Male. 16 and over.	MECHANICS, WATCHMEN, AND LABORERS. Male. Under 16.	MECHANICS, WATCHMEN, AND LABORERS. Female. 15 and over.	MECHANICS, WATCHMEN, AND LABORERS. Female. Under 15.	OFFICERS AND CLERKS. Male. 16 and over.	OFFICERS AND CLERKS. Male. Under 16.	OFFICERS AND CLERKS. Female. 15 and over.	OFFICERS AND CLERKS. Female. Under 15.	Total number of employés.	Wages and salaries of all employed during the year.	MATERIALS. Foreign wool in the condition purchased, consumed during the year.	MATERIALS. Domestic wool in the condition purchased, consumed during the year.	MATERIALS. Scoured wool (not including waste purchased and shoddy) consumed during the year.	MATERIALS. Value at mill of foreign and domestic wool consumed.	MATERIALS. Camel's hair and noils consumed.	MATERIALS. Value.	
														Pounds.	*Pounds.*	*Pounds.*		*Pounds.*		
6,681	1,424	17,699	2,231	647	6			189		8		28,885	$6,701,475	448,758	8,146,137	5,927,692	$3,821,183	21,779	$10,846	
554	138	1,187	226	71	1			34				2,211	664,293	126,174	975,501	587,113	377,371	21,779	10,846	1
150	22	471	54	9				1				707	92,385		60,000	60,000	21,000			2
20	15	201	42	3				3				284	24,700							3
3		3										6	460							4
1		20										21	801							5
		1										1	100							6
717	100	2,413	111	43	1			26				3,411	608,067	7,266	1,081,418	674,009	446,760			7
52	13	705	163	15				13		1		962	92,324		180,000	90,000	60,000			8
6		4						2				12	2,819							9
3		114	1									118	19,300							10
501	64	1,098	51	29				10				1,753	536,117	76,000	1,680,332	1,118,078	755,903			11
309	45	604	101	7				4				1,070	239,761	5,400	169,784	113,552	82,266			12
1,994	445	4,470	552	331	2			64				7,858	2,036,076	186,326	2,362,643	2,084,734	1,373,524			13
50	21	574	97	3								745	94,858							14
2,181	550	5,563	814	125	1			31		7		9,272	2,175,913	47,592	1,235,126	857,373	498,353			15
3	1	24	8	2				1				39	8,400							16
130	9	227	9	8								383	101,037		401,333	342,833	206,006			17
1	1			1	1							4	700							18
6		20	2									28	3,364							19

MATERIALS—continued.

Cotton yarn used.	Value.	Woolen yarn used, not made in mill.	Value.	Worsted yarn used, not made in mill.	Value.	Value of chemicals and dyestuffs.	Cords of wood.	Value.	Coal.	Value.	Value of all other materials used.	Total value of all materials.	
Pounds.		*Pounds.*		*Pounds.*			*Number.*		*Tons.*				
8,074,137	$1,991,749	3,753,566	$2,853,722	750,255	$758,803	$631,060	8,344	$28,416	42,980	$181,253	$2,104,800	$15,210,951	
19,834	6,614	50,025	46,025	14,582	22,101	33,467	723	2,931	4,659	22,928	269,783	1,013,949	1
105,800	31,400	226,800	179,405	10,000	8,400	1,050	350	600	160	424	47,531	290,895	2
30,000	9,000	76,300	82,850	5,200	6,800		30	120	135	510	4,000	103,280	3
		1,536	1,554									1,554	4
		2,000	1,800									1,800	5
		500	500									500	6
347,700	82,615	502,511	409,220	88,619	102,094	71,422	147	469	3,362	20,718	178,860	1,394,748	7
1,300	405	154,600	127,460	5,000	5,500	7,200	1,121	2,610	153	593	15,059	226,627	8
		5,000	4,000	400	500						500	5,000	9
11,300	2,882	36,600	33,150	4,500	4,750		19	93			700	41,575	10
73,436	19,187	96,500	76,300	2,500	3,800	72,999	4,800	18,009	722	4,742	101,390	1,249,600	11
		106,300	56,150	3,100	3,850	4,079			2,446	7,689	36,489	258,043	12
538,714	127,945	538,467	327,943	46,159	59,999	169,579	1,065	3,264	17,069	76,690	857,928	5,072,058	13
6,000	1,200	241,850	214,265	3,850	6,450		10	17	260	900	18,751	241,583	14
6,940,053	1,710,501	1,682,127	1,268,250	565,145	533,109	247,605	8	28	12,945	39,967	500,727	4,924,138	15
		22,750	13,650			350			75	388	450	14,838	16
		1,200	1,500	500	500	23,184	71	275	994	5,704	72,582	359,938	17
		1,400	1,700									1,700	18
		7,100	8,000	700	950	125					50	9,125	19

PRODUCTS—continued.

Scarfs.	Wristers.	Cardigan jackets.	Fancy jackets.	Nubias.	Ulsters.	Shawls.	Fancy knit goods.	Yarn, worsted and woolen.	Yarn, woolen.	Sacques.	Boot and shoe lining.	Waists.	Coverlets.	Skirts.	Value of all products not heretofore named.	
Dozens.	*Dozens.*	*Dozens.*	*Dozens.*	*Dozens.*	*Dozens.*	*Dozens.*	*Dozens.*	*Pounds.*	*Pounds.*	*Dozens.*	*Yards.*	*Dozens.*	*Number.*	*Doz.*		
47,178	20,745	105,321	58,522	72,050	12,389	49,545	19,868	25,000	195,000	925	453,350	2,800	1,550	62	$1,546,713	
								25,000							90,000	1
		1							45,000						52,700	2
															3,400	3
20			9													4
																5
			20													6
1,626	525	20,875	1,680	7,235		14,042	2,000			550	453,850				206,500	7
75	500	45								50					4,600	8
															10,000	9
					100	50				300						10
															66,500	11
5,150		1,600	51,225			250				25					1,175	12
2,750		35,705			149		718					2,800			2,800	13
		310			600											14
37,557	19,400	46,735	5,588	64,815	10,340	35,203	17,125		150,000				1,500	62	1,108,418	15
																16
																17
																18
	320	50			1,200		25						50		620	19

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REPORT

ON THE

MANUFACTURE OF CHEMICAL PRODUCTS AND SALT.

PREPARED UNDER THE DIRECTION OF HENRY BOWER, CHIEF SPECIAL AGENT,

BY

WM. L. ROWLAND.

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LETTER OF TRANSMITTAL.

To the Superintendent of Census.

Sir: I have the honor to submit herewith the final report on the manufacture of chemical products in the United States. As this is the first official report on this branch of industry, its preparation has been attended with extraordinary difficulty, owing to the lack of full and reliable information, particularly in matters of historical interest.

Manufacturing chemistry is so intimately associated with other branches of manufacture that it becomes difficult to locate the dividing line between them. In this report the plan pursued is, so far as practicable, that adopted by French statisticians. No attempt has been made to describe the various processes employed in the preparation of chemical products, as these differ so widely that the methods employed are almost innumerable. In the manufacture of a single article the processes employed by various makers are often essentially different. Moreover, such descriptions do not properly belong to a statistical report, but can be found in works on technical chemistry, and in the records of the patent office.

For convenience of reference the report is divided into two parts:

Part I treats of the general industry, with special mention of certain important products, and is accompanied by the following tables:

Table I.—Exhibiting by states the total production of chemical products in the United States.

Table II.—Exhibiting the statistics of the chemical industry in several of the principal cities. These points are centers of manufacture, and to secure uniformity in compilation statistics are given of the total manufacture within a radius of thirty miles.

Part II treats of the manufacture of common salt, and is accompanied by the following tables:

Table I.—Gives the general statistics of salt production in the United States for the census year 1880.

Table II.—Showing the relative production of the various salt-producing states according to the censuses of 1860, 1870, and 1880, respectively.

Table III.—Giving analyses of the brines and rock salts of the United States, which are fairly typical of their composition in the various sections.

Table IV.—Giving analyses of various brands and qualities of salt from the different sections.

Many small tables are introduced in both parts of the report when special mention is made of a product or the locality from which it is derived; but these are mainly compiled from the tables enumerated above.

In the compilation of these statistics I have been efficiently assisted by Mr. John Cooper, of Philadelphia, to whom my thanks are due.

Very respectfully, your obedient servant,

W. L. ROWLAND,
Special Agent.

PART I.—CHEMICAL PRODUCTION.

GENERAL DISCUSSION.

Although complete statistics of the chemical industry are given in the accompanying tables, it is desirable to give some of the more important features in a condensed form. No statistics are available to exhibit the growth of this industry, while its diversified character renders it impossible to consider each article separately, and therefore only a few chemical products have been selected for special mention.

During the census year 1,349 establishments were in operation, with aggregates of investment, cost, and production as follows:

Number of establishments	1,349
Value of buildings	$19,019,139
Value of machinery	$15,656,476
Total capital	$85,394,211
Number of men employed	26,776
Number of women employed	1,493
Number of children employed	1,251
Total amount paid in wages	$11,840,704
Tons of anthracite coal used	273,161
Value of anthracite coal used	$968,432
Tons of bituminous coal used	319,398
Value of bituminous coal used	$913,885
Total value of all materials	$77,471,836
Total value of products	$117,377,324

By this it will be seen that 41 per cent. of the total capital is invested in plant, exclusive of land. The average yearly wages paid is $401 11, allowing the same wages to men, women, and children; if, in determining the average yearly wages, those of women and children are considered as half those of men, the average of men's wages will be $420 66. This makes no allowance for establishments in operation during only a portion of the year. Inasmuch as a few discontinued work after the year began, while many more commenced operations during the last half of it, the figures given represent a lower average of wages than was actually the case. Only hands employed in manufacture are included in these statements, clerks, bookkeepers, superintendents, agents, and carters being omitted.

Among the materials used fuel is an important item for chemical establishments, and, other things being equal, cheap coal will invariably draw the manufacturing chemist to its neighborhood; 592,559 tons of coal, valued at $1,882,317, were consumed in this branch of industry during the year, with undetermined quantities of wood, coke, and charcoal.

Of the value of the product of this industry 10.08 per cent. was paid out in wages and 66 per cent. for materials, leaving 23.92 per cent. to meet the cost of freights, interest on capital, rent, superintendence, and other general expenses.

The diversified character of the industry allows the employment of capital in large or in small amounts, many operations, particularly in the manufacture of potash, being on so small a scale as to be omitted in the enumeration, since the law only admits the classification of establishments that produce in excess of $500 per annum. The amount of capital employed varies from merely nominal sums in many establishments to nearly $4,000,000 in others, with production in proportion to the capital.

From the statistics of Table I the following figures may be deduced as the average for each establishment:

Value of buildings	$14,098
Value of machinery	$11,606
Total capital	$63,302
Number of hands employed	22
Total amount paid in wages	$8,777
202 tons of anthracite coal used	$718
237 tons of bituminous coal used	$677
Total value of materials	$57,429
Total value of product	$87,011

The following table shows the number of establishments and total value of production in twelve of the leading states, in the order of production, with the percentages of each, compared with the total figures of the United States, only those states being given separately that make over 1 per cent. of the total production of the United States:

States.	ESTABLISHMENTS.		PRODUCT.			States.	ESTABLISHMENTS.		PRODUCT.		
	Number.	Percentages.	Total value.	Percentage.	Average percentage for each establishment.		Number.	Percentages.	Total value.	Percentage.	Average percentage for each establishment.
New York	217	16.08	$29,805,614	25.39	0.117	Missouri	39	2.89	$5,827,498	4.97	0.127
Pennsylvania	181	13.42	20,884,991	17.79	0.098	California	42	3.11	3,179,700	2.71	0.065
Massachusetts	179	13.27	10,604,662	9.04	0.050	South Carolina	29	2.15	2,693,053	2.30	0.079
New Jersey	62	4.60	9,499,577	8.09	0.130	Connecticut	41	3.04	2,419,743	2.06	0.050
Ohio	92	6.82	7,678,374	6.54	0.071	Rhode Island	41	3.04	1,968,041	1.68	0.041
Illinois	52	3.85	7,681,325	6.54	0.126	Twenty-six other states	314	23.28	7,891,624	6.72	0.021
Maryland	60	4.45	7,243,122	6.17	0.103						

It will be seen that the state of New York gives 25.39 per cent. of the entire production, followed by Pennsylvania with 17.79 per cent. The last column, containing the average percentage for each establishment in the various states, shows that New Jersey has the largest average production in the states mentioned, followed by Missouri, while the average percentages of New York and Pennsylvania are less.

These figures represent the geographical distribution of the industry as a whole, but the distribution of each article of production will not correspond with these percentages. Several of the special articles enumerated in Table I are produced by only a few establishments, and in limited quantity, the greater portion consumed within the United States being imported from foreign countries. For example, only one establishment mined and produced sulphur during the census year, yielding 1,200,000 pounds, while 176,238,600 pounds were imported; three establishments produced 80,518 pounds of aniline colors, while 563,872.12 pounds were imported; one establishment produced 56,292 pounds of phosphorus, valued at $29,271, while the importations were valued at $78,253; three establishments produced 40,259,938 pounds of soda salts, while 360,301,309 pounds were imported. On the other hand, four establishments produced 3,692,443 pounds of borax, of which only 15,278 pounds were imported; and six establishments produced 39,217,725 pounds of alum, of which 2,112,570 pounds were imported.

The following table serves to illustrate the distribution of the manufacture of special products, giving the states in the order of production, with the approximate percentage value in each, compared with the total value of products:

GLYCERINE.		NITRO-GLYCERINE.		STEARIC-ACID CANDLES.		OLEIC-ACID SOAP.		OTHER HARD SOAP.	
States.	Approximate percentage value of product.	States.	Approximate percentage value of product.	States.	Approximate percentage value of product.	States.	Approximate percentage value of product.	States.	Approximate percentage value of product.
Ohio	57	California	36	Ohio	50	Ohio	42	New York	27
New York	32	Pennsylvania	23	California	16	Missouri	18	Illinois	17
California	4	New Jersey	19	Missouri	12	Pennsylvania	13	Pennsylvania	12
Missouri	4	Ohio	14	Kentucky	9	Illinois	11	Massachusetts	9
Kentucky	3	New York	3	New York	7	New York	6	Ohio	8
		Massachusetts	3	Illinois	6	California	6	New Jersey	7
		Michigan	2			New Jersey	2	Missouri	3
						Six other states	2	Rhode Island	2
								California	2
								Maryland	2
								Wisconsin	2
								Connecticut	1
								Twenty-four other states.	8

SOFT SOAP.

States.	Approximate percentage value of product.
Massachusetts	46
New York	14
New Hampshire	11
Illinois	10
Maine	6
Connecticut	3
Pennsylvania	2
Rhode Island	2
New Jersey	2
Eleven other states	4

MANUFACTURED MANURES.

States.	Approximate percentage value of product.
Maryland	27
New York	13
New Jersey	12
Massachusetts	10
South Carolina	8
Pennsylvania	7
Delaware	5
Virginia	4
Illinois	3
Georgia	2
Eighteen other states	9

SULPHURIC ACID.

States.	Approximate percentage value of product.
Pennsylvania	26
New Jersey	19
New York	12
Ohio	10
Maryland	9
Massachusetts	9
Rhode Island	4
California	3
Illinois	2
Missouri	2
Connecticut	1
Seven other states	3

POTASH.

States.	Approximate percentage value of product.
Wisconsin	41
Michigan	27
New York	10
Ohio	9
Maine	6
Indiana	5
Minnesota	2

ACETATE OF LIME.

States.	Approximate percentage value of product.
New York	50
Pennsylvania	20
Michigan	19
Maryland	4
Vermont	3
Massachusetts	2
Rhode Island	1
New Jersey	1

SULPHATE AMMONIA.

States.	Approximate percentage value of product.
Pennsylvania	30
New York	24
Ohio	14
Illinois	7
New Jersey	7
Massachusetts	6
District of Columbia	3
Kentucky	2
Connecticut	2
Missouri	2
Louisiana	2
Two other states	1

CASTOR OIL.

States.	Approximate percentage value of product.
Missouri	50
New Jersey	25
Illinois	18
California	6
Kansas	1

DRY COLORS.

States.	Approximate percentage value of product.
New York	34
Pennsylvania	19
Connecticut	16
Massachusetts	14
New Jersey	10
Ohio	4
Maryland	1
Five other states	2

WHITE LEAD.

States.	Approximate percentage value of product.
Pennsylvania	24
New York	22
Missouri	21
Ohio	11
Illinois	6
Massachusetts	4
Nebraska	4
California	3
Maryland	3
Kentucky	2

OTHER SALTS OF LEAD.

States.	Approximate percentage value of product.
New York	39
Pennsylvania	34
Missouri	9
California	9
Massachusetts	5
Ohio	3
Kentucky	1

TABLE I.—STATISTICS OF THE CHEMICAL INDUSTRY, BY STATES AND TERRITORIES: 1880.

	States and Territories.	No. of establishments.	CAPITAL.			AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.
			Value of buildings.	Value of machinery.	Total capital.	Males above 16 years.	Females above 15 years.	Children and youths.	
			Dollars.	*Dollars.*	*Dollars.*				*Dollars.*
	The United States	1, 349	19, 019, 139	15, 656, 476	85, 394, 211	26, 776	1, 493	1, 251	11, 840, 704
1	California	42	368, 300	409, 725	2, 406, 350	548	16	9	282, 614
2	Colorado	2	7, 000	1, 250	36, 000	18	2	....	18, 200
3	Connecticut	41	285, 050	305, 250	1, 434, 250	506	30	4	270, 754
4	Delaware	23	177, 200	219, 900	931, 379	370	142	27	100, 026
5	District of Columbia	12	73, 500	41, 900	205, 967	132	....	2	46, 875
6	Florida	1	400	150	700	2	....	....	315
7	Georgia	4	65, 600	28, 000	245, 000	82	....	7	28, 377
8	Illinois	52	784, 429	747, 849	3, 348, 550	1, 293	72	98	571, 417
9	Indiana	16	27, 400	36, 550	102, 700	73	....	....	23, 116
10	Iowa	17	63, 456	54, 221	219, 600	108	6	3	34, 020
11	Kansas	12	17, 290	15, 035	68, 000	43	....	2	12, 992
12	Kentucky	15	172, 988	137, 700	712, 440	157	27	....	63, 475
13	Louisiana	7	61, 060	63,301	218, 701	87	8	5	45, 943
14	Maine	24	113, 600	72, 800	398, 480	161	....	....	53, 461
15	Maryland	60	959, 350	570, 839	5, 578, 302	1, 361	....	19	535, 125
16	Massachusetts	179	1, 530, 233	1, 067, 998	6, 828, 473	2, 016	63	64	953, 784
17	Michigan	38	65, 500	66, 200	258, 692	198	2	4	65, 158
18	Minnesota	6	35, 035	19, 000	113, 500	30	7	....	19, 024
19	Missouri	39	767, 154	691, 922	3, 415, 300	1, 114	31	29	542, 769
20	Nebraska	7	35, 800	35, 175	119, 300	65	2	7	24, 936
21	Nevada	7	31, 800	24, 800	274, 500	53	....	....	33, 670
22	New Hampshire	20	31, 175	12, 025	80, 600	49	1	....	19, 849
23	New Jersey	62	1, 712, 920	1, 372, 344	7, 371, 400	2, 345	78	232	1, 172, 654
24	New York	217	5, 508, 678	3, 619, 314	20, 141, 586	5, 552	429	270	2, 901, 960
25	North Carolina	1	40, 000	30, 000	350, 000	100	....	25	40, 000
26	Ohio	92	1, 134, 100	938, 579	5, 961, 003	1, 541	140	122	706, 434
27	Oregon	2	3, 950	8, 200	22, 000	8	....	....	3, 700
28	Pennsylvania	181	3, 932, 125	3, 824, 031	18, 349, 930	4, 273	336	187	2, 151, 799
29	Rhode Island	41	284, 250	353, 050	1, 291, 136	605	74	8	274, 657
30	South Carolina	29	396, 550	592, 730	3, 496, 300	2, 680	10	70	577, 190
31	Tennessee	9	41, 206	45, 471	127, 600	64	....	1	14, 406
32	Texas	6	7, 000	5, 833	30, 000	16	....	3	9, 488
33	Utah	2	4, 700	7, 700	20, 000	4	....	....	2, 778
34	Vermont	11	50, 800	28, 550	195, 900	95	....	....	23, 422
35	Virginia	38	133, 250	105, 800	645, 700	795	3	30	125, 010
36	West Virginia	9	23, 650	50, 300	140, 900	93	....	10	32, 999
37	Washington	1	500	200	2, 000	3	....	....	1, 000
38	Wisconsin	24	72, 200	52, 784	251, 972	136	14	13	57, 397

TABLE I.—STATISTICS OF THE CHEMICAL INDUSTRY, BY STATES AND TERRITORIES: 1880.

MATERIALS.						PRODUCTS.										
Anthracite coal.		Bituminous coal.		Value of all other materials.	Total value of all materials.	Aniline colors.		Anthracene.		Sulphate of ammonia.		Alum.		Borax.		
Tons.	*Dollars.*	*Tons.*	*Dollars.*	*Dollars.*	*Dollars.*	*Pounds.*	*Dollars.*	*Pounds.*	*Dollars.*	*Pounds.*	*Dollars.*	*Pounds.*	*Dollars.*	*Pounds.*	*Dollars.*	
273, 161	968, 432	319, 398	913, 885	75, 612, 108	77, 494, 425	80, 518	107, 292	344, 114	99, 242	16, 575, 088	618, 485	39, 217, 725	808, 165	3, 692, 443	277, 233	
1, 793	14, 987	6, 718	43, 404	2, 060, 687	2, 119, 078	....	....	....	....	....	....	....	....	1, 422, 443	107, 333	1
....	....	288	1, 162	47, 838	49, 000	....	....	....	....	....	....	....	....	....	....	2
17, 497	54, 124	1, 015	5, 145	1, 763, 166	1, 822, 435	....	....	....	....	375, 000	15, 000	....	....	....	....	3
2, 011	14, 004	....	....	795, 070	809, 074	....	....	....	....	....	....	....	....	....	....	4
302	1, 260	920	3, 536	212, 123	216, 919	....	....	62, 684	8, 875	530, 000	21, 200	....	....	....	....	5
....	....	....	....	500	500	....	....	....	....	....	....	....	....	....	....	6
....	....	....	....	209, 600	209, 600	....	....	....	....	....	....	....	....	....	....	7
2, 993	9, 293	19, 821	71, 878	5, 854, 259	5, 935, 430	....	....	....	....	1, 148, 000	43, 000	....	....	....	....	8
....	....	802	3, 084	86, 460	89, 544	....	....	....	....	....	....	....	....	....	....	9
45	130	995	3, 405	175, 175	178, 710	....	....	....		....	....	....	....	....	....	10
....	....	320	1, 679	126, 421	128, 100	....	....	....	....	....	....	....	....	....	....	11
....	....	6, 060	12, 610	455, 363	467, 973	....	....	....	....	400, 000	16, 000	....	....	....	....	12
....	....	400	2, 000	154, 007	156, 007	....	....	....	....	287, 000	10, 045	....	....	....	....	13
2, 656	13, 333	350	2, 100	313, 108	328, 541	....	....	....	....	....	....	....	....	....	....	14
1, 950	8, 442	31, 788	127, 185	4, 490, 010	4, 625, 637	....	....	4, 664	717	....	....	....	....	....	....	15
17, 065	75, 028	14, 886	76, 748	7, 238, 927	7, 390, 703	....	....	....	....	950, 000	35, 000	....	....	....	....	16
....	....	3, 270	6, 627	171, 358	177, 985	....	....	....	....	....	....	....	....	....	....	17
....	....	....	....	115, 100	115, 100	....	....	....	....	....	....	....	....	....	....	18
668	4, 321	30, 644	74, 976	3, 976, 977	4, 056, 274	....	....	....	....	250, 000	10, 500	....	....	....	....	19
....	....	1, 127	4, 122	206, 198	210, 320	....	....	....	....	....	....	....	....	....	....	20
....	....	....	....	37, 075	37, 075	....	....	....	....		....	....	....	2, 270, 000	169, 900	21
....	....	....	....	48, 660	48, 660	....	....	....	....	....	....	....	....	....	....	22
76, 909	215, 945	5, 492	23, 981	5, 848, 370	6, 088, 296	....	....	....	....	1, 100, 000	41, 250	6, 378, 550	91, 961	....	....	23
75, 308	306, 563	17, 419	61, 380	20, 050, 075	20, 418, 018	80, 518	107, 292	265, 516	73, 650	3, 872, 000	149, 160	3, 750, 000	70, 000	....	....	24
....	....	....	....	150, 000	150, 000	....	....	....	....	....	....	....	....	....	....	25
100	105	49, 353	101, 158	4, 974, 132	5, 075, 395	....	....	....	....	2, 500, 000	86, 250	....	....	....	....	26
....	....	....	....	10, 000	10, 000	....	....	....	....	....	....	....	....	....	....	27
60, 934	193, 393	106, 734	205, 203	12, 687, 296	13, 085, 892	....	....	11, 250	16, 000	4, 999, 738	185, 290	29, 089, 175	646, 204	....	....	28
3, 260	15, 999	7, 000	34, 712	1, 118, 491	1, 169, 202	....	....	....	....	142, 350	5, 000	....	....	....	....	29
9, 525	40, 725	4, 541	23, 250	1, 233, 729	1, 297, 704	....	....	....	....	....	....	....	....	....	....	30
....	....	704	2, 324	36, 790	39, 114	....	....	....	....	....	....	....	....	....	....	31
....	....	....	....	12, 825	12, 825	....	....	....	....	....	....	....	....	....	....	32
....	....	12	78	23, 564	23, 642	....	....	....	....	....	....	....	....	....	....	33
36	155	....	....	27, 185	27, 340	....	....	....	....	....	....	....	....	....	....	34
....	....	1, 160	4, 600	524, 075	528, 675	....	....	....	....	21, 000	790	....	....	....	....	35
....	....	5, 387	8, 543	64, 463	73, 006	....	....	....	....	....	....	....	....	....	....	36
....	....	....	....	2, 000	2, 000	....	....	....	....	....	....	....	....	....	....	37
109	625	2, 192	8, 995	311, 031	320, 651	....	....	....	....	....	....	....	....	....	....	38

TABLE I.—STATISTICS OF THE CHEMICAL INDUSTRY, BY STATES AND TERRITORIES: 1880.

	States and Territories.	PRODUCTS—continued.							
		Bromine.		Phosphorus.		Castor oil.		Stearic acid candles.	
		Pounds.	*Dollars.*	*Pounds.*	*Dollars.*	*Gallons.*	*Dollars.*	*Pounds.*	*Dollars.*
	The United States	404, 690	114, 752	56, 292	29, 271	893, 802	790, 741	18, 363, 066	2, 281, 600
1	California					50, 000	45, 000	2, 596, 000	375, 000
2	Colorado								
3	Connecticut								
4	Delaware								
5	District of Columbia								
6	Florida								
7	Georgia								
8	Illinois					192, 000	140, 350	1, 000, 000	130, 000
9	Indiana								
10	Iowa								
11	Kansas					13, 000	10, 100		
12	Kentucky							1, 811, 920	206, 263
13	Louisiana								
14	Maine								
15	Maryland								
16	Massachusetts								
17	Michigan								
18	Minnesota								
19	Missouri					436, 302	394, 041	2, 200, 000	284, 000
20	Nebraska								
21	Nevada								
22	New Hampshire								
23	New Jersey			56, 292	29, 271	200, 000	200, 000		
24	New York							940, 000	150, 000
25	North Carolina								
26	Ohio	150, 850	40, 462			2, 500	1, 250	9, 815, 146	1, 136, 337
27	Oregon								
28	Pennsylvania	90, 000	25, 120						
29	Rhode Island								
30	South Carolina								
31	Tennessee								
32	Texas								
33	Utah								
34	Vermont								
35	Virginia								
36	West Virginia	163, 840	49, 170						
37	Washington								
38	Wisconsin								

TABLE I.—STATISTICS OF THE CHEMICAL INDUSTRY, BY STATES AND TERRITORIES: 1880.

PRODUCTS—continued.

Soaps.						Glycerine.		Nitro-glycerine.		Manufactured manures.		Dry colors.		
Oleic acid soap.		Other hard soaps.		Soft soaps.										
Pounds. 33, 058, 411	*Dollars.* 1, 707, 969	*Pounds.* 378, 743, 627	*Dollars.* 18, 299, 350	*Pounds.* 34, 494, 100	*Dollars.* 358, 280	*Pounds.* 7, 117, 825	*Dollars.* 961, 477	*Pounds.* 3, 039, 722	*Dollars.* 1, 830, 417	*Tons.* 727, 453	*Dollars.* 19, 921, 400	*Pounds.* 67, 482, 415	*Dollars.* 4, 086, 821	
2, 135, 000	94, 300	8, 927, 500	429, 860	...	...	394, 800	38, 736	1, 242, 424	655, 680	1, 000	20, 000	...	...	1
...	...	1, 860, 000	60, 000	...	...	...	...	...	...	...	...	...	...	2
1, 800	108	2, 626, 534	188, 041	949, 408	11, 327	...	...	...	...	7, 475	248, 050	6, 490, 000	638, 000	3
...	...	742, 000	34, 000	...	...	...	...	...	...	37, 917	998, 165	...	...	4
...	...	1, 400. 679	55, 024	...	...	...	...	...	...	6, 300	199, 000	...	...	5
...	...	16, 000	600	...	...	...	...	...	...	...	...	...	...	6
...	...	...	...	...	...	...	...	...	...	11, 287	341, 500	...	...	7
1, 818, 000	190, 720	68, 204, 500	3, 183, 520	3, 519, 144	36, 600	...	...	...	...	27, 015	633, 990	203, 000	12, 125	8
...	...	1, 808, 500	61, 587	6, 000	100	...	...	...	...	1, 574	44, 877	...	...	9
...	...	3, 574, 025	177, 609	122, 710	2, 711	...	...	...	...	960	13, 000	...	...	10
...	...	3, 698, 000	159, 268	...	...	...	...	...	...	...	...	...	...	11
461, 880	15, 386	2, 907, 000	112, 800	...	...	220, 964	24, 625	...	...	1, 665	42, 000	832, 000	12, 480	12
...	...	3, 970, 000	164, 000	...	...	...	...	...	...	1, 823	68, 106	...	...	13
...	...	1, 004, 000	59, 162	1, 758, 760	22, 617	...	...	...	...	5, 850	175, 000	...	...	14
140, 000	6, 890	8, 178, 000	350, 310	...	...	...	...	...	...	191, 571	5, 457, 258	2, 599, 541	52, 922	15
10, 000	600	32, 991, 877	1, 545, 125	15, 505, 880	163, 479	...	...	90, 000	54, 000	69, 387	1, 920, 623	7, 432, 442	590, 389	16
...	...	2, 028, 500	85, 157	145, 520	1, 552	...	...	80, 000	44, 000	900	27, 000	...	...	17
...	...	2, 610, 000	116, 900	...	...	...	...	...	...	600	12, 000	...	...	18
8, 540, 000	312, 400	16, 537, 869	562, 563	250, 000	2, 750	400, 000	38, 000	...	...	5, 905	146, 932	156, 000	17, 680	19
...	...	522, 000	26, 160	...	...	...	...	...	...	470	4, 700	...	...	20
...	...	413, 200	24, 792	...	...	...	...	...	...	...	...	...	...	21
...	...	800, 225	33, 012	2, 777, 256	37, 846	...	...	...	...	...	...	...	...	22
630, 000	36, 600	23, 062, 320	1, 328, 741	1, 579, 000	6, 430	...	...	454, 990	338, 037	80, 859	2, 290, 202	4, 362, 000	405, 200	23
1, 904, 946	99, 224	95, 927, 871	4, 833, 497	4, 804, 510	50, 686	2, 190, 000	312, 000	72, 000	54, 000	88, 336	2, 636, 159	14, 643, 968	1, 409, 734	24
...	...	...	...	...	...	...	...	...	...	12, 000	300, 000	...	...	25
14, 689, 619	710, 356	35, 709, 464	1, 495, 505	45, 000	575	3, 912, 061	548, 116	577, 473	259, 863	13, 365	377, 025	1, 775, 000	154, 600	26
...	...	420, 000	24, 000	...	...	...	...	...	...	...	...	...	...	27
2, 359, 966	225, 482	39, 433, 197	2, 219, 580	1, 217, 232	8, 076	...	...	522, 835	424, 837	53, 507	1, 432, 345	25, 325, 464	759, 551	28
276, 000	10, 800	8, 367, 540	440, 270	736, 360	7, 242	...	...	...	...	11, 979	156, 427	...	...	29
...	...	40, 000	1, 400	...	...	...	...	...	...	64, 794	1, 537, 230	...	...	30
...	...	1, 222, 930	48, 000	24, 000	300	...	...	...	...	314	12, 670	...	...	31
...	...	610, 000	28, 375	27, 400	290	...	...	...	...	...	...	...	...	32
...	...	608, 000	38, 360	...	...	...	...	...	...	...	...	...	...	33
...	...	350, 700	20, 750	89, 600	1, 225	...	...	...	...	...	...	3, 662, 000	33, 840	34
...	...	1, 123, 000	52, 785	...	...	...	...	...	...	28, 921	791, 341	...	...	35
...	...	64, 785	4, 530	832, 000	3, 120	...	...	...	...	629	16, 300	...	...	36
...	...	80, 000	4, 800	20, 000	300	...	...	...	...	...	...	...	...	37
97, 200	5, 103	6, 903, 411	329, 267	84, 320	1, 054	...	...	...	...	1, 050	19, 500	1, 000	300	38

TABLE I.—STATISTICS OF THE CHEMICAL INDUSTRY, BY STATES AND TERRITORIES: 1880.

	States and Territories.	PRODUCTS—continued.									
		White lead.		Other salts of lead.		Ground barytes.		Zinc oxide.		Acetate of lime.	
		Pounds.	*Dollars.*	*Pounds.*	*Dollars.*	*Tons.*	*Dollars.*	*Pounds.*	*Dollars.*	*Pounds.*	*Dollars.*
	The United States	123, 477, 890	8, 770, 699	11, 375, 466	758, 680	19, 165	371, 829	20, 121, 761	766, 337	6, 593, 009	156, 892
1	California	4, 000, 000	260, 000	100, 000	65, 000						
2	Colorado										
3	Connecticut					6, 000	150, 000				
4	Delaware										
5	District of Columbia										
6	Florida										
7	Georgia										
8	Illinois	7, 889, 079	489, 181								
9	Indiana										
10	Iowa										
11	Kansas										
12	Kentucky	2, 365, 000	176, 550	150, 000	9, 000						
13	Louisiana										
14	Maine					2, 200	50, 000				
15	Maryland	3, 240, 000	249, 000							224, 000	6, 720
16	Massachusetts	4, 758, 521	360, 073	627, 474	40, 000					135, 000	3, 500
17	Michigan									1, 500, 000	30, 000
18	Minnesota										
19	Missouri	26, 400, 324	1, 813, 600	1, 082, 000	71, 100	4, 425	100, 094	660, 000	29, 700		
20	Nebraska	3, 000, 000	350, 000								
21	Nevada										
22	New Hampshire										
23	New Jersey							16, 774, 756	654, 051	80, 000	1, 800
24	New York	28, 144, 009	1, 951, 507	5, 234, 360	292, 400					3, 171, 544	78, 086
25	North Carolina										
26	Ohio	13, 140, 458	967, 321	345, 000	21, 500			30, 405	2, 888		
27	Oregon										
28	Pennsylvania	30, 540, 499	2, 153, 467	3, 831, 632	259, 205	1, 500	20, 000	2, 656, 600	79, 698	1, 260, 000	30, 650
29	Rhode Island									45, 000	2, 250
30	South Carolina										
31	Tennessee					465	10, 685				
32	Texas										
33	Utah										
34	Vermont									177, 465	3, 886
35	Virginia					4, 575	41, 050				
36	West Virginia			5, 000	475						
37	Washington										
38	Wisconsin										

TABLE I.—STATISTICS OF THE CHEMICAL INDUSTRY, BY STATES AND TERRITORIES: 1880.

PRODUCTS—continued.

Potash and pearlash.		Soda.		Sulphur.		Sulphuric acid.		Glucose.		Value of all other products.	Total value of all products.	
Pounds.	*Dollars.*	*Pounds.*	*Dollars.*	*Pounds.*	*Dollars.*	*Pounds.*	*Dollars.*	*Pounds.*	*Dollars*	*Dollars.*	*Dollars.*	
4, 571, 671	232, 643	40, 259, 938	866, 560	1, 200, 000	21, 000	308, 765, 432	3, 661, 876	151, 740, 400	4, 551, 212	44, 927, 101	117, 377, 324	
						5, 105, 995	129, 195			959, 596	3, 179, 700	1
										35, 000	95, 000	2
						5, 163, 669	53, 500			1, 115, 717	2, 419, 743	3
										107, 921	1, 140, 086	4
						400, 000	5, 000			33, 340	322, 439	5
										520	1, 120	6
										12, 000	353, 500	7
						4, 140, 000	62, 000	48, 380, 000	1, 450, 400	1, 309, 439	7, 681, 325	8
232, 500	11, 625									38, 281	156, 470	9
								860, 400	25, 812	68, 611	287, 743	10
										16, 865	186, 233	11
										111, 151	726, 255	12
						1, 050, 000	15, 750			71, 758	329, 659	13
279, 299	14, 010					2, 000, 000	35, 000			207, 728	563, 517	14
						43, 920, 000	340, 840			778, 465	7, 243, 122	15
						23, 016, 381	326, 666			5, 565, 207	10, 604, 662	16
1, 393, 962	62, 542					980, 000	4, 916			107, 937	363, 104	17
146, 000	5, 840									85, 800	220, 540	18
						2, 880, 000	57, 600			1, 986, 538	5, 827, 498	19
										6, 140	387, 000	20
		1, 800, 000	16, 560	1, 200, 000	21, 000	1, 440, 000	16, 540			34, 740	283, 532	21
										38, 053	108, 911	22
						74, 994, 625	693, 113			3, 382, 921	9, 499, 577	23
515, 500	23, 442					41, 363, 543	438, 723	102, 500, 000	3, 075, 000	14, 001, 054	29, 805, 614	24
											300, 000	25
493, 229	20, 761					24, 200, 000	386, 000			1, 469, 565	7, 678, 374	26
											24, 000	27
		38, 459, 938	850, 000			66, 346, 819	937, 522			10, 611, 964	20, 884, 991	28
						9, 500, 000	130, 000			1, 216, 052	1, 968, 041	29
										1, 154, 423	2, 693, 053	30
										49, 865	121, 520	31
										9, 010	37, 675	32
											38, 360	33
										41, 795	101, 496	34
						897, 000	9, 000			112, 200	1, 007, 166	35
						1, 367, 400	20, 511			115, 204	299, 310	36
										500	5, 600	37
1, 511, 181	94, 423									71, 741	521, 388	38

TABLE II.—STATISTICS OF THE CHEMICAL

	Centers of manufacture. (a)	No. of establishments.	CAPITAL.			AVERAGE NUMBER OF HANDS EMPLOYED.				Total amount paid in wages during the year.
			Value of buildings.	Value of machinery.	Total capital.	Males above 16 years.	Males below 16 years.	Females above 15 years.	Females below 15 years.	
			Dollars.	*Dollars.*	*Dollars.*					*Dollars.*
1	New York	159	5, 530, 548	3, 641, 035	20, 078, 850	5, 467	334	419	13	2, 899, 412
2	Philadelphia	109	3, 701, 722	3, 562, 597	17, 634, 773	3, 973	176	336	5	2, 048, 028
3	Boston	106	1, 064, 997	764, 918	4, 438, 248	1, 464	61	50		727, 662
4	Baltimore	43	898, 100	513, 029	5, 303, 252	1, 184	6		11	505, 775
5	Chicago	29	595, 829	482, 779	2, 651, 800	839	92	69		428, 710
6	Saint Louis	35	752, 604	696, 422	3, 392, 200	1, 025	23	29		488, 687
7	Cincinnati	32	864, 100	659, 254	4, 393, 203	962	49	102		442, 000
8	Buffalo	16	602, 700	497, 400	2, 907, 200	1, 107	109	9		582, 420
9	Providence	62	493, 550	464, 000	2, 146, 586	822	8	81		372, 353
10	San Francisco	33	338, 000	378, 425	2, 297, 550	488	8	16		256, 443
11	Charleston	23	345, 000	488, 400	3, 009, 000	1, 772	69	10		386, 779
12	Pittsburgh	35	451, 434	368, 161	1, 887, 704	470	5	1		201, 174
13	Cleveland	22	189, 500	220, 600	1, 290, 200	403	51	18		189, 160
14	Louisville	12	167, 688	135, 300	699, 440	150		27		60, 875
15	Richmond	10	78, 500	49, 000	372, 000	132	1	3		29, 260
16	New Orleans	7	61, 000	63, 301	218, 701	87	5	8		45, 943
17	Washington	12	73, 500	41, 900	205, 967	132	2			46, 875

	Centers of manufacture. (a)	PRODUCTS—continued.							
		Bromine.		Phosphorus.		Castor oil.		Stearic acid candles.	
		Pounds.	*Dollars.*	*Pounds.*	*Dollars.*	*Gallons.*	*Dollars.*	*Pounds.*	*Dollars.*
1	New York					200, 000	200, 000	940, 000	150, 000
2	Philadelphia			56, 292	29, 271				
3	Boston								
4	Baltimore								
5	Chicago							1, 000, 000	130, 000
6	Saint Louis					623, 302	530, 841	2, 200, 000	284, 000
7	Cincinnati							9, 805, 646	1, 135, 487
8	Buffalo								
9	Providence								
10	San Francisco					50, 000	45, 000	2, 596, 000	375, 000
11	Charleston								
12	Pittsburgh	90, 000	25, 120						
13	Cleveland								
14	Louisville							1, 811, 920	206, 263
15	Richmond								
16	New Orleans								
17	Washington								

	Centers of manufacture. (a)	PRODUCTS—continued.									
		Dry colors.		White lead.		Other salts of lead.		Ground barytes.		Zinc oxide.	
		Pounds.	*Dollars.*	*Pounds.*	*Dollars.*	*Pounds.*	*Dollars.*	*Tons.*	*Dollars.*	*Pounds.*	*Dollars.*
1	New York	16, 418, 968	1, 695, 134	28, 868, 000	1, 725, 750	5, 234, 360	292, 400			16, 774, 756	654, 051
2	Philadelphia	10, 165, 215	637, 716	14, 906, 431	1, 003, 450	2, 924, 314	203, 128	500	5, 000		
3	Boston	4, 535, 000	356, 815	4, 758, 521	360, 073	627, 474	40, 000				
4	Baltimore	2, 599, 541	52, 922	3, 240, 000	249, 000						
5	Chicago	83, 000	10, 000	7, 889, 079	489, 181						
6	Saint Louis	156, 000	17, 680	23, 928, 324	1, 690, 000	1, 082, 000	71, 100	4, 100	96, 650	660, 000	29, 700
7	Cincinnati	551, 000	120, 600	10, 552, 213	760, 261	245, 000	14, 500				
8	Buffalo			1, 600, 000	130, 000						
9	Providence	1, 200, 000	150, 000								
10	San Francisco			4, 000, 000	260, 000	100, 000	65, 000				
11	Charleston										
12	Pittsburgh	2, 003, 249	20, 975	15, 634, 068	1, 150, 017	907, 318	56, 077				
13	Cleveland	824, 000	30, 000	2, 588, 245	207, 060	100, 000	7, 000			30, 405	2, 888
14	Louisville	832, 000	12, 480	2, 365, 000	176, 550	150, 000	9, 000				
15	Richmond										
16	New Orleans										
17	Washington										

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a These centers include all works situated within a radius of thirty miles from the center of each city, and, therefore, in many cases include portions of adjoining states.

INDUSTRY, BY CENTERS OF MANUFACTURE: 1880.

MATERIALS.						PRODUCTS.										
Anthracite coal.		Bituminous coal.		Value of all other materials.	Total value of all materials.	Aniline colors.		Anthracene.		Sulphate of ammonia.		Alum.		Borax.		
Tons.	Dollars.	Tons.	Dollars.	Dollars.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	
129,434	435,413	12,787	58,146	19,279,961	19,773,520	32,000	42,500	265,516	73,650	4,900,000	188,250	5,220,000	100,375	....	....	1
67,109	230,746	85,988	180,157	12,434,688	12,845,591	....	....	11,250	16,000	4,459,738	167,740	32,247,725	677,790	....	....	2
11,318	47,458	13,608	69,367	5,296,572	5,413,397	....	....	....	....	950,000	35,000	....	....	....	....	3
1,944	8,406	31,387	125,579	4,141,552	4,275,537	....	....	4,664	717	....	....	....	....	....	....	4
2,986	9,254	18,545	69,042	4,596,288	4,674,584	....	....	....	....	1,148,000	43,000	....	....	....	....	5
668	4,321	30,596	74,120	4,004,371	4,082,812	....	....	....	....	250,000	10,500	....	....	....	....	6
....	....	34,126	71,059	3,667,667	3,738,726	....	....	....	....	1,500,000	48,750	....	....	....	....	7
436	2,160	7,050	17,365	3,293,254	3,312,779	....	....	....	....	72,000	2,160	1,750,000	30,000	....	....	8
4,524	21,719	7,700	38,612	2,237,679	2,298,010	....	....	....	....	142,350	5,000	....	....	....	....	9
1,793	14,987	6,718	43,404	1,961,454	2,019,845	....	....	....	....	....	....	....	....	130,000	10,400	10
3,525	16,725	8,215	16,250	970,321	1,003,296	....	....	....	....	....	....	....	....	....	....	11
....	....	20,181	26,686	1,227,875	1,254,561	....	....	....	....	540,000	17,550	....	....	....	....	12
....	....	10,038	21,687	851,548	873,235	....	....	....	....	1,000,000	37,500	....	....	....	....	13
....	....	6,048	12,575	450,498	463,073	....	....	....	....	400,000	16,000	....	....	....	....	14
....	....	960	8,600	332,000	335,600	....	....	....	....	21,000	790	....	....	....	....	15
....	....	400	2,000	152,007	154,007	....	....	....	....	287,000	10,045	....	....	....	....	16
302	1,260	920	3,536	212,123	210,919	....	....	62,684	8,875	530,000	21,200	....	....	....	....	17

PRODUCTS—continued.

Soaps.						Glycerine.		Nitro-glycerine.		Phosphate rock.		Manufactured manures.		
Oleic acid soap.		Other hard soaps.		Soft soap.										
Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Tons.	Dollars.	Tons.	Dollars.	
1,964,946	102,874	82,619,995	4,128,531	5,006,390	37,550	2,190,000	312,600	454,990	338,037	....	....	121,605	3,532,652	1
2,899,966	256,682	31,868,384	1,969,346	138,600	1,230	....	....	....	....	....	....	96,296	2,478,018	2
10,000	600	21,960,232	1,077,795	9,892,440	85,543	....	....	....	....	....	....	45,609	1,244,253	3
140,000	6,890	7,854,000	336,110	....	....	....	....	....	....	....	....	176,980	5,005,270	4
1,800,000	199,000	65,329,000	3,077,440	768,000	3,000	....	....	....	....	....	....	25,400	620,000	5
8,540,000	312,400	14,295,869	470,163	250,000	2,750	400,000	38,000	....	....	....	....	7,505	160,772	6
14,554,619	704,656	19,282,364	824,651	....	....	3,746,061	523,116	....	....	....	....	6,900	204,000	7
....	....	20,405,000	1,187,840	560,000	9,000	....	....	....	....	....	....	12,000	420,000	8
270,000	10,890	10,605,310	537,010	1,183,000	13,864	....	....	....	....	....	....	15,604	226,377	9
2,135,000	94,300	7,495,000	368,100	....	....	394,800	38,736	1,242,424	655,680	....	....	1,000	20,000	10
....	....	40,000	1,400	....	....	....	....	....	....	103,605	559,377	64,782	1,536,690	11
....	....	6,382,068	291,340	948,832	5,670	....	....	....	....	....	....	150	4,500	12
15,000	900	1,438,000	52,405	....	....	166,000	25,000	577,473	259,863	....	....	5,540	145,100	13
461,880	15,386	2,605,000	99,500	....	....	220,964	24,625	....	....	....	....	1,665	42,000	14
....	....	1,073,000	50,285	....	....	....	....	....	....	....	....	15,100	476,600	15
....	....	3,970,000	164,000	....	....	....	....	....	....	....	....	1,823	68,106	16
....	....	1,400,679	55,024	....	....	....	....	....	....	....	....	6,300	199,000	17

PRODUCTS—continued.

Acetate of lime.		Potash and pearlash.		Soda.		Sulphuric acid.		Glucose.		Value of all other products.	Total value of product.	
Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Dollars.	Dollars.	
....	....	....	....	....	....	80,731,175	862,817	....	....	14,564,223	29,000,794	1
....	....	....	....	38,459,938	850,000	82,628,847	922,142	....	....	16,913,801	20,131,314	2
....	....	....	....	....	....	23,016,381	326,666	....	....	4,169,718	7,696,465	3
224,000	6,720	....	....	....	....	43,920,000	340,840	....	....	774,965	6,773,434	4
....	....	....	....	....	....	4,140,000	62,000	....	....	1,236,380	5,861,001	5
....	....	....	....	....	....	2,880,000	57,600	....	....	1,981,538	5,753,694	6
....	....	....	....	....	....	4,000,000	71,000	....	....	1,069,612	5,476,633	7
....	....	100,000	5,000	....	....	7,000,000	113,750	102,500,000	3,075,000	51,900	5,024,650	8
180,000	5,750	....	....	....	....	9,500,000	130,000	....	....	2,404,699	3,483,500	9
....	....	....	....	....	....	5,105,995	129,195	....	....	940,196	3,001,607	10
....	....	....	....	....	....	....	....	....	....	30,600	2,128,067	11
....	....	....	....	....	....	8,154,965	115,149	....	....	303,927	1,990,325	12
....	....	25,000	1,450	....	....	20,200,000	315,000	....	....	348,695	1,432,861	13
....	....	....	....	....	....	....	....	....	....	109,151	710,955	14
....	....	....	....	....	....	897,000	9,000	....	....	19,200	555,875	15
....	....	....	....	....	....	1,050,000	15,750	....	....	71,758	329,659	16
....	....	....	....	....	....	400,000	5,000	....	....	33,340	322,439	17

Industrial progress appears in an extraordinary degree in the advances made by applied chemistry during the present century. Scientific research has opened a vast field for the application of many new and valuable compounds, and has also reduced the cost of many chemical products, rendering some hitherto unimportant chemicals convenient and economically available and enlarging the applications of others already in use. Chemistry has unlocked the treasures of the earth to enrich the soil, to beautify and render complete our homes, to clothe us, to cure or relieve the sick, to preserve health by cleanliness and purification, and to supply the means of illumination. The rapidity with which the experimental discoveries of the scientist are adapted to practical purposes is, at times, astonishing to the investigator himself. Beside the utilization of our natural resources, the waste products of manufacture are the constant subject of investigation, and often interesting and valuable products result therefrom. The debt of various branches of art and manufacture to new and improved methods of modern chemistry can hardly be overestimated. Chemical processes and products are, indeed, so intimately associated with nearly all manufactures as to be inseparable, and therefore it becomes a difficult matter to locate accurately the dividing line where manufacturing chemistry ends and purely mechanical operations commence.

In this report the plan adopted is, so far as possible, similar to that employed by the statisticians of France. Preparations of drugs, pharmaceutical mixtures, and proprietary medicines are not enumerated; but manures, soap, candles, glycerine, white lead, and colors are included, their manufacture being true chemical processes. The production of unground dry lead and colors appears, while grinders of paints and colors are excluded from this tabulation.

Petroleum and its allied products, though properly classified under this head, have been made the subject of investigation by the Census Office, and the results will appear in a separate report.

It must be remembered that this report exhibits the statistics of the industry *during the census year*, from June 1, 1879, to May 31, 1880, which was unfortunately a year of considerable depression, although before its close the tide of activity set in and the production of chemicals was largely increased, the demand being met, not only by a greater supply from existing establishments, but in many cases by the erection of additional and larger works. The production of glucose during the census year gives no adequate idea of the extent of that industry at the present time. (*a*)

In the compilation of these statistics of the chemical industry a number of the products have been deemed of special interest; and their production has therefore been tabulated separately, and has been particularly mentioned in the following pages.

SODA.

An important feature developed by this report is the small amount of soda salts produced in this country. Soda is by far the most important chemical product used, and its consumption has borne an intimate relation to the advance of civilization. The record of its use extends to very early times. In the Old Testament, a substance called "neter", which effervesced with vinegar, is mentioned as having been used for cleansing. This is probably the same Egyptian word which the Romans called "nitrum", which certainly referred to soda, and not to saltpeter. The word "natron" first occurs in Europe in the fifteenth century, though at that time potash and soda were not recognized as different substances, but as only modifications of the same. In 1702 a difference was recognized, and it was established in 1736. Until the time of the French revolution potash was the more important of the two salts, and was distinguished as the "vegetable alkali", in contradistinction to the "mineral alkali", or soda.

Until within a few decades potash was exclusively prepared from wood ashes, as it is now in this country. As the demand for alkali increased with augmented population and higher civilization, the inadequate supply of potash in Europe, and the cost of transit from heavily-wooded countries, steadily increased its cost. For this reason many attempts were made to utilize the soda of common salt by conversion into the carbonate, but they were not successful until, in 1791, the French government granted Nicholas Le Blanc a patent for the manufacture of soda from salt.

The invention of his process achieved one of the grandest results of manufacturing chemistry, and is particularly noteworthy as being perfect from the beginning; for, although many minor details have been altered and improved, the principal methods employed are the same to this day. The process consisted of two parts:

1. The formation of "sodium sulphate, or salt-cake", by the decomposition of common salt with sulphuric acid; and 2. The formation of sodium carbonate by mixing and heating the salt-cake with charcoal and limestone.

This process is still used for the production of soda from salt, though small coal has been substituted for charcoal, and other improvements have been made by the collection and recovery of the waste products. The process was not introduced into England to any extent until 1824, and has never, except on a small scale, been adopted in this country.

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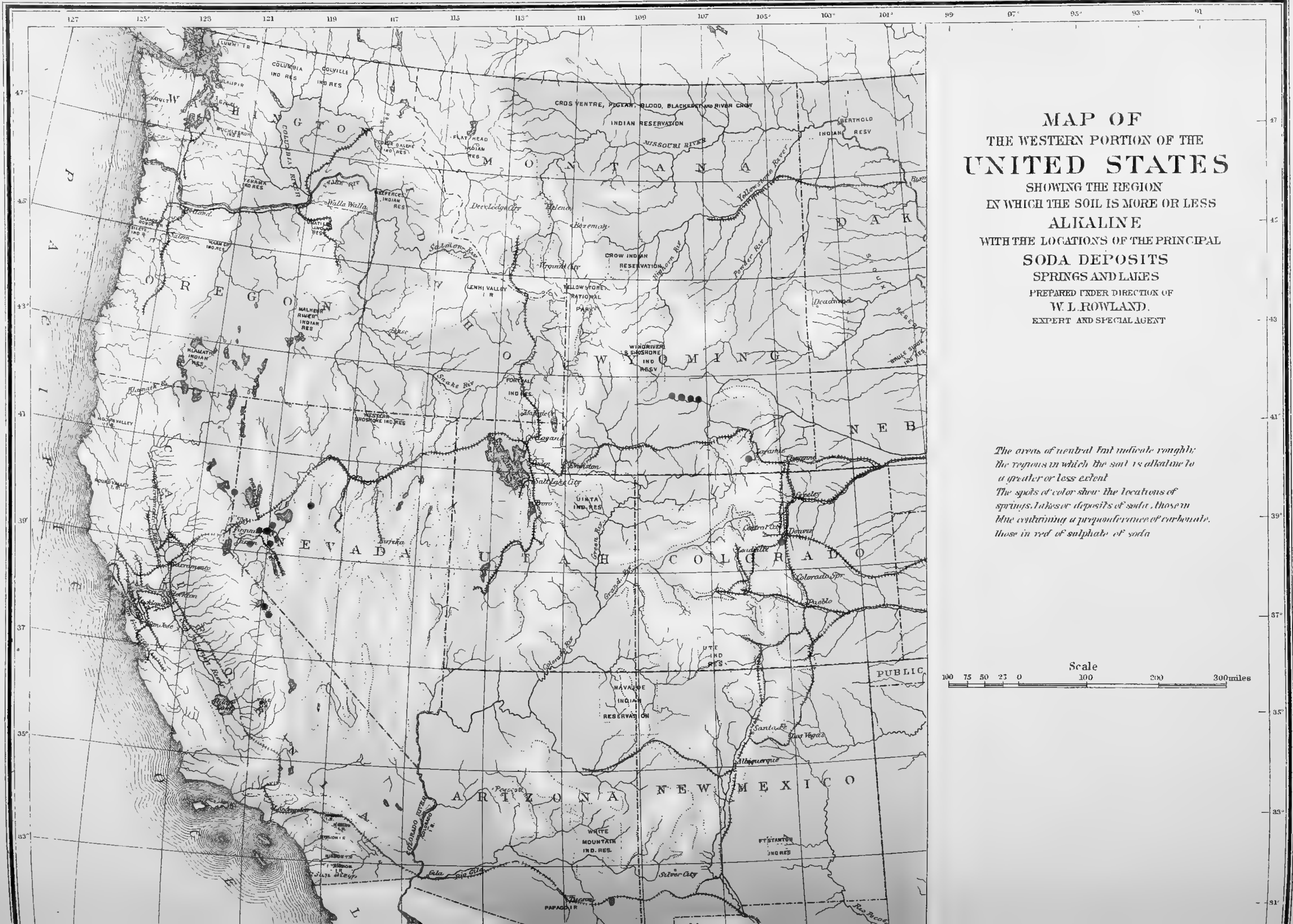
a According to an article by Professor Wiley (*Popular Science Monthly*, June, 1881, p. 251), "on August 1, 1880, ten glucose factories were in operation in the United States, consuming daily about 20,000 bushels of corn." Professor W. H. Brewer, quoting this in his census report on the cereals (p. 106), adds that he has personal knowledge that the capacity of one or two establishments was greatly underestimated, and that the daily consumption was undoubtedly much more. Professor Wiley is also quoted by Professor Brewer as estimating for May, 1881, a consumption daily of 35,000 bushels, there being nine new factories in process of construction, half of them then running.



MAP OF
THE WESTERN PORTION OF THE
UNITED STATES
SHOWING THE REGION
IN WHICH THE SOIL IS MORE OR LESS
ALKALINE
WITH THE LOCATIONS OF THE PRINCIPAL
SODA DEPOSITS
SPRINGS AND LAKES
PREPARED UNDER DIRECTION OF
W. L. ROWLAND.
EXPERT AND SPECIAL AGENT

The areas of neutral tint indicate roughly the regions in which the soil is alkaline to a greater or less extent. The spots of color show the locations of springs, lakes or deposits of soda, those in blue containing a preponderance of carbonate, those in red of sulphate of soda

The uses of soda are almost innumerable. For every pane of window-glass that admits light to our houses and shelters us from the weather; for every pound of hard soap we use; for every sheet of our paper, whether for writing or for printing; for the bleaching of cloth; and even for the manufacture of bread, as well as for many other important and necessary articles, we are largely dependent upon this chemical.

The total consumption of soda salts in the United States during the census year is estimated at 398,500,000 pounds, while the total production, by this report, is given as 40,259,938 pounds, or about 10 per cent. of the consumption. At the same time the United States contains vast amounts of carbonate and sulphate of soda, found in large lakes and deposits throughout the western states and territories.

The accompanying map has been prepared to indicate the position of the more important of these formations, with special reference to facilities for railroad transportation. The flat tint shows that portion of the United States denominated "alkaline", where the rainfall is less than the evaporation, by which soluble salts are brought to the surface. In this belt occur many lakes whose waters contain a greater or less percentage of soda salts, as well as deposits of the crystallized mass. In most cases calcium and magnesium salts are present, but usually in small amounts, while the general composition of the salts in these lakes and deposits varies from nearly pure carbonate in some to chloride and sulphate in others.

This "alkaline belt" is situated in the least explored region of the United States; and as the soil is generally unfit for cultivation without irrigation, owing to the insufficient rainfall, private exploration has been confined to a search for minerals, and but little attention has been paid to the alkaline deposits. It has therefore, owing to the lack of reliable information of the extent and character of the lakes and deposits, been impossible to obtain complete data for the preparation of this map. The "alkali" of the plains, so called in distinction from common salt, is largely sulphate of soda. The accompanying map exhibits the location of a number of these deposits or lakes that I have visited, or concerning which reliable information has been obtained. A few of these will be subsequently described in detail. No attempt has been made to show the extent of these deposits, as it would be impossible on a map of so small a scale.

The only natural deposit now worked to any extent for soda is situated in the Carson desert, Churchill county, Nevada, 24 miles south from Wadsworth, the nearest point on the line of the Central Pacific railroad. It consists of two lakes, evidently the craters of extinct volcanoes, separated by a distance of about 225 yards. These lakes are circular in form, with precipitous banks, rising in some places to a height of 150 feet, and have no outlet, being supplied by fresh-water springs. The larger lake covers an area of 402 acres, and is very deep, soundings having been made to a depth of 170 feet. The water of this lake carries carbonate of lime, which deposits in an amorphous condition on the rocks, or, meeting the concentrated solution of soda, combines with it to form gaylussite, which crystallizes, often in beautiful forms, on any convenient substance.

In the spring, after the rainy season, both lakes are well filled with water, which gradually evaporates during the summer, concentrating the larger and causing the smaller lake to become nearly dry. An analysis of a sample of water from the larger lake, taken in August, and analyzed by Professor O. D. Allen, (*a*) gave in 1,000 parts:

	Per cent.
Sodium chloride	64.9413
Sodium sulphate	13.7626
Sodium carbonate	29.2482
Sodium sulphide	0.2384
Potassium sulphate	3.6515
Magnesium carbonate	0.0652
Silica	0.2050
Excess carbonic oxide	0.4658
	112.5780

A sample taken and analyzed by Mr. Henry Pemberton, of Philadelphia, gave:

	Per cent.
Sodium carbonate	3.286
Sodium sulphate	1.848
Sodium chloride	7.371

corresponding to 26.5 per cent. sodium carbonate in the solid constituents.

Several attempts have been made to work this lake, but all have been thus far unsuccessful, owing to the difficulty of economically purifying the soda. (*b*)

In the spring the smaller lake covers an area of about 8 acres, but is nearly dry by the end of the dry season. The soil in and around the lake is impregnated with soda, and at various points, from 1 to 3 feet under the surface, a sea-green, ice-like mass of soda is found. An analysis which I made of this natural soda gave:

	Per cent.
Sodium carbonate	73.16
Sodium chloride	1.68
Sodium sulphate	1.58
Insoluble residue	23.70

The natural soda thus contains only 3.26 per cent. of foreign soluble matter.

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a *United States Geological Exploration of the Fortieth Parallel*, by Clarence King.

b It is stated by the superintendent of the small lakes that 400 tons of soda were made from this large lake in the summer of 1881.

The lake is fed by numerous small springs rising from the bottom, that are no doubt fresh until they come into contact with the soda-saturated soil, which is thus leached, and the soda brought into the lake. This lake is divided by means of earth-work embankments into several small ponds or basins, in which the evaporation is effected by solar heat. The crystallized product is collected and air-dried under open sheds, thus losing its water of crystallization and rendering its transportation to market less expensive. It is sacked, hauled by wagon to Wadsworth, and is sent by rail to San Francisco.

Several smaller deposits in Nevada have been worked at various times in small amounts, but only for the San Francisco market, as the cost of transportation renders it impracticable to ship East. This alkaline belt extends from northwestern Nevada to Death valley, in California. The lakes of this section have no outlets, and are all more or less highly saturated with the alkaline leachings of the soil, with a composition varying from nearly pure carbonate to sulphate or chloride. The alkaline waters and deposits of this belt contain nearly pure sodium salts,

A large deposit of nearly pure sulphate of soda occurs in Nevada, close to the California line, about 60 miles north of the railroad. This bed is said to be from 2 to 8 feet in thickness, extending over an area of from 100 to 200 acres, and underlying a layer of soil from a few inches to 2 feet thick. A sample of the soda, analyzed by Mr. Henry Pemberton, gave:

	Per cent.
Sodium sulphate	49. 33
Sodium chloride	0. 93
Water	49. 74
Silica	traces.

corresponding to 98.15 per cent. sodium sulphate in the dried mass.

Analyses of alkaline incrustations or efflorescences in Nevada, published in the *United States Geological Exploration of the Fortieth Parallel*, gave—

1. Sample collected near Hardin City, Nevada, analyzed by Professor O. D. Allen:

	Per cent.
Sodium carbonate	52. 10
Sodium sulphate	27. 55
Sodium chloride	18. 47

2. Sample from Brown's station, Nevada, analyzed by R. W. Woodward:

	Per cent.
Sodium sesquicarbonate	18. 15
Sodium sulphate	20. 88
Sodium chloride	49. 67
Sodium borate	11. 30

3. Sample from Peko station, Nevada, analyzed by R. W. Woodward:

	Per cent.
Sodium carbonate	73. 50
Excess carbonic oxide	10. 07
Sodium sulphate	4. 60
Sodium borate	4. 49
Sodium chloride	7. 55

One of the largest and most interesting known deposits is situated 70 miles north of Rawlins, in Wyoming territory, about one mile from Independence rock, and consists of three large lakes, called, respectively, the New York lake, Wilmington lake, and Horseshoe lake. The New York lake is the largest of these, and is liquid even at the end of the dry season. A sample of the water was taken for analysis, but was unfortunately lost in transit; it is said, however, to consist mainly of sulphate. During the rainy season this lake overflows considerable of the surrounding surface, where it evaporates during the dry season, and the salt remains as a deposit. An examination of one of these small ponds that was nearly dry showed a thin crust of white soda salts extending over most of the surface, under which was a layer of soft, sticky blue mud, with a strong odor of sulphureted hydrogen. This layer of mud was from 3 inches to 2 feet deep, and covered a sea-green, ice-like mass of soda; but having no facilities for boring, it was impossible to determine its depth. A sample of this salt, dried at 110° centigrade, which I analyzed, contained:

	Per cent.
Sodium carbonate	59. 24
Sodium sulphate	19. 28
Sodium chloride	1. 25
Other salts	1. 54
Insoluble residue	18. 64

The Wilmington lake covers an area of about 75 acres, and is divided during the dry season into two lakes. At the time these lakes were visited (October, 1880) one was entirely dry, and the water in the other was almost covered with a snow-white mass of soda from 1 to 4 inches thick. Underlying this was found the same blue mud, but no soda deposit, nor has any been found by deep boring.

The Horseshoe lake covers an area of some 20 acres, and contains a deposit of soda averaging 5 feet in thickness. From the center of this lake a stream rises, the size of one's arm, which is strongly charged with soda salts.

A series of small lakes containing soda salts extends from this point southward, consisting principally of sulphate. At the end of the dry season they bear a resemblance to partially frozen lakes, from the crystallization of the soda on the surface.

Very few analyses have been made of these waters, but there have been sufficient to show the occurrence of an abundant supply of sulphate of soda, with a considerable quantity of carbonate.

The following extracts from a letter to the Superintendent of Census refer to one of these deposits located near Laramie City, Wyoming territory:

> Inasmuch as you are collecting for your report of the decennial census statistics of the economy, property, and resources of the people, and have called upon me for data, I have the honor to submit the following with reference to the deposits of native soda existing in this territory.
>
> Special attention was first directed to these deposits by a cube of the material taken from the principal one, which is near this place, and exhibited at the centennial exposition at Philadelphia. The cube exhibited contained over 200 cubic feet of solid crystalline sulphate of soda, almost chemically pure, and as it exists in its native state. Its constituent elements, as well as I can ascertain, are, by weight, as follows: 19.4 per cent. of soda and 24.8 per cent. of sulphuric acid, constituting 44.2 per cent. of sulphate of soda, the residue being the water of crystallization (55.8 per cent).
>
> * * * * * * * * *
>
> The deposit whence the sample mentioned was taken covers an area of more than 100 acres, being a solid bed of crystallized sulphate of soda about 9 feet thick. The deposit is supplied from the bottom by springs, whose water holds the salts in solution. The water rising to the surface rapidly evaporates, and the salts with which it is impregnated readily crystallize into the form mentioned. Upon removing any of the material the water rising from the bottom fills the excavation made, and the salts, crystallizing, replace in a few days the material removed. Hence the deposit is practically inexhaustible, and it now contains about 50,000,000 cubic feet of chemically pure, crystallized sulphate of soda ready to be utilized.
>
> * * * * * * * * *
>
> As the material of our native deposit is already sulphate of soda, we may dispense with the first and most expensive part of Le Blanc's process, the production of sulphate of soda from chloride of sodium and sulphuric acid. All that we have to do is to convert the sulphate soda into the carbonate, and here the latter part of that process seems precisely adapted to the purpose, and could be economically adopted, charcoal and limestone being cheap and abundant in the neighborhood.
>
> * * * * * * * * *
>
> And here it might be well to state that the deposit is convenient to lines of transportation, being only about 11 miles from this point on the Transcontinental railroad, the intervening country being a hard and level plain, affording an excellent natural road-bed, with grass and an abundance of good water at convenient intervals. Hence we have a resource here, in addition to our mines of the precious metals, which affords a most promising opportunity for the profitable and safe employment of capital in an immense industry. And as the source is inexhaustible, the cost of production such as to preclude successful competition by the importers, and other deposits of equal extent and affording material of equal purity cannot be found in this country, we may reasonably hope for the establishment of an industry here whose product will supply the entire soda trade of the United States, giving employment to a thousand hands, saving millions to the people, and enriching its proprietors.
>
> Very respectfully, your obedient servant,
>
> STEPHEN W. DOWNEY. (*a*)

Still another deposit is located near Morrison, about 12 miles from Denver, Colorado. This consists of three lakes, averaging 5 feet in depth, with an aggregate area of 16 acres. An analysis of the water by Professor Sidney H. Short gave 1.31 pounds of salts of soda and magnesia to the gallon, and an analysis of the salts found in the solution gave:

	Per cent.
Magnesium sulphate	39.37
Sodium sulphate	32.91
Calcium sulphate	4.51
Aluminium sulphate	1.50
Silicate	6.10
Water	15.53

The soil surrounding the lakes is also found to be thoroughly impregnated with these salts, an analysis of soil near the lakes giving 9.25 pounds to the cubic foot. This impregnation is said to extend to a depth of at least 52 feet over an area of 80 acres. Coal, limestone, sand, and fire-clay are found in the immediate neighborhood.

In the *Report of the Geological Survey West of the One-Hundredth Meridian*, by Lieutenant Wheeler, mention is made of a deposit of soda near Croton Springs, Arizona territory. The flat is several square miles in extent, and is covered with a thick deposit of soda, which, upon analysis, gave the following percentages:

	Per cent.
Sodium sesquicarbonate	15.51
Sodium sulphate	74.66
Sodium chloride	8.85
Other salts and loss	0.98

---

[a] A letter from Mr. Downey, dated March 9, 1882, states: "A road has already been constructed from Laramie City to these deposits by the Union Pacific Railway Company, who intend putting up works at or near Laramie City for the purpose of working the soda very extensively."

There are two small ponds in the flat which contain a saturated solution, and deposit during the dry season a white crust on the shore. An analysis of this gave:

	Per cent.
Sodium sesquicarbonate	26.25
Sodium sulphate	60.03
Sodium chloride	13.14
Other salts	0.58

Although these lakes and deposits occur over such a wide extent of country, few have been examined with a view to establish the manufacture of soda, the high cost of transportation and present distance to railroad having combined to render it economically impracticable. The territories are now being rapidly developed by the building of new railroads, and the time is near at hand when reduction in railroad freights will make these deposits available for the manufacture of soda.

MANUFACTURED MANURES.

Within the past ten years the consumption of manures has increased to an enormous extent, until their manufacture has become one of the great industries of the United States, producing during the census year finished goods to the value of $19,921,400.

Previous to 1800 only three patents for manures appear on the British patent roll. In the first third of the present century a few more were granted, but it was not until the time of Baron Liebig that the industry was brought into prominence. In 1840 Liebig produced his memorable work on organic chemistry in its application to agriculture and physiology, and from the works of this eminent chemist agricultural chemistry received a great impetus. In 1842 Mr. J. B. Lawes secured a patent in Great Britain for the conversion of tricalcic into monocalcic phosphate by means of oil of vitriol. The suggestion of this method, which has become the foundation of the modern industry of manures, is none the less due to Liebig. He, however, proposed to increase the fertilizing power of bone-dust by this means, while Lawes proposed to use the mineral phosphates. Although bone-dust must still be considered an important constituent of these manures, mineral phosphates have now become the largest source of supply.

Bearing in mind the greatly increased demand for phosphatic manures of this description, consequent upon their universally beneficent effects in the field, which would not otherwise have been met, and the reduction effected in their cost, at the same time with many other practical advantages which the command of these manures affords, we perceive that the means for rendering available for our present use the stores of phosphate of lime laid up by nature in a mineral form constitute without doubt the greatest boon conferred by modern chemistry on agriculture.

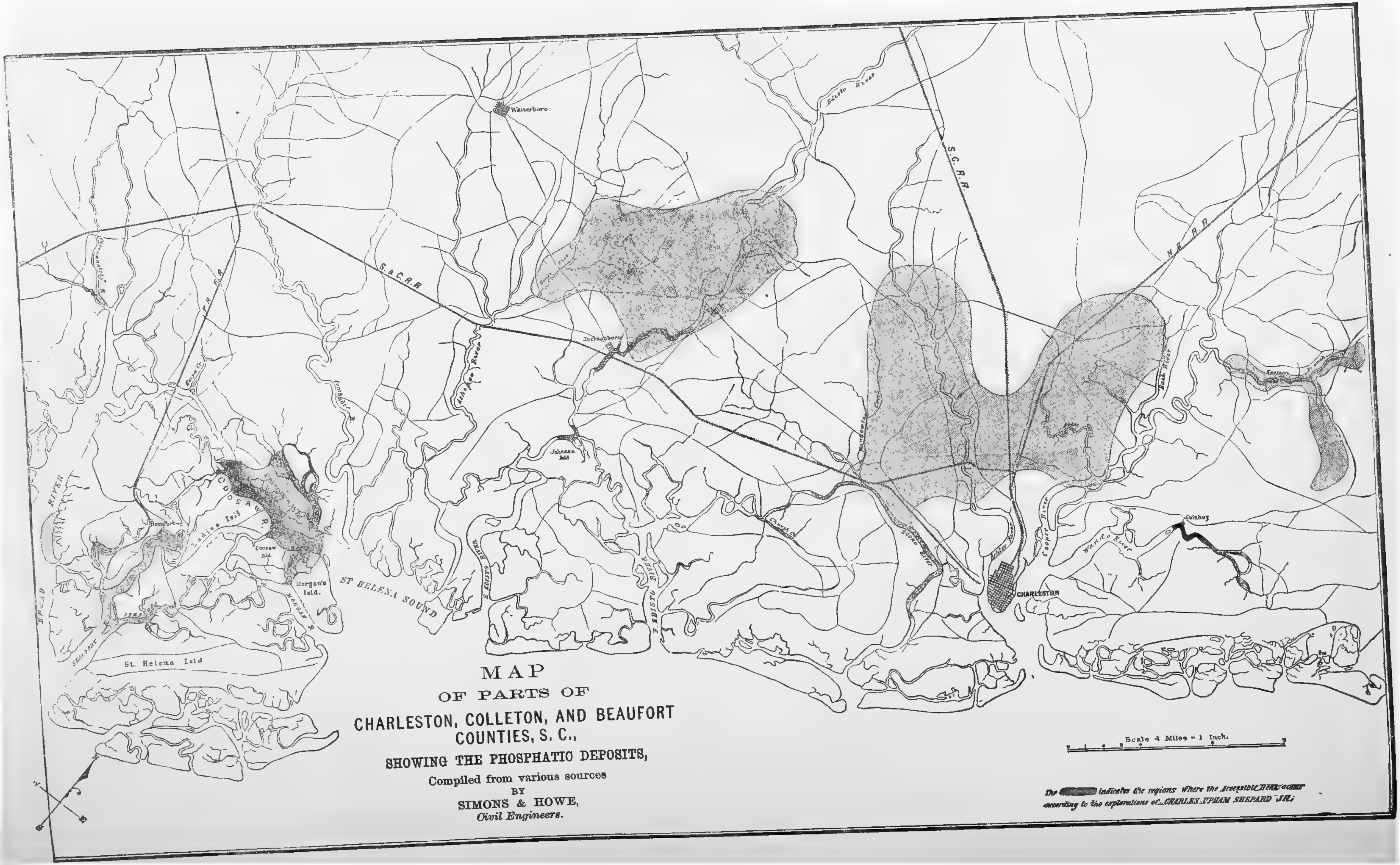
The general effects of manufactured manures may be best understood by bearing in mind the connection between their principal constituents (which for simplicity we may regard as nitrogen and phosphoric acid) and cultivated produce. All the albuminous compounds of plants or the flesh-forming principles of food contain nitrogen as their characteristic constituent, as well as smaller quantities of phosphorus (derived from phosphoric acid), in combination with the commoner organic elements, carbon, hydrogen, and oxygen. Again, phosphoric acid combined with bases, especially lime, forms a considerable portion of the ash of all agricultural produce. By the constant removal of these essential elements the soil becomes impoverished, unless they are returned to it in the form of manures. Liebig laid down as the prime condition of sound success this principle, viz: "*The faithful restitution to the soil of the ash constituents removed by the crops.*"

When England was searching the world for means to enrich an impoverished soil, Liebig said:

> England is robbing all other countries of the conditions of their fertility. Already, in her eagerness for bones, she has turned up the battle-grounds of Leipsic, of Waterloo, and of the Crimea; already from the catacombs of Sicily she has carried away the skeletons of many successive generations. Annually she removes from the shores of other countries to her own the manurial equivalent of three and a half millions of men, whom she takes from us the means of supporting, and squanders it down her sewers to the sea. Like a vampire she hangs upon the neck of Europe, nay, of the entire world, and sucks the life-blood from nations, without a thought of justice toward them, without a shadow of lasting advantage for herself.

In like manner, we may say: America is robbing herself of the conditions of fertility. Already has she exhausted many of the rich valleys of the East and begun vigorously to draw upon the fertility of the West. Annually she sends away food sufficient for millions of men, and the remainder she is squandering down her sewers to the sea.

To make return to the soil of the elements removed therefrom is the only way to counteract this great evil, and for this purpose the manufactured manures have proved themselves most eminently adapted. The exhaustion of the soil in the eastern, middle, and southern states has created a large demand for manufactured manures, particularly in cotton- and tobacco-producing sections. This demand has been augmented by a constantly-increasing call for these manures from the older and more densely populated portions of the West, until the production has assumed gigantic proportions.



MAP
OF PARTS OF
CHARLESTON, COLLETON, AND BEAUFORT COUNTIES, S. C.,
SHOWING THE PHOSPHATIC DEPOSITS,

Compiled from various sources
BY
SIMONS & HOWE,
Civil Engineers.

The ▨ indicates the regions where the Accessible Rock occurs according to the explorations of CHARLES UPHAM SHEPARD JR.

The following table exhibits the distribution of the industry, with the total production of each state having more than one establishment, during the census year. Since that period the manufacture has largely increased, particularly in South Carolina, the chief source of mineral phosphates in the United States:

States, etc.	No. of establishments.	PRODUCT.	
		Tons.	Value.
Total	278	727, 453	$19, 921, 400
Connecticut	13	7, 475	248, 050
Delaware	19	37, 917	998, 165
District of Columbia	3	6, 300	199, 000
Georgia	4	11, 287	341, 500
Illinois	7	27, 015	633, 990
Indiana	6	1, 574	44, 877
Kentucky	4	1, 665	42, 000
Louisiana	2	1, 823	68, 106
Maine	4	5, 850	175, 000
Maryland	40	191, 571	5, 457, 258
Massachusetts	24	69, 387	1, 920, 623
Missouri	7	5, 905	146, 932
Nebraska	2	470	$4, 700
New Jersey	18	80, 859	2, 290, 202
New York	26	88, 336	2, 636, 159
Ohio	9	13, 365	377, 025
Pennsylvania	31	53, 507	1, 432, 345
Rhode Island	12	11, 979	156, 427
South Carolina	7	64, 794	1, 537, 230
Tennessee	3	314	12, 670
Virginia	28	28, 921	791, 341
West Virginia	2	629	16, 300
Wisconsin	2	1, 050	19, 500
California, Iowa, Michigan, Minnesota, and North Carolina.	5	15, 460	372, 000

The raw materials commonly employed may be divided into three groups:

a. Mineral and animal-bone phosphates.

b. Animal refuse, i. e., fish-scraps from the manufacture of oil, meat refuse from the slaughter-houses, and oil-cake from the oil manufacture.

c. Sulphate of ammonia.

SOUTH CAROLINA PHOSPHATES.

The principal mineral phosphate in use in this country is obtained in the state of South Carolina. The extent of accessible deposits, so far as known, is represented by the accompanying map, prepared and kindly furnished to the Census Office by Dr. C. U. Shepard, jr., chemist to the department of agriculture, Charleston, South Carolina.

It must be distinctly understood, however, that all the tract indicated by the red shading is only here and there available at the present time, the deepest shaded portions of the map representing the most accessible "river deposits". The red-colored territory represents, approximatively, 240,000 acres, while the extent of the accessible deposits may be roughly estimated at 10,000 acres. This section is low and flat, generally not more than 10 feet, above high-water mark, while elevations of over 20 feet are rare. The phosphate rock is found in lumps or nodules, distributed in layers of varying thickness, and usually only a few feet under the surface. Where water-courses have intersected this region the rock has been deposited in the beds of the streams, and this has caused mining to be divided into two classes, namely, "land mining" and "river mining".

Profitable land mining depends mainly upon—

1. The location of the deposit with reference to point of shipment or consumption.
2. The difficulties to be encountered in mining, namely, the depth and character of the overlying earth, drainage, presence of trees, etc.
3. The quality of the rock.
4. The extent and yield of the deposit.
5. The supply of water, wood, and labor.
6. The facilities for removing the rock.

Profitable river mining is chiefly dependent upon—

1. The location with regard to both commerce and health.
2. The depth of water and liability to storms.
3. Thickness and character of the rock-bed.
4. The probable occurrence with the rock of troublesome concomitants, such as marl and oyster-shells.
5. The quality of the rock.

The depth of the deposit in either case is a very important matter, as at present land mining is not profitable at an average depth exceeding 6 feet, nor water mining at a depth exceeding 20 feet. The generally level character of the strata in this section is favorable to successful mining. In many places phosphate beds are found underlying 20 acres or even hundreds of adjoining acres of land where mining is carried on at a depth not exceeding 6 feet, or form the bottom of broad and shallow stretches of water at a tolerably uniform depth. These, however, are the exceptions, and hence the extent of accessible deposits is limited to a small percentage of the whole known deposit. The rock occurs in nodular masses, nearly round or kidney-shaped, that from the land being usually yellowish white in color, and from the water bluish black. The thickness of the stratum averages 8, and rarely exceeds 30 inches. The yield per acre varies from 300 to 1,200 tons. Numerous fossils of both land and marine animals occur, associated with the rock.

Beginning at the northeast corner of the accompanying map, the first deposit observed is in the Wando river. This has produced many thousand tons of high-grade rock, in small dark nodules, raised mainly by tongs. To the northwest of this deposit are the rock-beds of the eastern branch of the Cooper river. These contain a considerable quantity of rock, richer toward the junction of the two branches, but have been very little worked. The largest of the accessible deposits underlies that section included between Back and Stono rivers and Rantowle's creek. This is a land deposit, and occurs at a remarkably uniform depth. The Stono river has been successfully worked for a long time, and is still a popular field, owing to the favorable depth of water for working, either with dredges or with tongs, its proximity to the city, and the easy manipulation of the rock in process of manufacture.

The deposits of the Edisto river are of good quality, but lack continuity and uniformity in depth. An extensive deposit of rock occurs in the Bull and the Coosa rivers, and underlying Chisholm island, that has furnished a large proportion of the amount shipped. Several very heavy beds of phosphate rock occur in the neighborhood of Beaufort, but, unfortunately, they are of low grade, and are not worked at present.

A large income is annually yielded to the state from royalties, and the right to mine in the rivers is granted by the state. Two forms of privileges are granted, "exclusive rights" and "general rights"; the former give permission to mine exclusively within certain limits, while the latter allow mining in any river deposit to which no "exclusive right" has been granted. Both are subject to a royalty of $1 per ton on all mined.(*a*) The income to the state from land phosphate is derived from the usual state tax assessed on one-half the value of the rock mined.

The following table gives the statistics of "the mining of phosphate rock in South Carolina":

	Number of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	MATERIALS.						PRODUCT.	
			Males above 16 years.	Males below 16 years.	Females above 15 years.		Number of tons of anthracite coal.	Value.	Number of tons of bituminous coal.	Value.	Value of all other materials.	Total value of all materials.	Tons of phosphate rock mined.	Value.
Total for State	21	$2,071,300	2,405	70	10	$490,047	6,800	$28,000	3,376	$17,550	$279,109	$324,659	211,377	$1,123,823
WATER PHOSPHATE.														
Beaufort county	5	485,300	904	1	......	190,288	6,000	24,000	1,326	7,000	240,694	271,694	107,772	564,446
Charleston county	4	230,000	230	......	......	16,159	....	....	550	2,750	200	2,950	10,166	55,172
Total	9	715,300	1,134	1	......	206,447	6,000	24,000	1,876	9,750	240,894	274,644	117,938	619,618
LAND PHOSPHATE.														
Charleston county	10	1,291,000	971	69	10	247,600	800	4,000	1,500	7,800	37,900	49,700	81,740	444,800
Colleton county	2	65,000	300	......	......	36,000	....	....	....	....	315	315	11,699	59,405
Total	12	1,356,000	1,271	69	10	283,600	800	4,000	1,500	7,800	38,215	50,015	93,439	504,205

The mining of the South Carolina rock was begun in 1868, and increased very rapidly during the following ten years, stimulated by an increasing foreign demand, which suddenly fell off in 1879, owing to the depression existing in England and on the continent of Europe. The following table, prepared by Mr. E. Willis, of Charleston, shows the shipments of crude rock from South Carolina:(*b*)

Tons shipped from—	1875.				1876.				1877.				1878.			
	From June 1, 1874, to May 31, 1875.				From June 1, 1875, to May 31, 1876.				From June 1, 1876, to May 31, 1877.				From June 1, 1877, to May 31, 1878.			
	Foreign ports.	Domestic ports.	Consumed.	Total.	Foreign ports.	Domestic ports.	Consumed.	Total.	Foreign ports.	Domestic ports.	Consumed.	Total.	Foreign ports.	Domestic ports.	Consumed.	Total.
Total	70,546	32,560	19,684	122,790	75,815	38,231	18,850	132,896	102,767	47,053	13,400	163,220	121,742	68,946	17,635	208,323
Beaufort	44,617	7,000	....	51,617	50,384	9,400	....	59,784	73,923	6,285	....	80,208	100,619	8,217	....	108,836
Charleston	25,929	25,560	19,684	71,173	25,431	28,831	18,850	73,112	28,844	40,768	13,400	83,012	21,123	60,729	17,635	99,487
Other points than Beaufort and Charleston.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

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a Since the census year the royalty on river rock has been increased to $1 25 per ton.

b In the comparison of Mr. Willis' figures with the reports of this office, it must be borne in mind that the former represent amounts *shipped* and the latter amounts *mined*.

Tons shipped from—	1879.				1880.				1881.				1882.			
	From June 1, 1878, to May 31, 1879.				From June 1, 1879, to May 31, 1880.				From June 1, 1880, to May 31, 1881.				From June 1, 1881, to January 31, 1882.			
	Foreign ports.	Domestic ports.	Consumed.	Total.	Foreign ports.	Domestic ports.	Consumed.	Total.	Foreign ports.	Domestic ports.	Consumed.	Total.	Foreign ports.	Domestic ports.	Consumed.	Total.
Total	119, 566	60, 899	18, 900	199, 365	61, 375	107, 348	22, 040	190, 763	70, 768	157, 824	38, 142	266, 734	58, 259	129, 184	32, 286	219, 729
Beaufort	97, 799	8, 618	....	106, 417	47, 157	13, 346	....	60, 503	62, 200	65, 895	....	128, 095	53, 811	46, 747	....	100, 558
Charleston	21, 767	52, 281	18, 900	92, 948	14, 218	94, 002	22, 040	130, 260	8, 568	91, 929	38, 142	138, 639	4, 448	75, 242	32, 286	111, 976
Other points than Beaufort and Charleston.	....	....	....	....	....	....	....	....	....	....	....	....	....	7, 195	....	7, 195

By this it will be seen that the exportation fell off from 121,742 tons in 1878 to 70,768 tons in 1881. Meanwhile the domestic consumption has increased from 86,581 tons to 195,966 tons. The shipments for the eight months from June 1, 1881, to January 31, 1882, aggregate 219,729 tons, an average of 27,466 tons per month.

This industry, though inaugurated during the troublous "reconstruction era", has overcome all obstacles, and now produces raw material to the value of one and one-quarter million dollars. The rock is mainly used at home in the manufacture of manures.

The composition of the South Carolina phosphates varies widely, and it is therefore impossible to show their typical composition. As the result from hundreds of analyses of clean and dry samples, of fair to excellent qualities, Dr. Shepard gives the following percentages:

	Per cent.
Phosphoric acid	[a]25 to 28
Carbonic acid	[b]2½ to 5
Sulphuric acid	½ to 2
Lime	35 to 42
Magnesia	traces to 2
Alumina	traces to 2
Sesquioxide of iron	1 to 4
Fluorine	1 to 2
Sand and silica	4 to 12
Organic matter and combined water	2 to 6
Moisture	½ to 4

In addition to these ingredients, sodium, chlorine, and occasionally other elements occur in small quantities. Iron pyrites, rarely found beyond 1 per cent., are included under the estimate of sulphuric acid and sesquioxide of iron. The organic matter is nitrogenous, containing occasionally as high as one-quarter per cent. of nitrogen.

SULPHUR AND SULPHURIC ACID.

The production of sulphur in this country is very limited, as only one establishment was enumerated in 1880. The works are located about 35 miles northwest of Humboldt station, Nevada, in the Rabbit Hole range of the Humboldt mountains, where the sulphur is mined and purified. The crude material is found in a more or less pure state in irregular masses, associated with gypsum and a white ash, and varies in color from a pale lemon yellow to a shiny black. The latter is considered the richest, owing to its dense structure, which causes it to produce a greater weight of sulphur to a given volume of ore.

To separate the sulphur from the accompanying impurities the crude material is charged into an upright cast-iron boiler and steam is admitted under a pressure of 40 to 60 pounds. The sulphur is run off from the bottom, remelted, and purified in pans, and cast into cylinders or rolls weighing 250 pounds, then carried 35 miles to Humboldt, and shipped by rail to San Francisco. Until quite recently the mining of sulphur has not been profitable, mainly owing to the high cost of transportation. The market is limited to the Pacific coast.

About twelve years since a large deposit of sulphur was discovered in Calcasieu parish, Louisiana, while boring for petroleum. An attempt was made two years ago to utilize this deposit, but on account of difficulties arising from the flow of water the enterprise was abandoned.

The consumption of sulphur has rapidly increased within the past few years. In 1878 962,049 pounds of crude sulphur were imported into the United States, and 1,756,745 pounds in 1880. Since then the consumption has largely increased, owing to the establishment of a number of new acid-works, as well as a greater production in those already existing.

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[a] Equivalent to bone phosphate of lime, 55 to 61 per cent.

[b] Equivalent to carbonate of lime, 5 to 11 per cent.

The uses of sulphuric acid are innumerable and its manufacture is of prime importance, large quantities being annually consumed in the refining of petroleum and in the manufacture of manures, sulphate of ammonia, alum, copperas, chlorine, phosphorus, and glucose. In Europe the acid is mainly produced by the combustion of pyrites, but in this country it is almost entirely made from sulphur. At the present time two establishments in New York and one in Georgia are using native sulphides of iron, and one in Vermont employs pyrites for the production of copperas, by the slow oxidation of the mineral.

The following table exhibits the number of establishments producing sulphuric acid during the census year, and the total production for each state having more than one establishment:

States.	No. of establishments.	PRODUCT.		States.	No. of establishments.	PRODUCT.	
		Pounds.	Value.			Pounds.	Value.
Total	49	308, 765, 432	$3, 661, 876	New York	5	41, 363, 543	$438, 723
				Ohio	5	24, 200, 000	386, 000
California	2	5, 105, 995	129, 195	Pennsylvania	9	66, 346, 819	937, 522
Connecticut	2	5, 163, 669	53, 500	Rhode Island	2	9, 500, 000	130, 000
Maryland	4	43, 920, 000	340, 840	District of Columbia, Illinois, Louisiana, Maine, Michigan, Missouri, Nevada, Virginia, and West Virginia.	9	15, 154, 400	226, 317
Massachusetts	4	23, 016, 381	326, 666				
New Jersey	7	74, 994, 625	693, 113				

POTASSIUM BICHROMATE.

This important chemical salt, owing to the discovery of extensive chrome-iron deposits in Maryland, was one of the first manufactured in this country. From this source the greater part of the chrome ores were obtained for domestic manufacture until the discovery of ore in California, where since 1869 many large deposits have been discovered and worked, particularly throughout the coast ranges. Ore also occurs in the Sierra Nevada range, but at present the cost of transportation is in most cases too great to admit of its utilization. Large quantities of ore have been shipped from Del Norte and San Luis Obispo counties, California, but in the latter the supply is very inconstant, owing to the bunchy character of the deposits.

The general results of over one hundred analyses of the ore found in California may be stated as follows:

	Per cent. of chromic oxide.
Del Norte county	39 to 45
Napa county	42 to 46
Placer county	35 to 55
Tuolumne county	44 to 45
San Luis Obispo county	38 to 60
El Dorado county	20

The production of bichromate in the United States during the census year was 4,000,000 pounds, valued at $520,000. A new company has recently been organized, which has purchased several California deposits, and will soon begin the manufacture of this useful chemical. The uses of potassium bichromate are various, but are mainly in the manufacture of chrome pigments, printing, dyeing, charging electric batteries, and in tanning leather.

POTASH.

The manufacture of "potash" and "pearlash" has been carried on for a long time by the leaching of wood ashes, the only source of these salts in the United States. The production has decreased very materially, owing to the scarcity of wood, as well as from the competition in foreign markets, caused by the introduction of potash from waste products of the beet-sugar industry and from the "Stassfurt salts".

During the census year potash and pearlash were produced in seven states, as follows:

States.	No. of establishments.	PRODUCT.		States.	No. of establishments.	PRODUCT.	
		Pounds.	Value.			Pounds.	Value
Total	68	4, 571, 671	$232, 643	Minnesota	1	146, 000	$5, 840
				New York	8	515, 500	23, 442
Indiana	3	232, 500	11, 625	Ohio	12	493, 229	20, 761
Maine	8	279, 299	14, 010	Wisconsin	9	1, 511, 181	94, 423
Michigan	27	1, 393, 962	62, 542				

Until the introduction of the Le Blanc's process for the manufacture of soda the alkalies were made from the ashes of plants, trees, etc., marine plants furnishing soda and land plants potash; but this source soon became insufficient, for, as the demand increased, the supply of ash-producing substances decreased, consequent upon the exhaustion of forest lands. By the introduction of Le Blanc's process soda soon became of prime importance, and, for most purposes where an alkali was needed, replaced potash. The purposes for which potash is best adapted are, however, sufficiently numerous to create a steady demand for that article. Its principal uses are for the manufacture of soft soap and for the preparation of potassium prussiate, bichromate, iodide, bromide, permanganate, hydrate, and chlorate.

PHOSPHORUS.

The manufacture of phosphorus was begun in the United States in 1870 by Messrs. Rose & Lowell, at Mount Holly, New Jersey. Phosphorus was then selling for $1 25 per pound, but the price was rapidly lowered by English competition to 70 cents in 1873, when Messrs. Rose & Lowell failed and the manufacture ceased. The property was then purchased by the present owners, who commenced to manufacture in January, 1874, when the price had again advanced to $1 20 per pound, presumably from the lack of American competition. Prices again declined to 50 cents in 1878, and the works were closed, and now remain idle. In 1877 the manufacture was undertaken in Camden, New Jersey, and has continued to the present time. It is understood that the larger part of the product is used in the manufacture of phosphor-bronze.

The principal use for phosphorus is in the manufacture of matches, which industry is mainly controlled in this country by a single company, who have contracted with an English company for their phosphorus supply at a price considerably below the market price in England and below the cost of production here. The market price of phosphorus in England to-day is about 70 cents, but it is imported into the United States, an *ad valorem* duty of 20 per cent. being paid, and is sold in New York for 60 cents per pound.

During the census year the production of phosphorus in the United States was 56,292 pounds, valued at $29,271, while the value of importations was $78,253.

BORAX (BIBORATE OF SODA).

Until 1872 all borax used in this country was either imported as such or was manufactured here from imported boracic acid; but during that year extensive deposits of natural borax were developed on the Pacific coast, and, by domestic competition, the price rapidly declined from 32 cents per pound in 1872 to 8 cents in 1879. (*a*)

Borax was first produced in California from the waters of Borax lake, in Lake county, a narrow sheet of water about one mile in length, whose contents at certain seasons were found to consist of a saturated solution of borax. It was also found that the mud at the bottom of this shallow lake was filled with borax crystals, and movable coffer-dams were put down, the mud was dug out and leached, and the partially-purified article prepared; but the weakening of the water and the solution of the crystals by the entrance of fresh water, as well as the discovery of large deposits in Nevada, caused the abandonment of these works several years since.

Four companies on the Pacific coast were engaged in the manufacture of borax during the census year; three raised and purified the natural borax, and the fourth made a small amount from native borate of lime. The oldest and most productive works are located near Columbus, Esmeralda county, Nevada. The borax occurs here as an efflorescence on the surface, and also impregnates the soil, in conjunction with borate of lime (Ulexite), sulphate of lime, and common salt. The soil is leached in large vats, and the borax is purified by settling and subsequent slow crystallization. The product is then hauled by wagons, 360 miles, to Wadsworth, on the Central Pacific railroad, and sent by rail to San Francisco, where it is shipped east by vessel.

Another large deposit occurs in San Bernardino county, California, in the slate range, which is worked in a similar manner, the product being hauled to San Bernardino.

The extent of the deposits of crude borax proves to have been largely overestimated, and they are now generally recognized to be only temporary in character. Doubtless, when these are exhausted, if no others are discovered, increased facilities for transportation will cause the borate of lime, now neglected, to be used in the manufacture of borax.

BROMINE.

The manufacture of bromine was begun in this country in 1846 by Dr. David Alter, of Freeport, Pennsylvania, who continued the business for about ten years and sold the product for from $6 to $8 per pound. At this time bromine was mainly used in the preparation of daguerreotype plates, but when this method of photography was superseded the demand for bromine decreased, and, in consequence, its production ceased.

In 1866 the discovery of the value of potassium bromide as a nerve sedative caused a renewed demand for bromine, and Messrs. Rosengarten & Sons, of Philadelphia, sent a chemist (Mr. C. W. Bodey) to Tarentum to investigate the subject. Works were erected, and the first bromine was made May 30 of that year. The demand increased so rapidly that the supply of bittern became insufficient in Pennsylvania, and in 1868 works were erected in Pomeroy, Meigs county, Ohio. As the demand grew the production also increased rapidly, and, by the adoption of improved processes of manufacture, the price steadily declined from $6 per pound in 1856 to 28 cents in 1880.

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[a] It had gradually advanced to 13½ cents in January, 1882.

During the census year there were twelve establishments in operation in the following states, as follows: [a]

States.	No. of establishments.	PRODUCT.	
		Pounds.	Value.
Total	12	404, 690	$114, 752
Ohio	5	150, 850	40, 462
Pennsylvania	3	90, 000	25, 120
West Virginia	4	163, 840	49, 170

Analyses of the following bitterns have been published:

1. Sample from Freeport, Armstrong county, Pennsylvania, analyzed by Mr. M. H. Boyé, in 1848:

	Per cent.
Potassium chloride	0. 128
Sodium chloride	0. 877
Calcium chloride	24. 640
Magnesium iodides, bromides, and chlorides	10. 146
Total solids	35. 791

The proportion of magnesium salts was divided as follows:

	Per cent.
Magnesium	2. 5750
Bromine	0. 7010
Chlorine	6. 8660
Iodine	0. 0035
Total	10. 1455

2. Samples taken in 1880 from Midland, Michigan, and analyzed by Mr. Ayers, at the university of Michigan, resulted as follows (specific gravity, 1.2557):

	No. 1. Per cent.	No. 2. Per cent.
Sodium chloride	5. 6754	6. 0801
Calcium chloride	14. 3574	14. 5859
Magnesium chloride	3. 9263	3. 4019
Magnesium bromide	4. 8356	4. 8356
Calcium sulphate	0. 0160	0. 0160
Water	63. 3941	63. 3941
Total	92. 2048	92. 3136

At Pomeroy, Ohio, about one ounce of bromine is obtained from a gallon of bittern, or one pound for every two barrels of salt made.

The salt brines of the United States are richer in bromine than those of any other part of the known world, and now furnish large quantities for exportation. Home competition has lowered the price, until the profits of the business have been reduced to a very small margin.

NITRO-GLYCERINE.

This "high explosive" was first prepared in the laboratory in 1847, but it was not until 1865 that its great value as a blasting agent began to be recognized. It was first used in its pure liquid state, and many terrible accidents accompanied its transportation and use. This caused attempts to be made to reduce its dangerously explosive character, which resulted, in 1867, in the invention of dynamite, and led to its gradual introduction.

The general composition of dynamite consists of an absorbent, such as "infusorial earth", saturated with nitro-glycerine. It is found that a good "earth" will absorb from three to four times its weight of nitro-glycerine, and possesses the advantage over other absorbents of retaining it even under heavy pressure.

During the census year nineteen establishments were in operation making nitro-glycerine, as follows:

States.	No. of establishments.	PRODUCT.	
		Pounds.	Value.
Total	19	3, 039, 722	$1, 830, 417
California	4	1, 242, 424	655, 680
Pennsylvania	10	522, 835	424, 837
Massachusetts, Michigan, New Jersey, New York, and Ohio	5	1, 274, 463	749, 900

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[a] Since the census year the manufacture of bromine has been started at Midland, Michigan, with considerable success.

The production has, however, largely increased since that period; but the largest nitro-glycerine works in the East, owned by a combination of leading gunpowder manufacturers, though in process of construction during the census year, did not begin operations till its close. Another large concern in California also commenced about the same time.

ACETATE OF LIME.

The manufacture of acetate of lime and its associated product, methylic alcohol, was started in the United States about the year 1867 by Messrs. J. A. Emmons and A. S. Saxon, in Crawford county, Pennsylvania. Their production gradually increased, and in 1874 Mr. George C. Edwards established the Burcey Chemical Company at Binghamton, New York, to refine the crude wood spirit obtained from the various acetate manufacturers. During the census year seventeen establishments were in operation in the following states:

States.	No. of establishments.	PRODUCT.			
		Acetate of lime.		Crude methylic alcohol.	Charcoal.
		Pounds.	Value.	Value.	Value.
Total	17	6,593,009	$156,892	$86,274	$31,770
New York	8	3,171,544	78,086	53,234	10,700
Pennsylvania	3	1,260,000	30,650	17,040	5,300
Michigan, Maryland, Massachusetts, Vermont, Rhode Island, and New Jersey	6	2,161,465	48,156	16,000	15,770

Beside the above amount of dry acetate, three establishments produced 130,000 gallons of liquid acetate (strength 15° to 36° Baumé), valued at $12,200. (*a*)

Two qualities of acetate are produced, known as "brown" and "gray", the production of the latter forming about one-fifth of the total.

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a Since the census year the production has rapidly increased, until in April, 1882, twenty-eight firms were engaged in this manufacture, producing an average of 550 tons of acetate and 600 barrels of spirits per month. As several of these firms have more than one works, the total number of establishments is estimated as thirty-five.

PART II.—PRODUCTION OF SALT.

GENERAL DISCUSSION.

In the following table the most important statistics have been summarized as a basis for comparison of the condition of the salt industry in 1870 and 1880 respectively, with the percentage of increase or decrease:

	1870.	1880.	Percentage increase.
Number of establishments	282	268	* — 4. 96
Number of blocks or furnaces	402	308	* —23. 38
Number of vats or ponds	24, 525	47, 462	93. 52
Total capital employed	$6, 561, 615	$8, 225, 740	25. 36
Total wages paid	$1, 146, 910	$1, 260, 023	9. 86
Total value of materials used	$1, 760, 670	$2, 074, 049	17. 80
Total value of salt produced	$4, 818, 229	$4, 829, 566	0. 24
Total bushels of salt produced	17, 606, 105	29, 805, 298	69. 29

* Decrease.

By this it will be seen that the number of establishments and the number of blocks have decreased, while the capital and production have largely increased; but at the same time it appears that only 58.71 per cent. of the capital was turned over in 1880, to 73.43 per cent. in 1870; 69.03 per cent. of the value of the product was paid out for wages and materials in 1880, to 60.35 per cent. in 1870; and, though the amount of the product has increased 69.29 per cent., the value has increased only 0.24 per cent.

In the production of salt the brine is evaporated either by solar heat or by artificial heat, the former being exclusively used in the evaporation of surface brines, and the latter being generally employed for subterranean brines. In evaporation by artificial heat two distinct methods of heating are in use: First, by direct heat, as in the pan and kettle process; and second, by steam passing through pipes in the settlers and grainers. In Michigan steam is furnished by the exhaust of the adjoining saw-mills; in other localities by close evaporators or covered pans.

TABLE I.—GENERAL STATISTICS OF SALT PRODUCTION IN THE UNITED STATES: 1880.

States and Territories.	Number of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	SUBTERRANEAN BRINES.			BY ARTIFICIAL HEAT.								
											Machines.							
			Males above 16 years.	Females above 15 years.	Children and youths.		Wells.	Average depth of wells.	Average strength of brine (degrees salometer).*	Blocks or furnaces.	Kettles.	Aggregate capacity.	Pans.	Aggregate capacity.	Settlers.	Aggregate capacity.	Grainers.	Aggregate capacity.
							No.	*Feet.*		*No.*	*No*	*Gallons.*	*No.*	*Gallons.*	*No.*	*Gallons.*	*No.*	*Gallons.*
The United States	268	$8, 225, 740	4, 125	20	144	$1, 260, 023	546	.....	.....	308	9, 345	1, 187, 507	1, 058	668, 207	661	19, 736, 670	527	5, 178, 718
California †	25	375, 650	188	...	.....	50, 620	.....	.....	.....	2	56	6, 750	2	500	.....	.....	.....	.....
Kansas	1	6, 000	2	...	.....	700	1	93	24. 0	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kentucky	3	20, 500	34	...	.....	8, 750	3	560	34. 0	3	78	7, 600	4	3, 040	2	15, 484	1	12, 791
Louisiana ‡	1	250, 000	45	...	.....	11, 000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Massachusetts †	5	9, 000	8	...	.....	1, 030	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Michigan	86	2, 147, 209	1, 416	...	52	541, 852	209	882	92. 3	103	174	21, 352	54	231, 257	237	6, 160, 246	355	3, 295, 527
Nevada	7	45, 300	31	3	2	9, 688	150	30	12. 0	.....	.....	.....	.....	.....	.....	.....	.....	.....
New York	69	2, 286, 081	962	11	39	274, 087	42	322	69. 5	134	8, 347	1, 086, 540	.....	.....	269	10, 331, 931	.....	.....
Ohio	25	832, 600	449	2	2	105, 261	58	912	36. 8	26	291	22, 265	359	150, 632	59	1, 202, 035	59	561, 484
Pennsylvania	16	234, 500	131	...	6	52, 047	19	883	24. 9	16	.....	.....	21	66, 390	21	450, 062	24	174, 507
Texas	3	92, 000	17	1	1	8, 150	1	10	.....	2	59	5, 600	.....	.....	2	400	9	500
Utah	10	13, 400	62	3	8	20, 932	4	2	82. 5	2	.....	.....	.....	.....	.....	.....	.....	.....
Virginia	1	1, 000, 000	76	...	.....	14, 219	2	272	90. 0	4	340	37, 400	.....	.....	.....	.....	.....	.....
West Virginia	15	910, 500	702	...	34	160, 227	57	1, 042	35. 6	16	.....	.....	614	215, 588	71	1, 576, 512	79	1, 133, 909
Wyoming	1	3, 000	2	...	.....	1, 460	.....	.....	.....	.....	.....	.....	4	800	.....	.....	.....	.....

* 4° salometer = 1° Baumé.

† Salt made from sea-water.

‡ Rock-salt mined and ground.

TABLE I.—GENERAL STATISTICS OF SALT PRODUCTION IN THE UNITED STATES: 1880—Continued.

States and Territories.	BY ARTIFICIAL HEAT—continued.						BY SOLAR EVAPORATION.			PRODUCTS.	
	Materials.				Value of all other materials.	Total value of all materials.	Machines.		Total value of materials.	Salt.	Total value of all products.
	Coal.	Value.	Wood.	Value.			Vats or ponds.	Aggregate area.			
	Tons.		Cords.				Number.	Square feet.		Bushels.	
The United States.	453, 846	$492, 959	541, 179	$423, 141	$1, 090, 936	$2, 007, 036	47, 462	75, 253, 446	$67, 013	29, 805, 298	$4, 829, 566
California *	13	76	125	300	40	416	203	17, 713, 602	19, 079	884, 743	121, 650
Kansas	......	......	......	......	......	......	33	60, 000	710	13, 000	5, 700
Kentucky	3, 760	3, 408	......	......	5, 600	9, 008	......	......	......	83, 000	21, 950
Louisiana †	......	......	......	......	......	......	......	......	......	312, 000	56, 160
Massachusetts *	......	......	......	......	......	......	456	316, 420	20	9, 575	3, 800
Michigan	......	......	524, 655	377, 939	629, 294	1, 007, 233	3, 750	867, 180	2, 500	12, 425, 885	2, 271, 913
Nevada	......	......	......	......	......	......	54	543, 953	5, 800	182, 408	92, 640
New York	136, 843	240, 112	......	......	233, 004	473, 116	42, 939	12, 068, 796	33, 904	8, 748, 203	1, 107, 760
Ohio	133, 470	112, 044	207	293	90, 206	202, 543	......	......	......	2, 650, 301	363, 791
Pennsylvania	55, 750	37, 141	......	......	36, 906	74, 047	......	......	......	851, 450	177, 415
Texas	......	......	2, 900	6, 400	1, 200	7, 600	8	16, 640	1, 500	50, 600	29, 700
Utah	......	......	400	480	20	500	18	43, 645, 075	3, 500	483, 800	60, 280
Virginia	......	......	12, 000	36, 000	3, 000	39, 000	......	......	......	425, 895	127, 678
West Virginia	124, 010	100, 178	162	269	91, 666	192, 113	......	......	......	2, 679, 438	380, 369
Wyoming	......	......	730	1, 460	......	1, 460	1	21, 780	......	5, 000	8, 760

* Salt made from sea-water.

† Rock-salt mined and ground.

SALT, GROUND OR REFINED.

States.	Number of establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	MATERIALS.						PRODUCTS.	
			Males above 16 years.	Females above 15 years.	Children and youths.		Coal, tons.	Value.	Wood, cords.	Value.	Value of all other materials.	Total value of all materials.	Salt, bushels.	Value.
The United States.	8	$322, 900	149	47	8	$44, 997	1, 746	$5, 743	200	$500	$274, 450	$280, 693	1, 044, 600	$361, 656
California	1	85, 000	8	2	2	6, 800	......	......	......	......	40, 000	40, 000	66, 600	60, 000
Maine	2	1, 700	4	......	......	1, 300	......	......	......	......	2, 750	2, 750	8, 000	4, 750
Michigan	1	7, 000	7	7	6	5, 000	500	2, 500	200	500	16, 000	19, 000	50, 000	30, 000
New York	4	229, 200	130	38	......	31, 897	1, 246	3, 243	......	......	215, 700	218, 943	920, 000	266, 906

The following table exhibits the amount of salt produced by the various processes, and the sources from which the brines are derived:

States and territories.	BY SOLAR EVAPORATION.			BY ARTIFICIAL HEAT FROM SUBTERRANEAN BRINES.	
	From sea or bay water.	From inland lakes, or natural deposits.	From subterranean brines.	By kettle or pan process.	By steam evaporation process.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
Total	887, 968	930, 808	3, 011, 000	8, 860, 171	16, 115, 351
California	878, 393	......	......	6, 350	......
Kansas	......	......	13, 000	......	......
Kentucky	......	......	......	50, 000	33, 000
Louisiana	......	312, 000	......	......	......
Massachusetts	9, 575	......	......	......	......
Michigan	......	......	153, 500	* 184, 270 † 1, 910, 610	10, 177, 505
Nevada	......	114, 908	67, 500	......	......
New York	......	......	2, 777, 000	5, 971, 203	......
Ohio	......	......	......	276, 343	2, 373, 958
Pennsylvania	......	......	......	......	851, 450
Texas	......	16, 600	......	34, 000	......
Utah	......	482, 300	......	1, 500	......
Virginia	......	......	......	425, 895	......
West Virginia	......	......	......	......	2, 679, 438
Wyoming	......	5, 000	......	......	......

* Kettle process.

† Pan process; used only in Michigan.

The following table shows the production of a number of the principal states and territories in the order of present production, with a statement of the increase during the decade from 1870 to 1880, with percentages.

States.	Rank.	PRODUCT IN BUSHELS.		INCREASE.	
		1880.	1870.	Bushels.	Percentage.
Michigan	1	12, 425, 885	3, 981, 316	8, 444, 569	212
New York	2	8, 748, 203	* 8, 715, 176	33, 027	....
West Virginia	3	2, 679, 438	4, 633, 750	1, 954, 312	† —42
Ohio	4	2, 650, 301	2, 898, 649	248, 348	† — 9
California	5	884, 743	174, 855	709, 888	406
Pennsylvania	6	851, 450	579, 970	271, 480	47
Utah	7	483, 800	1, 950	481, 850	24, 710
Virginia	8	425, 895	2, 063	423, 832	20, 544
Louisiana	9	312, 000	128, 000	184, 000	144
Kentucky	10	83, 000	64, 000	19, 000	30
Massachusetts	11	9, 575	22, 846	13, 271	† —58

* These figures are an average taken from the amounts reported by the New York state salt inspector for 1869 and 1870, as the figures of the Census Office are evidently incorrect.

† Decrease.

It is apparent that the greatest increase has been in Michigan, Utah, Virginia, and California. In New York the production did not materially increase, while in West Virginia, Massachusetts, and Ohio a large decrease is shown.

TABLE II.—COMPARATIVE STATEMENT OF THE SALT INDUSTRY ACCORDING TO THE CENSUS REPORTS OF 1880, 1870, AND 1860.

States.	Number of establishments.			Number of blocks or furnaces.			Number of vats or ponds.			Capital employed.			Wages paid.		
	1880.	1870.	1860.	1880.	1870.	1860.*	1880.	1870.	1860.*	1880.	1870.	1860.	1880.	1870.	1860.
The United States	268	282	399	308	402	....	47, 462	24, 525	....	$8, 225, 740	$6, 561, 615	$3, 692, 215	$1, 260, 023	$1, 146, 910	$371, 954
California	25	8	2	2	......	....	203	[illegible]	....	375, 650	66, 500	800	50, 620	13, 400	5, 400
Kentucky	3	4	6	3	......	....	....	....	....	20, 500	16, 500	70, 000	8, 750	10, 070	14, 978
Massachusetts	5	9	13	.....	.....	....	456	2, 755	....	9, 000	27, 300	30, 525	1, 030	1, 875	5, 892
Michigan	86	65	1	103	76	....	3, 750	3, 461	....	2, 147, 209	1, 717, 500	100, 000	541, 852	331, 239	200
New York	69	93	296	134	147	....	42, 939	18, 106	....	2, 286, 081	1, 584, 211	2, 313, 590	274, 087	204, 226	24, 520
Ohio	25	40	28	26	131	....	....	....	....	832, 600	1, 085, 904	338, 700	105, 261	161, 420	91, 524
Pennsylvania	16	27	34	16	4	....	....	2	....	234, 500	171, 700	190, 800	52, 047	57, 980	64, 776
Utah	10	1	......	2	......	....	18	....	....	13, 400	650	....	20, 932	300	....
West Virginia (*a*)	16	20	14	20	......	....	....	64	....	1, 910, 500	1, 631, 300	523, 800	174, 446	290, 800	148, 464
Other states and territories.	13	15	5	2	44	....	96	129	....	396, 300	260, 050	124, 000	30, 998	75, 600	16, 200

States.	Total value of all materials used.			Bushels of salt produced.			Total value of salt produced.		
	1880.	1870.	1860.	1880.	1870.	1860.	1880.	1870.	1860.
The United States.	$2, 074, 049	$1, 760, 670	$1, 054, 980	29, 805, 298	17, 606, 105	12, 717, 198	$4, 829, 566	$4, 818, 229	$2, 289, 504
California	19, 495	....	....	884, 743	174, 855	44, 000	121, 650	48, 150	7, 100
Kentucky	9, 008	5, 520	7, 450	83, 000	64, 000	169, 665	21, 950	20, 920	41, 190
Massachusetts	20	250	1, 020	9, 575	22, 846	31, 525	3, 800	11, 550	9, 832
Michigan	1, 009, 733	410, 561	275	12, 425, 885	3, 981, 316	2, 360	2, 271, 913	1, 176, 811	600
New York	507, 020	494, 854	676, 301	8, 748, 203	†4, 977, 720	7, 521, 335	1, 107, 760	925, 709	1, 289, 511
Ohio	202, 543	352, 922	139, 627	2, 650, 301	2, 898, 649	1, 743, 200	363, 791	773, 492	276, 871
Pennsylvania	74, 047	83, 203	48, 603	851, 450	579, 970	1, 011, 800	177, 415	187, 312	196, 916
Utah	4, 000	240	....	483, 800	1, 950	....	60, 280	780	....
West Virginia (*a*)	231, 113	385, 255	166, 204	3, 105. 333	4, 635, 813	2, 076, 513	508, 047	1, 508, 855	410, 684
Other states and territories.	17, 070	27, 865	15, 500	563, 008	268, 986	116, 800	192, 960	164, 650	56, 800

* Not enumerated. † These figures are evidently incorrect, as the New York state salt inspector reported 8,662,237 bushels in 1869, and 8,748,115 bushels in 1870.

a Including Virginia, as follows:

Number of establishments.		Number of blocks or furnaces.		Number of vats or ponds.		Capital employed.		Wages paid.		Total value of all materials used.		Bushels of salt produced.		Total value of salt produced.	
1880.	1870.	1880.	1870.	1880.	1870.	1880.	1870.	1880.	1870.	1880.	1870.	1880.	1870.	1880.	1870.
1	2	4	....	....	....	$1,000,000	$300	$14, 219	....	$39, 000	$400	425, 895	2, 063	$127, 678	$1, 250

In 1860 the division of the state had not as yet been accomplished.

TABLE III.—ANALYSES OF BRINES AND ROCK-SALT IN THE UNITED STATES.

Date of analysis.	Locality.	Sodium chloride.	Calcium chloride	Magnesium chloride.	Bromides.	Iron carbonate.	Calcium sulphate.	Magnesium sulphate.	Other sulphates.	Other salts.	Total solids determined.	Analyst.
	BRINES.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	
July 5, 1862	Syracuse, New York	15. 3570	0. 0795	0. 1449	Traces.	0. 0029	0. 5747	......	......	......	16. 1590	Dr. C. A. Göessmann.
	Geddes, New York	15. 2027	0. 0795	0. 1449	......	0. 0012	0. 5747	......	......	......	16. 0030	Do.
	Salina, New York	14. 9443	0. 0827	0. 1316	......	0. 0021	0. 5873	......	......	......	15. 7480	Do.
	Liverpool, New York	14. 1483	0. 1037	0. 1336	......	0. 0010	0. 5234	......	......	......	14. 9100	Do.
April 11, 1860	Saginaw valley (first well), Michigan	17. 9120	2. 1420	1. 5220	......	0. 1050	0. 1160	......	......	0. 2200	22. 0170	Professor Douglass.
October, 1862	Banks, Bay county, Michigan	19. 8595	2. 9611	1. 2612	......	......	0. 0722	......	......	......	24. 1540	Dr. C. A. Göessmann.
	Port Austin, Huron county, Michigan	17. 6161	3. 1274	1. 5675	......	......	0. 0129	......	......	......	22. 3239	Do.
	East Tawas, Iosco county, Michigan	15. 6141	3. 4843	1. 2433	......	......	0. 0350	......	......	......	20. 3767	Do.
December, 1879	San Francisco bay, California	2. 3756	......	0. 3030	0. 0025	......	0. 1263	0. 1837	0. 0470	......	3. 0381	Fr. Gutzkow.
May, 1860	East Saginaw, Michigan	16. 8710	3. 2873	1. 7743	0. 0401	0. 0116	0. 0982	......	......	0 0745	22. 1570	Professor Chilton.
1860	Saltsburgh, Indiana county, Pennsylvania.	7. 1320	1. 5726	0. 3986	......	0. 0078	......	......	......	0. 0005	9. 1115	George J. Poepplein.
	Pittsburgh, Allegheny county, Pennsylvania.	2. 2756	0. 3900	0. 1344	......	......	......	......	......	......	2. 8000	G. H. Cook.
	Charleston, Kanawha county, West Virginia.	7. 3094	1. 5162	0. 3744	......	......	......	......	......	......	9. 2000	Do.
	Saltville, Smythe county, Virginia	25. 9750	......	......	......	......	0. 3221	0. 1029	......	......	26. 4000	Do.
	Great Salt Lake, Utah	11. 8628	......	1. 4909	......	......	0. 0858	......	1. 4684	0. 0862	14. 9941	Professor O. D. Allen.
	ROCK-SALT.											
1879	Wyoming, New York	93. 7400	0. 4130	0. 5560	......	......	1. 6960	......	......	*3. 2760	99. 6810	Dr. F. E. Engelhardt.
August, 1869	Petit Anse island, Iberia parish, Louisiana.	99. 6170	......	......	......	......	0. 3180	0. 0620	......	......	99. 9970	Joseph Jones, M. D.
	Saltville, Smythe county, Virginia	99. 5500	Trace.	......	......	......	......	......	......	0. 4500	100. 0000	C. B. Hayden.

* Insoluble matter.

TABLE IV.—ANALYSES OF COMMON SALT PREPARED FOR MARKET.

Date of analysis.	Kind of salt.	Locality.	Sodium chloride.	Calcium chloride.	Magnesium chloride.	Calcium sulphate.	Magnesium sulphate.	Other salts.	Moisture.	Authority.
			Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	
1854	Solar salt	Syracuse, New York	97. 3100	0. 0500	0. 0500	1. 0500	......	......	1. 5400	Professor Cook.
April 7, 1875	Factory-filled dairy (kettle process).	......do	97. 7598	......	0. 0591	1. 2272	0. 0769	0. 0564	0. 7880	Walz and Stillwell.
	......do	......do	98. 5242	0. 0473	0. 0346	0. 7217	......	0. 0264	0. 6280	Do.
(Published) 1876	First quality (kettle process)	East Saginaw, Michigan	95. 8422	0. 3564	0. 1408	0. 3165	......	......	3. 3441	Dr. C. A. Göessmann.
	First quality (pan process)	Bay City, Michigan	97. 2880	0. 3290	0. 3400	0. 6970	......	......	1. 3460	S. S. Garrigues, Ph. G.
	First quality (steam evaporation process)	East Saginaw, Michigan	94. 3660	1. 3650	0. 6940	0. 4780	......	......	3. 4780	Dr. H. C. Hahn.
	Solar	Zilwaukee, Saginaw county, Michigan.	96. 4700	0. 7430	0. 4170	0. 1730	......	......	2. 1970	Do.
1861	Fine (steam evaporation process).	Hocking Valley, Ohio	93. 2600	1. 4300	0. 7000	......	......	0. 0100	4. 6000	Dr. C. A. Göessmann.
	......do	Mason City, West Virginia	95. 7700	0. 6100	0. 0400	......	......	0. 1100	3. 4700	Do.
	First quality (steam evaporation process).	Charleston, Kanawha county, West Virginia.	91. 3100	1. 2600	0. 4300	......	......	......	7. 0000	J. P. Hale, M. D.
	......do	do	96. 3800	0. 2200	......	......	......	......	3. 4000	Do.
	First quality (kettle process)	Saltville, Smythe county, Virginia.	99. 1100	......	......	0. 6800	0. 1100	......	0. 1000	George W. Palmer.
April 16, 1874	Solar (from bay water)	Mount Eden, Alameda county, California.	98. 4350	......	......	......	*0. 3650	......	1. 2000	Falkeman and Reese.
March 14, 1879	......do	......do	99. 4400	Not given.			......	......	......	Prof. Thomas Price.
January 26, 1881	Ground rock	Petit Anse, Iberia parish, Louisiana.	99. 8800	Trace.	......	0. 1260	......	......	......	Prof. E. W. Hilgard.

* Sulphates of lime and magnesia.

Considerable difficulty has been experienced in the collection of the salt statistics, owing to a difference in nomenclature as well as in methods of manufacture in the various salt-producing sections. Two instruments are in use for the determination of density: the salometer in Michigan and New York, and Baumé's hydrometer in California, Ohio, Pennsylvania, and West Virginia, 1° of the former being equal to 0.26° Baumé, or, conversely, 1° Baumé is about equivalent to 4° salometer. The division of this salometer is based on the capacity of water for holding salt in solution, zero representing pure water (at 60° F.), and 100° water saturated with salt. In this report the strength of brine is indicated by this salometer, whose degrees are readily convertible into the Baumé scale through division by four.

The accompanying map represents graphically the location of the industry, processes employed, and the relative production of the various sections engaged in the manufacture, as well as the source of the brine supply.

Table III gives a statement of the composition of the best known brines; Table IV gives analyses of the manufactured product. These analyses are believed to be representative, though not complete; only two giving the percentage of bromides. They have been collated from various sources, and are of value to show not only the purity of the brines, but also as far as possible the other salts contained in the bitterns. These are utilized to some extent for the manufacture of epsom salts in Massachusetts, bromine in Pennsylvania, West Virginia, Ohio, and Michigan, and magnesium carbonate in California.

The consumption of salt in the United States during the year 1880 is estimated at 48,000,000 bushels, while the production was 29,805,298 bushels.

In the eastern states the industry has suffered from two causes, which have combined to limit the market to a smaller circuit: First, Liverpool salt, brought as ballast, has practically controlled the market on the seaboard; and, second, in the western market, where large quantities of salt are used for meat-packing, the low prices of Michigan salt have defied competition.

The latter portion of Table I gives the statistics of the production of ground or refined salt. For dairy purposes many dairymen have given the preference to certain brands of English refined salt, but several makers in this country now produce an equally pure article.

By this report it is intended to refer to processes in use only so far as is necessary to show the different conditions of advantage and disadvantage under which the various sections are placed. In the consideration of this industry in detail the several salt-producing sections are given in alphabetical order.

CALIFORNIA.

The history of the salt industry in California is of quite recent date, as will be seen by Table II, only two establishments having been enumerated in 1860. During the ten years previous to 1880 the production increased over 400 per cent., from 174,855 bushels in 1870 to 884,743 bushels in 1880. All but a small fraction of this is made from surface brines, the greater portion from the water of San Francisco bay.

On the east side of San Francisco bay, in Alameda county, twenty companies were in operation during the census year, and produced 849,193 bushels by solar evaporation from the bay water. The manufacturer here enjoys advantages not possessed by the eastern states, which enable him to produce salt from a weak brine and compete advantageously, both in quality and in price, with the Liverpool salt, which is largely imported in ballast. These advantages, briefly enumerated, are: First, a long dry season of six or eight months, during which little or no rain falls, thus avoiding the expense and trouble of covering the brines in wet weather, as no loss of time is incurred during the process; second, a constant wind, that furnishes power for the moving of the brines and assists in the evaporation; third, as this wind blows across the bay, no dust is conveyed or deposited that might render the salt impure.

In the largest and most complete works in Alameda county the bay water is admitted at high tide through flood-gates into a large pond formed on the surface of the ground by earth-dikes, where the evaporation commences, and is continued through a series of five similar ponds of decreasing size. The water is moved from pond to pond by means of paddles moved by wind-power, until it enters the sixth, where it has attained a strength of 100° salometer and all the sulphate of lime has been deposited. The first five ponds are clay-bottomed; the sixth and seventh, in which the salt is crystallized, are floored with wood. The bittern is drawn off from the crystallizing ponds when it reaches a strength of 114° salometer, the treatment in utilization of the magnesia contained in the bitterns being to produce carbonate of magnesia, a salable article.

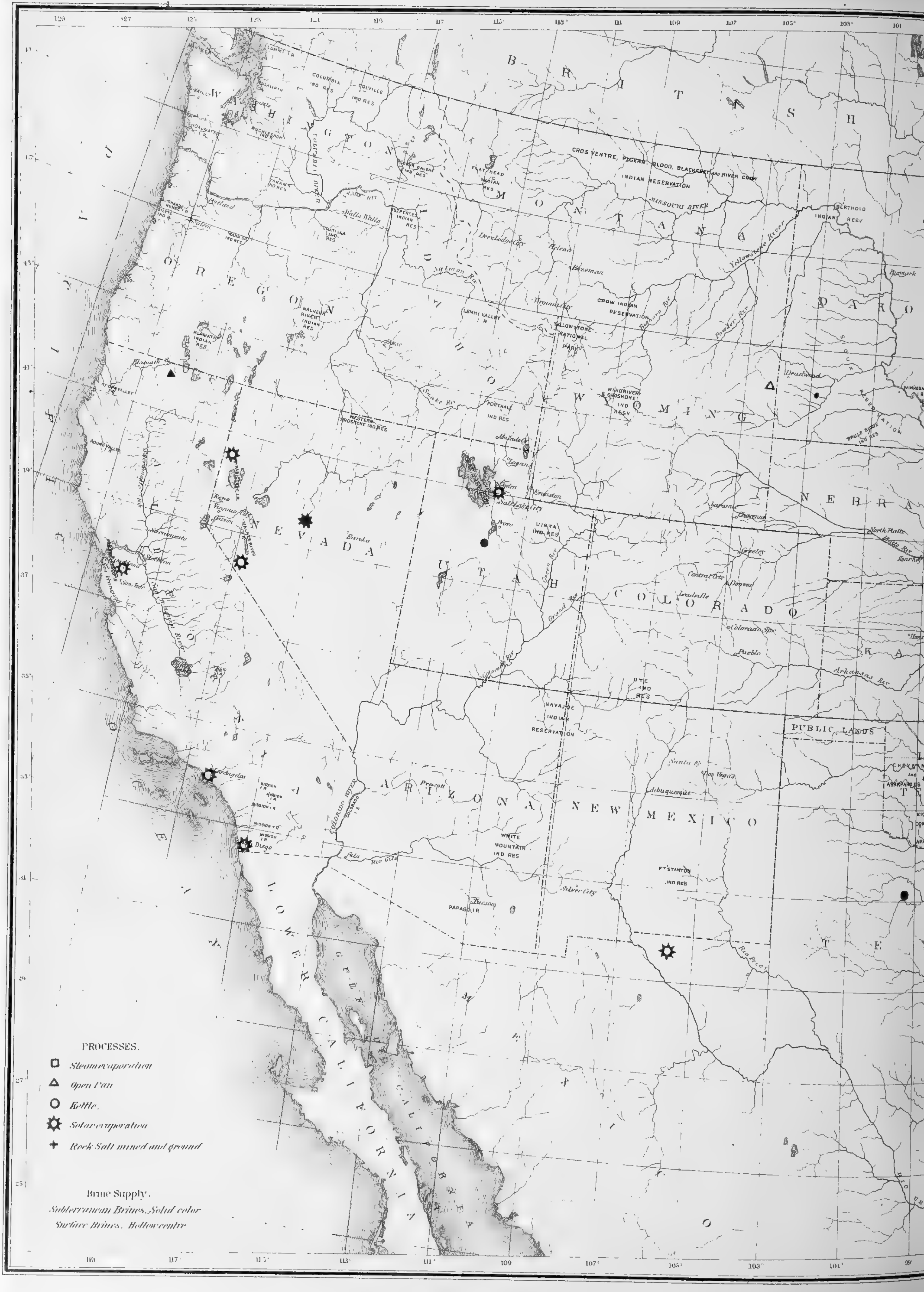
An analysis of the bittern, made by Fr. Gutzkow, in December, 1879, gave:

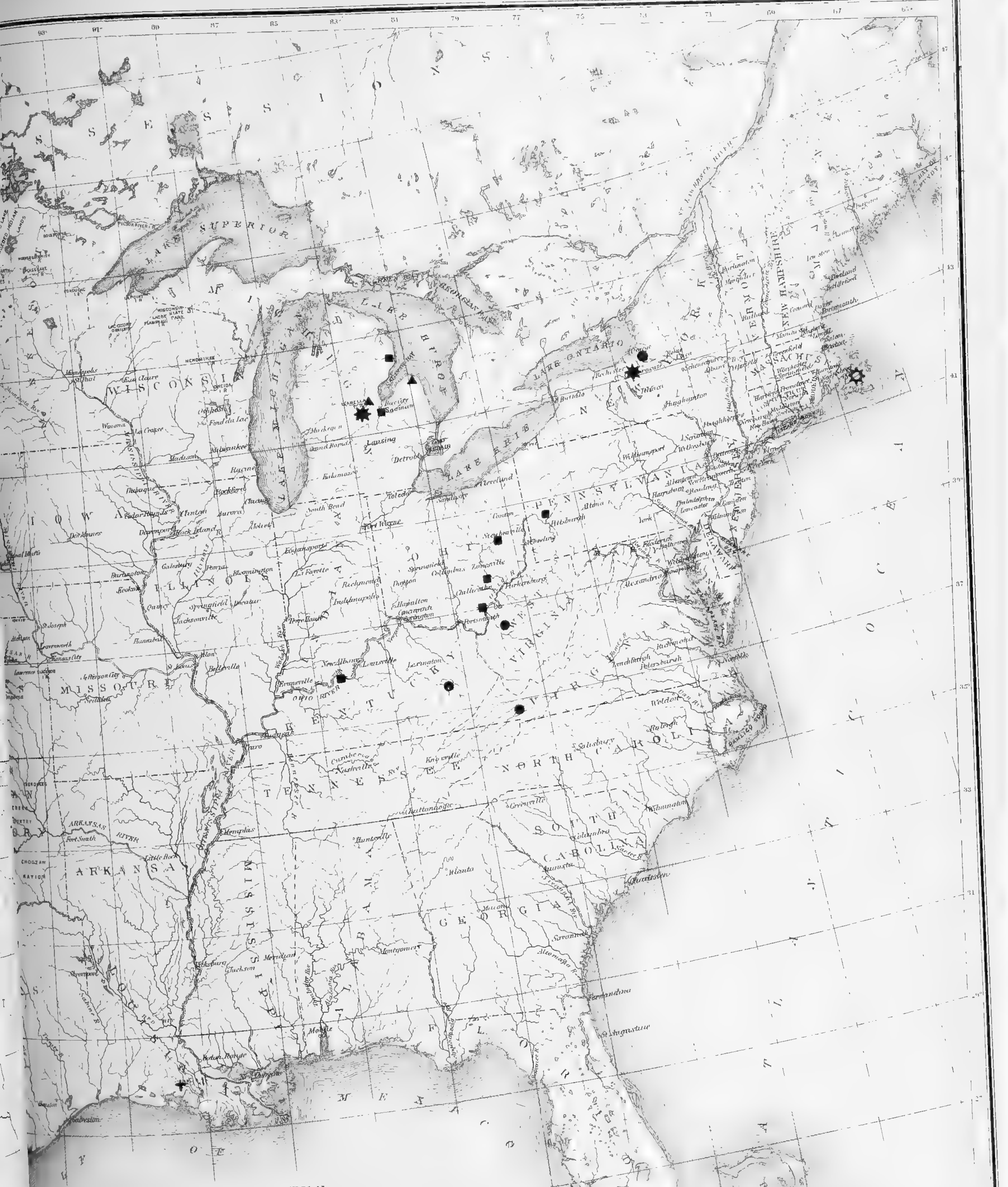
[Temperature of sample, 65° F.; strength of sample, 112° salometer.]

	Per cent. of solids.
$NaCl$	16.5969
$MgCl_2$	10.8569
K_2SO_4	1.4533
$MgSO_4$	5,5389
$MgBr_2$	0.1090
	34.5550

Salt is made in a similar way in San Diego and Los Angeles counties, but in the latter county the brine is taken from a salt lake about 700 feet from the beach, and covering an area of 14 acres, with a depth of about 2½ feet. Previous to 1860 the salt crystallized naturally in the lake, but fresh-water springs entering, it has been necessary to pump the brine into receptacles. At first the salt was made in kettles, with "brew" (natural asphalt) for fuel, but this process has been replaced by solar evaporation in clay-bottomed ponds.

It must be admitted that some of the salt made on the coast by this process is of very inferior quality; but this is owing to carelessness and ignorance on the part of some of the makers, and would, no doubt, be avoided if a system of inspection were adopted and enforced either by the state or by an association of manufacturers.


PROCESSES.
□ Steam evaporation
△ Open Pan
○ Kettle.
✹ Solar evaporation
+ Rock Salt mined and ground
Brine Supply.
Subterranean Brines..Solid color
Surface Brines. Hollow centre
BRITISH
WASHINGTON
OREGON
IDAHO
MONTANA
WYOMING
DAKOTA
NEBRASKA
NEVADA
CALIFORNIA
UTAH
COLORADO
ARIZONA
NEW MEXICO
LOWER CALIFORNIA
GULF OF CALIFORNIA
MEXICO
PACIFIC OCEAN
PUBLIC LANDS
Salt Lake City
Ogden
Provo
San Francisco
Los Angeles
San Diego
Eureka
Santa Fe
Albuquerque
Denver
Cheyenne
Helena
Yellowstone National Park
Missouri River
Yellowstone River
Colorado River
Rio Grande
Rio Pecos



MAP OF THE
UNITED STATES
SHOWING THE LOCATION OF THE
SALT INDUSTRY
TOGETHER WITH THE PROCESSES EMPLOYED, SOURCE OF BRINE SUPPLY
AND APPROXIMATE PRODUCTION DURING THE CENSUS YEAR 1880
PREPARED UNDER THE DIRECTION OF
W. L. ROWLAND, EXPERT AND SPECIAL AGENT

A. Hoen & Co. Lith. Baltimore

Siskiyou county is the only locality on this coast where salt is produced from subterranean brines. On the river, about six miles from Yreka, is a flowing well, 675 feet deep, capable of producing 10,600 gallons of brine per hour. It is accompanied by a continual flow of gas, which, when lighted, produces a yellow flame 30 inches in diameter and 5 feet in height. The brine in this well is very weak, and is concentrated by means of brush ricks before heating.

KENTUCKY.

The number of establishments producing salt in this state has decreased from six in 1860, with a production of 169,665 bushels, to three in 1880, with a production of 83,000 bushels. This decrease is mainly due to Michigan competition in the western markets and foreign competition on the sea-coast, which has limited the market to the local demand. In Clay and Breathitt counties the kettle process is in use, but in Meade county salt is made in furnaces similar to those employed in the Ohio River district, with the exception that natural gas is used for fuel.

LOUISIANA.

One of the most interesting salt deposits in America is situated on the island of Petit Anse, Iberia parish, Louisiana. This consists of a bed of superior salt, underlying a rolling section of country, with elevations varying from tide-level to 180 feet above. The deposit seems to follow the contour of the surface, but is mainly below the level of mean tide, and consists, so far as known, of a solid bed without flaw or fissure. The rock is composed of an aggregation of cubes, one-eighth to one-quarter of an inch in diameter, and weighs 125 pounds per cubic foot. The general appearance of the mine is similar to a tunnel driven through granite. So far as known at present, this deposit extends over about 140 acres, and is of unknown thickness. The shaft is now 100 feet in depth, of which 75 feet is solid salt. It seems strange that no effort has been made to ascertain the depth, but the manager says "a little calculation will show there is no need of it, as a known depth of 75 feet over an area of 140 acres will supply any possible demand for many years to come, and it would, therefore, be a mere matter of curiosity". The mine and plantation on which it is situated are now owned by the third generation of Averys who have lived on this island.

Salt-springs or licks were known to occur on the place as early as 1790, and in 1812 Mr. Avery, the grandfather of the present owners, boiled salt from these springs to supply the plantation and neighboring country. The return of peace with England, however, again permitted the importation of salt at rates with which these rude attempts could not compete, and salt manufacture ceased and became a mere tradition until the civil war of 1860, when supplies were again cut off, and Judge Avery resumed the work of his father. Batteries of sugar-kettles, and such plant as could be improvised from appliances in the neighborhood, were used, and the manufacture from the brine was pushed as far as appliances would admit.

Early in 1862 the brine supply became insufficient, and, upon sinking a new well, at a depth of 16 feet the workmen struck what they supposed to be a log or stone, but upon examination the supposed stone proved to be solid salt. Upon a more thorough investigation the probable extent of the deposit was established, and a report made to the confederate government at Richmond that resulted in the establishment of a post-office on the island, the building of a causeway, and consequently a more systematic method of working. At the point where the salt was first discovered it was but a few feet under the surface (only 11 feet in some places), and was therefore quarried like building-stone. In this way a very large amount was taken out and distributed over the South during the following year; but in 1863 the quarries were destroyed and the operations stopped by a federal expedition sent out for that purpose.

At the close of the war a company was formed, a shaft was sunk, headings were driven some 350 feet, and hoisting and grinding machinery was erected; but the venture did not prove a financial success, and was abandoned. In 1879 a second company undertook the work, but it was again abandoned. It is now in the hands of a company of New York capitalists. A canal is being opened from the island to the Gulf, which will furnish direct water communication with a market, and new and approved forms of machinery for crushing and grinding the salt have been adopted.

Analyses of this salt are given in Table III.

MASSACHUSETTS.

This is the only state on the Atlantic coast that still manufactures salt from sea-water. When operations were first begun in the early part of this century salt sold readily for $1 per bushel at the works, and lumber for the construction of vats and covers was less than half its present value. These combined advantages served to make it a profitable business at the time, but with the reduction in the value of salt and the increased cost of lumber the business has become unprofitable, and is fast dying out. The remaining works are now kept up by taking down old works to repair those in operation, but as soon as this make-shift is exhausted the business will undoubtedly cease.

MICHIGAN.

The existence of salt-springs in Michigan has been recognized from the earliest settlement of the state, and it was known that the Indians previously supplied themselves with salt from certain springs. In 1837, when Michigan was admitted to the Union, a state geologist was appointed, Dr. Douglas Houghton, who, in his report the following year, said he regarded it important to examine the salt-springs, to select them for state purposes, and directed his investigation to that end during the following year, but with only partial success. Upon the death of Dr. Houghton other investigators continued the work, and became satisfied of the existence of strong brines in the state, which has been practically demonstrated by the deep borings now made.

The first practical attempt at salt-boring was made in Grand Rapids in 1859, and a well was sunk to a depth of 257 feet, but only a weak brine was obtained. In March, 1860, a well 636 feet deep was completed by the Saginaw Salt Manufacturing Company, and the manufacture began in July of the same year. The following represents the strength of brine found at various depths:

	Degrees salometer.
At 90 feet	1
102 feet	2
211 feet	10
212 feet	14
487 feet	26
516 feet	40
531 feet	44
559 feet	60
569 feet	64
606 feet	86
636 feet	90

Within the past ten years the production of salt in Michigan has increased from 3,981,316 bushels in 1870 to over 12,425,885 bushels in 1880. This has been due to a variety of causes, which have allowed the manufacturers to produce at small cost, and thereby undersell salt from other sections, and for some purposes to supply the entire western market. In the first place, the brines are more highly saturated than in any other section, especially in Bay and Midland counties, where many of them are completely saturated, and register 100° salometer, or even more, owing to the presence of other soluble salts. Further than this, the item of fuel is merely nominal, as the works are generally run in connection with saw-mills, and the exhaust steam is used for the evaporation of the brine. Even where this plan is not pursued fuel is cheap, wood from the saw-mills being purchased for about 50 cents per cord. Convenient transportation to market is another advantage possessed by this section, owing to its situation on the shores of the great lake system.

The following table exhibits the statistics of production in the several counties of the state:

Counties.	No. of establishments.	Capital.	Greatest number of hands employed at any one time during the year.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	SUBTERRANEAN BRINES.			BY ARTIFICIAL HEAT.								
											Machines.								
				Males above 16 years.	Females above 15 years.	Children and youths.		Number of wells.	Average depth of wells in feet.	Average strength of brine (degrees salometer) 4° salometer=1° Baumé.	Number of blocks.	Number of kettles.	Aggregate capacity in gallons.	Number of pans.	Aggregate capacity in gallons.	Number of settlers.	Aggregate capacity in gallons.	Number of grainers.	Aggregate capacity in gallons.
The State	86	$2,147,209	1,546	1,416	....	52	$541,852	209	877	92.4	103	174	21,352	54	231,257	237	6,160,246	355	3,295,527
Bay	28	926,000	569	531	....	21	244,860	89	967	96.0	33	......	....	2	5,984	73	2,048,274	157	1,538,313
Huron	6	171,800	215	178	....	5	64,400	13	1,013	86.4	9	......	....	25	60,184	49	864,752	9	44,433
Iosco	4	100,000	86	76	....	10	35,210	12	979	88.0	4	......	....	....	....	18	691,342	23	356,121
Midland	1	20,000	15	15	....	....	6,750	1	1,300	110.0	1	......	....	....	....	6	205,371	4	48,829
Saginaw	47	929,409	661	616	....	16	190,632	94	789	91.0	56	174	21,352	27	165,089	91	2,350,507	162	1,307,831

Counties.	BY ARTIFICIAL HEAT—continued.				BY SOLAR EVAPORATION.			PRODUCT.			
	Materials.				Machines.			If inspected.		Number of bushels salt.	Value.
	Number of cords wood.	Value.	Value of all other materials.	Total value of all materials.	Number of vats.	Aggregate area in square feet.	Total value of all materials.	Number of barrels (grade No. 1).	Number of barrels (grade No. 2).		
The State	524,655	$377,939	$629,294	$1,007,233	3,750	867,180	$2,500	2,449,005	36,172	12,425,885	$2,271,913
Bay	211,692	126,283	276,975	403,258	500	19,680	2,500	994,439	7,342	5,008,905	936,473
Huron	47,820	47,820	58,200	106,020	....	....	....	238,417	5,583	1,220,000	227,299
Iosco	34,643	16,321	31,700	48,021	....	....	....	152,500	7,500	800,000	146,960
Midland	8,000	8,000	8,000	16,000	....	....	....	25,060	5,610	153,350	25,901
Saginaw	222,500	179,515	254,419	433,934	3,250	847,500	....	1,038,589	10,137	5,243,630	935,280

Since the census year the production has steadily increased,[a] the leading process employed being steam evaporation in grainers. The brine is settled cold, then admitted directly into the grainers, and evaporated by means of steam passing through galvanized-iron pipes. A considerable quantity of salt, especially in Huron county, is made by the pan process, by which the brine is evaporated in rectangular pans by direct firing. The kettle process was formerly used to a considerable extent, but is now almost entirely superseded by those above mentioned. Only three kettle-blocks were in operation during the census year. A small amount of salt was made by solar evaporation, three establishments working during that time.

As early as the year 1865 a system of inspection was adopted by a number of manufacturers; but as it was not general, a considerable quantity of inferior salt was put on the market, which served to injure the reputation of Michigan salt. In 1869, through the efforts of the Saginaw and Bay Salt Association, the state legislature passed an "act to regulate the manufacture and provide for the inspection of salt". Since that time it has been the duty of the inspector and his deputies to examine all salt prepared for market and brand it according to quality. A non-compliance with the terms of this act by the manufacturer is punishable by fine. This system of inspection has been followed to the present time, and has done much to raise the quality of the salt. The first-quality salt is divided into three grades: "fine," "packers," and "solar" salt, and is packed for shipment in barrels of 280 pounds, marked and branded according to law.

The brine in this state is noteworthy for its great strength, and therefore the small amount of sulphate of lime present. An examination of Table III shows the general composition of the brines. The variation in the depth of the wells and in strength of brine in the various counties is as follows:

	Depth of wells (feet).	Strength of brine (degrees).
Bay county	738 to 1,050	90 to 100
Huron county	550 to 1,800	80 to 90
Iosco county	900 to 1,050	83 to 92
Manistee county[b]	1,964	Rock-salt, 93 per cent. pure.
Midland county	1,300	110
Saginaw county	675 to 1,014	84 to 98

In obtaining the statistics of Michigan production it has been impossible to represent the actual amount of fuel used in the manufacture of salt, owing to the joint use of steam for the salt-blocks and saw-mills.

From present indications it appears that Michigan will hold first place in the salt production of the country for some time to come, or until her forests are exhausted and the strength of the brine weakened by the constant drain.

NEVADA.

Owing to the adoption of the chlorination process in the treatment of ores of the precious metals in the western states and territories a demand has been created that has caused the utilization of some of the salt deposits and brines so frequently occurring in these sections. This is particularly the case in Nevada, where, it will be seen, by an examination of Table I, there were seven establishments in operation during the census year, producing 182,408 bushels of salt, mainly used in this process, and of this amount 108,033 bushels were raised directly from natural deposits on the surface during the dry season. Through the section of country included between the eastern slope of the Rocky mountains and the Sierra Nevada are many ponds and lakes whose waters are more or less highly saturated with salt. During the dry season the water in many of these evaporates, leaving a more or less pure deposit which simply requires to be gathered for use. This is the source of the greater portion of the salt produced in Nevada, though three establishments evaporate a surface brine in prepared receptacles by the aid of solar heat. One establishment secures its brine by sinking a large number of wells to a depth of 30 feet; the remainder work with surface brines or deposits.

NEW YORK.

Before the settlement of this country the Indians were accustomed to obtain salt from the salt-springs surrounding Onondaga lake, and the few white settlers in the neighborhood supplied themselves by boiling down the brine in kettles suspended over the fire by means of crotched sticks. The attention of the state having been called to the importance of these springs, in 1788 a treaty was entered into with the Onondaga tribe of Indians, by which the state agreed to care for the property for the mutual benefit of both whites and Indians; but the Indians became dissatisfied with the treaty, and in 1795 another treaty was made, by which the Onondaga Salt-Springs reservation was absolutely ceded to the state in consideration of a cash payment of $1,000 and the annual royalties of $700 and 150 bushels of salt. The area of the reservation is about 10 square miles, and includes the city of Syracuse, the town of Geddes, nearly all the town of Salina, and the whole of Onondaga lake. By this treaty the state is bound to hold and work the property forever.

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[a] By the report of the state salt inspector the production for the year ending November 30, 1881, is given as 13,751,495 bushels.

[b] Since the census year well-boring has begun on the western shore of Michigan, in Manistee county, and by January 1, 1882, one well was completed and four others were being sunk. At a depth of 1,964 feet the first well reached a bed of rock salt 32 feet in thickness.

Nothing was done by the state until 1797, when the property was surveyed, a superintendent appointed, and a duty of 4 cents a bushel collected by the state; the brine was raised by private individuals, and the state only stepped in to say that when a manufacturer had obtained all the water he wished, his neighbor should be allowed to take the surplus, if needed. In 1817 the duty was raised to 12½ cents a bushel, in order to aid in the payment for the canal connecting lake Erie with the Hudson river, and remained the same until 1833, when it was reduced to 6 cents, though for the last three years of that period a rebate was allowed which removed the entire duty and assisted toward the payment of the canal tolls. In 1846 the duty was modified to 1 cent per bushel, which has remained to the present day. In return for this duty the state sinks wells, raises water, and furnishes it to the manufacturer, and also inspects and weighs the salt.

Originally the Onondaga salt-springs were true springs, flowing over the surface; but, as the consumption of brine has increased, it has been necessary to sink wells, until now a depth of over 400 feet has been necessary in many wells to obtain a good supply of water. During the census year there were forty-two wells on the reservation, varying in depth and strength of brine in the four districts as follows:

	Depth of wells (feet).	Strength of brine (degrees).
Syracuse	250 to 330	52 to 74
Geddes	336 to 412	72 to 76
Liverpool	362 to 419	74 to 76
Salina	187 to 312	52 to 76

This, however, gives the strength of brines at a particular time during that period. The average strength of brine (at 60° F.) reported for the years 1879 and 1880 by Dr. Engelhardt is given as:

	1879. Degrees.	1880. Degrees.
Syracuse	66.61	66.13
Geddes	67.16	67.55
Liverpool	67.47	67.10
Salina	67.47	67.10

The following table gives the statistics of salt manufactured in the four districts of Onondaga county:

Districts.	Number of establishments.	Capital.	Greatest number of hands employed at any one time during the year.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	SUBTERRANEAN BRINES.			BY ARTIFICIAL HEAT.				
											Machines.				
				Males above 16 years.	Females above 15 years.	Children and youths.		Number of wells.	Average depth of wells in feet.	Average strength of brine (degrees salometer) 1° Baumé = 4° salometer.	Number of blocks.	Number of kettles.	Aggregate capacity in gallons.	Number of settlers.	Aggregate capacity in gallons.
Total	69	$2,286,081	1,040	962	11	39	274,087	42	319	70.4	134	8,347	1,086,540	269	10,331,931
Geddes	16	756,000	264	245	......	14	88,049	10	376	74.3	25	2,091	250,250	40	1,387,700
Liverpool	12	423,500	192	187	......	2	45,728	6	385	75.0	24	1,682	202,950	52	2,800,656
Salina	23	662,150	347	313	8	23	85,735	9	202	69.9	61	3,482	442,940	121	4,338,217
Syracuse	18	444,431	237	217	3	......	54,575	17	299	64.4	24	1,092	190,400	56	1,805,358

Districts.	BY ARTIFICIAL HEAT—continued.				BY SOLAR EVAPORATION.			PRODUCT.			
	Materials.				Machines.			If inspected.			
	Number of tons coal.	Value.	Value of all other materials.	Total value of all materials.	Number of vats.	Aggregate area in square feet.	Total value of all materials.	Number of barrels (grade No. 1).	Number of barrels (grade No. 2).	No. of bushels salt.	Value.
Total	136,843	$240,112	$233,004	$473,116	42,939	12,068,796	$33,904	933,068	3,916	8,748,203	$1,107,760
Geddes	38,925	69,455	41,860	111,315	14,132	4,077,136	13,541	186,044	....	2,689,159	307,438
Liverpool	19,332	28,809	39,103	67,912	9,045	2,572,960	5,261	161,495	240	1,383,918	174,135
Salina	52,420	92,576	108,232	200,808	10,726	2,816,332	4,057	392,375	3,549	2,953,013	410,773
Syracuse	26,166	49,272	43,809	93,081	9,036	2,602,368	11,045	193,154	127	1,722,113	215,414

The industry in this state during the past ten years has been very much depressed, owing to domestic as well as foreign competition. In New York city Syracuse salt met with foreign competition, and if a market was sought in the West or South it met with the competition of Michigan salt, made and sold at prices unremunerative to the Syracuse manufacturer. This depression reached its lowest ebb in 1876, when less than 5,500,000 bushels were sold. A considerable improvement has taken place since that time, and many salt-blocks that were abandoned have again resumed.

There are three hundred and sixteen "water-rights" on the reservation, but during the census year only one hundred and thirty-four were in operation. (*a*)

The principal impurity in the brines, as will be seen by an examination of Table III, is sulphate of lime, which causes the kettle process to be employed to this day. But two processes are in use: the evaporation by solar heat and the kettle process; the former producing a very coarse salt, highly valued for meat-packing, etc., while the latter produces a fine salt, which, when purified, is excellent for table and for dairy purposes.

A deposit of rock-salt was discovered in 1878 about a mile from the village of Wyoming and about 40 miles southwest of Rochester, in New York state. Upon sinking a well for oil, at a depth of 1,300 feet a solid bed of rock-salt was discovered, about 70 feet in thickness, and preparations have been made to make salt from the brine produced by admitting fresh water to the salt deposit. An analysis of the rock-salt is given in Table III. The extent of the deposit is not known, and to determine it will require a series of borings. It is intended to employ the pan process at this place.

OHIO AND WEST VIRGINIA.

The manufacture of salt in these states is so intimately associated that it will be advisable to consider them as forming a common group, and take up the consideration of the several salt-producing sections, divided according to location, as follows:

District No. 1, Hocking valley, Athens county, Ohio.
District No. 2, Muskingum valley, Morgan and Muskingum counties, Ohio.
District No. 3, Tuscarawas valley, Columbiana, Guernsey, and Tuscarawas counties, Ohio.
District No. 4, Ohio River valley, Meigs county, Ohio, and Mason county, West Virginia.
District No. 5, Kanawha valley, Kanawha county, West Virginia.

The first salt made by the whites in Ohio was on the Scioto river, as early as 1794, at which time all salt was carried by pack-mules over the mountains and sold for from $6 to $10 per bushel. The production at the Scioto salt-works increased until 1808, when 20,000 bushels were made, and sold for $3 a bushel. Stronger brines were discovered elsewhere, and the manufacture ceased at this place.

The following table exhibits the statistics of the several districts in Ohio and West Virginia:

Districts.	Number of establishments.	Capital.	Greatest number of hands employed at any one time during the year.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total amount paid in wages during the year.	SUBTERRANEAN BRINES.			BY ARTIFICIAL HEAT.								
														Machines.					
				Males above 16 years.	Females above 15 years.	Children and youths.		Number of wells.	Average depth of wells in feet.	Average strength of brine (degrees salometer) 4° salometer=1° Baumé.	Number of blocks.	Number of kettles.	Aggregate capacity in gallons.	Number of pans.	Aggregate capacity in gallons.	Number of settlers.	Aggregate capacity in gallons.	Number of grainers.	Aggregate capacity in gallons.
Total	40	$1, 743, 100	1, 328	1, 151	2	36	$265, 488	115	956	36. 5	42	291	22, 265	973	366, 220	130	2, 778, 547	138	1, 695, 393
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Districts.	BY ARTIFICIAL HEAT—continued.						PRODUCT.	
	Materials.							
	Number of tons coal.	Value.	Number of cords wood.	Value.	Value of all other materials.	Total value of all materials.	Number of bushels salt.	Value.
Total	257, 480	$212, 222	369	$562	$181, 872	$394, 656	5, 329, 739	$744, 160
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Ohio River valley	180, 311	152, 634	269	462	119, 122	272, 218	3, 986, 147	525, 066
Kanawha valley	34, 590	24, 784	....	....	27, 930	52, 714	662, 249	91, 140

In the Hocking and Muskingum Valley districts the kettle process is chiefly used. In the Muskingum valley a considerable amount of salt was formerly made, but owing to weakening of the brine, as well as to some other embarrassments common to this section, the production has decreased to a small amount.

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[a] By the report of the state salt inspector, 7,917,236 bushels were inspected during the year ending December 31, 1881.

The point of greatest production in these states is district No. 4—Ohio River valley. The works are situated on both sides of the Ohio river, at and near Pomeroy, Ohio. The first salt made in this district was on the West Virginia side, in 1849, from a well 700 feet deep, which was followed in 1851 by borings on the Ohio side and the subsequent manufacture of salt. The process now employed is a combination of the pan- and steam-evaporation processes, by which the brine is first heated in closed pans and the steam from these is conducted through copper pipes placed in the grainers. The pans differ from those used in Michigan and Pennsylvania, being of cast-iron, made in sections, with rounded bottom.

Fifth district.—The Kanawha valley is located in the neighborhood of Charleston, Kanawha county, West Virginia. This section was known and found available for the manufacture of salt by the Indians, and occasionally by white settlers, in colonial times, but the preparation of salt for market was not begun until 1797, when a kettle-block was erected, with a production of about 150 pounds of impure salt per day, which sold for from 8 to 10 cents per pound. This salt was made from brines at the surface, but in 1808 a well was sunk by another party to a depth of 58 feet, which furnished a stronger and more constant supply of brine; another kettle-block was erected, and the price fell to 4 cents per pound. The success of these parties induced others to sink wells, and already, by 1817, there were some thirty establishments in operation, producing over 600,000 bushels of salt. In this year the discovery of coal in the neighborhood gave a new impetus to the industry, and it shortly became the only fuel used. In these wells petroleum and natural gas occur, especially in the deeper borings. A few manufacturers at various times have employed the gas to lift the brines and furnish fuel for evaporation, but the liability of the flow of gas to cease has prevented its systematic employment as fuel.

Until the year 1835 the kettle process was alone used by the Kanawha salt-makers, but at that time a furnace was built of the same pattern employed in the Ohio River district, consisting, as stated, of a combination of the pan- and steam-evaporation processes; and this furnace gradually replaced the kettle-block, until the latter was entirely abandoned.

No solar salt is made in Ohio or West Virginia. The salt is packed for the market in barrels of two sizes: for general use, in barrels of 280 pounds, and for the meat-packing trade, in barrels of 350 pounds. Analyses of the salt are given in Table IV.

The principal impurities in the brines of this section are the chlorides of lime and of magnesia. Analyses of the brines are given in Table III.

An analysis of the bittern, furnished by Dr. J. P. Hale, gave the following result:

	Per cent.
Sodium chloride	26.63
Calcium chloride	57.55
Magnesium chloride	15.82
	100.00

The extreme variations in the depth of wells and strength of brines in the several districts of Ohio and West Virginia are as follows:

	Depth of wells (feet).	Strength of brines (degrees salometer).
District No. 1	562 to 670	40
District No. 2	490 to 900	26 to 40
District No. 3	900	40
District No. 4	1,000 to 1,350	30 to 40
District No. 5	900 to 1,000	28 to 48

The brines of these states contain a considerable percentage of bromides, and the bitterns resulting from the manufacture of salt have been largely worked for bromine. Further reference to this, together with analyses of the bitterns, is given in the article on "Bromine", page 21, of this report.

Recent analyses by Professor J. W. Mallett show the occurrence of iodides in these bitterns, but as yet no attempt has been made to utilize them. The following table gives the quantities of iodine found in four samples of bitterns:

Sample taken from—	Specific gravity at 15° centigrade.	Grains of iodine to the gallon.
	Per cent.	*Per cent.*
Snow Hill furnace	1.305	4.14
Daniel Boone furnace	1.270	2.80
Newcastle furnace	1.300	3.65
Hartford City furnace	1.285	2.69

Since the discovery of the strong Michigan brines and their subsequent working the production of salt in Ohio and in West Virginia has steadily declined, as manufacturers are unable to compete in the western market with the cheap Michigan product, and in the southern and eastern market with the imported article. The cost of manufacture is considerably more in Ohio and in West Virginia than in Michigan, owing to the weaker brines and the necessity of using fuel solely for the production of salt. To be sure, coal outcrops at their very doors and cheap transportation is available, but these facilities do not enable them to compete with the Michigan manufacturer, who also has cheap transportation, as well as saturated brines and merely nominal cost of fuel. For these reasons the industry in these states has been gradually decreasing; furnaces have been abandoned and left to decay, while those in operation have only worked a part of the time, and from the present outlook these will, of necessity, be closed at no distant day, and the manufacture of salt in this district may become extinct, or only produce sufficient to supply a local demand.

PENNSYLVANIA.

The first salt-works in western Pennsylvania were erected in Westmoreland county about the year 1800, and salt was made from a weak brine, testing 16° salometer. As usual at this early date, the kettle process was employed, but this has been entirely superseded by a combination of the pan- and steam-evaporation process, similar to the one in use in Ohio and West Virginia, but differing in some practical details.

One of the newest plans, and apparently one of the most complete processes, is in use in Allegheny county. The brine, of a strength of 32° salometer, is obtained from a flowing well, which delivers it directly into the outside wooden settler or storage reservoir, from which it is pumped into an upright cylindrical boiler, where it settles while hot, and slowly concentrates to 48° by steam from the pans. It is then admitted into a series of three horizontal cylindrical boilers, where it is still further concentrated, the steam being used in heating the brine in the grainers. On the top of the furnace, over the horizontal boilers, is a series of three pans, heated by the products of combustion after they have passed the boilers, and into these pans the brine from the boilers is forced by the steam pressure existing in them. After leaving the pans and boilers the granulation takes place in the usual manner, by the steam-evaporation process. During the day coal is used for fuel, but at night the boilers are heated by natural gas, as the gas is used in the daytime by the rolling-mills in this vicinity and delivered at night to the salt-works. The economy of this process is denied by many, who assert that the boiler is soon destroyed by the action of the magnesium chloride developed in the heated brines; but the owner states that when air is completely excluded from the boilers no action ensues.

The principal impurities in the brines of western Pennsylvania are the chlorides of lime and of magnesium, as will be seen by an examination of Table III.

The depth of wells differs in Allegheny county from 580 to 2,000 feet, with a strength of brine from 20° to 34°; in Westmoreland county, from 400 to 450 feet, with a brine registering 16° to 28°.

The bitterns from the salt-works contain a considerable amount of bromides, which have been used for the preparation of bromine (see page 22).

The market for this salt is found in western Pennsylvania and on the borders of Ohio and Virginia. It is not shipped by the Ohio river, but is carried to the headwaters of the Monongahela.

TEXAS.

Deposits of salt or salt brines are found in many counties in Texas, but being worked in the crudest manner the salt is generally impure. The largest section containing brines or deposits is in El Paso county, where a superficial area of some 200 acres is covered by lakes, many of which evaporate completely during the dry season, leaving a solid deposit of salt. One of these is situated about 90 miles east of Ysleta, and covers an area of 60 acres. During the dry season this sun-dried product is simply shoveled up and hauled away to sell to the miners in New Mexico, or to Chihuahua, Mexico. The purchaser pays the owner of the deposit $1 per "faneja" (about 2½ bushels) and gathers and transports his own salt. The Mexicans formerly gathered salt from this place without royalty, in accordance with a time-honored custom, but the lakes were finally claimed by American parties, who demanded a royalty on the salt. To this the Mexicans took umbrage, and a fight ensued, in which thirteen American soldiers were killed, but the Mexicans were obliged to submit to the tax. During the census year 6,600 bushels were produced from this deposit.

In Nueces and Refugio counties sea-water has been evaporated to dryness, and in Lampasas county a "saline" was worked before and during the war, but has since been abandoned.

The most of the salt produced in Texas during the census year was made in Van Zandt county, where an establishment is located having one kettle-block, and a surface for solar evaporation of 16,640 square feet.

UTAH.

The concentrated brine of the Great Salt lake furnishes Utah with an inexhaustible supply of salt, and from this source is taken the salt used in the treatment of the ores in that territory. Up to the present time the mode of working has been very primitive, and produces a very impure salt.

The tides of the lake are caused by the winds; as when a stiff northwest wind is blowing the water will rise from 12 to 18 inches on the eastern side of the lake and overflow the marshes that are usually dry. This feature is turned to advantage in the manufacture of salt, and these marshes or lagoons are surrounded with dikes. Early in the season, when the wind is in a favorable direction, gates are opened and the lagoons are flooded. When the water recedes the gates are closed, and the retained water, therefore, evaporates gradually, often completely. The salt, which has crystallized in a solid cake on the bottom, is then broken up and removed for use. By this method the soluble impurities are retained in the salt; it is also very difficult to obtain it free from insoluble foreign matter, mud, etc. Only a small fraction of the salt is used for domestic purposes, however, and for the chlorination process pure salt is unnecessary.

In Juab county a small amount of salt is made from subterranean brines, and the existence of a large deposit of very pure rock-salt is stated by Professor Barfoot, of Salt Lake City, but it has not been possible to obtain detailed information.

VIRGINIA.

As early as 1765 it was known that wild animals were accustomed to frequent certain salt licks near the Holston river, and by 1790 the settlers made a considerable quantity of salt from these places for domestic uses. In 1820 an open well was sunk, which, at a depth of 216 feet, reached a bed of rock-salt. This open well was continued for 52 feet through the salt, and borings were made 110 feet deeper, but no water was found, nor was the bottom of the deposit reached. In 1874 the well was again cleaned out, and at a depth of 272 feet from the surface a tunnel was driven in a westerly direction 99 feet to a well previously bored, in which the brine was found too weak to use alone; this brine was thus admitted to the rock-salt, and a strong brine obtained. The deposit of rock-salt appears to cover at least 100 acres and is of considerable depth; and, with an unlimited supply of remarkably pure and strong brine, there is every prospect of a prosperous manufacture at this point for a long time to come.

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REPORT

ON THE

MANUFACTURE OF GLASS.

BY

JOS. D. WEEKS,

SPECIAL AGENT.

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LETTER OF TRANSMITTAL.

PITTSBURGH, PA., *March* 21, 1883.

Hon. C. W. SEATON,
Superintendent of Census.

SIR: I have the honor to transmit herewith my final report on the manufacture of glass.

Referring to my preliminary report, published in Census Bulletin No. 118, under date of March 30, 1881, I beg to say that further investigation disclosed the fact that the returns received up to that time were somewhat imperfect, and the statistics given in this report have been amended in accordance with the later returns received.

Most of the glass-makers of the country appreciated the importance of a full and complete report, many of them not only forwarding their reports promptly and with full details, but lending me every assistance in their power in completing the history of glass in this country, which is herewith attached.

In undertaking the collection of these returns it was discovered that no directory of the glass works of the United States existed. While attempts had been made in recent years to prepare such a directory, they had been abandoned by those undertaking the work, and it was believed to be impossible to make a complete directory. However, with the assistance of some gentlemen well informed with the glass industry, such a directory, though imperfect, was prepared. Copies were sent to every glass works in the United States and to every one who was supposed to have any information regarding glass works, and as a result of this a directory, believed to be correct at its date, was prepared. Schedules were sent out to the names in this list, and the result is the present report.

This report covers the statistics of those establishments only that made glass from the sand, or works having furnaces and pots in which the glass was melted and made into the various forms of plate- and window-glass, glassware, and green glass. It does not include the statistics of any staining, cutting, engraving, drawing, or spinning glass, or any of the other processes of reworking glass, except in the case of establishments that cut and engrave in connection with the manufacture of the glass from the sand. In a word, the report covers the manufacture, and not the reworking, of glass.

In addition to the statistics and history of glass-making in this country, such information as could be obtained regarding the statistics of this industry in Europe and a short sketch of its history, both ancient and modern, are appended. For the purpose of completeness I have also added some statements regarding the classification of glass, its properties, the materials used, furnaces and pots employed, and the various modes of glass-making, with some quite full statements regarding tempered and slag glass.

Particular attention has also been paid to statements showing the state of the art during the census year. While every point has not been covered—indeed it was not deemed wise to consider to any extent forms or varieties of glass other than the four kinds particularly reported upon—it is believed that the report will show with reasonable fullness the condition of glass-making at the close of the census year.

It seems hardly necessary to state that it is impossible to gather from the tables given in this report any statement, even an approximate one, of the amount of profit made by the manufacturers of glass in the census year. The tables show only the value of materials and wages and the cost of product. Materials and wages added together and subtracted from product will not give profit, as, in addition to materials and wages, there is in the cost of an article a large number of contingent expenses, such as rent, insurance, taxes, interest, discount, expense of selling, office expenses, advertising, traveling, etc., all of which must be added to the value of materials and wages before the difference between this sum and the selling price of the product will show the profit.

In forwarding this report I desire to express my great obligations to the large number of gentlemen in various parts of this and other countries who have so kindly assisted me in the preparation of this report. It is impossible to name them all, but special thanks are due to Mr. L. Lobmeyer, of Vienna, Austria; Mr. Julius Fahdt, of Dresden, Germany; Mr. Henry Chance and Mr. Thomas Webb, of England; Hon. John F. Bodine, of Williamstown, New Jersey; Hon. W. C. De Pauw, of New Albany, Indiana; Mr. J. K. Cummings, of Saint Louis, Missouri; Mr. Charles Colné, formerly of Washington, District of Columbia, who reported on glass for the Paris Exposition; Mr. Isaac Craig and Mr. James B. Lyon, of Pittsburgh, Pennsylvania; and very especially to Mr. Thomas Gaffield, of Boston, to whose intelligent assistance and ready and free loan of books this report is indebted for much of its exactness and fullness. I also have made free use of a number of works on glass. In important quotations credit is given in the text, but in many cases it has not been deemed necessary, and I desire to acknowledge here my indebtedness to the *Encyclopædia Britannica*, Pellatt's *Curiosities of Glass Making*, Nesbitt's *Glass*, Bontemp's *Guide du Verrier*, Lardner's *Cabinet Cyclopedia*, Jarves' *Reminiscences of Glass Making*, Blancourt's *Art of Glass*, Sauzay's *Wonders of Glass Making in All Ages*, the several pamphlets of Mr. Chance referred to in the text, Gaffield's *Action of Sunlight on Glass*, and *Glass in the Old World*, by M. A. Wallace-Dunlop, and for the history, in this country especially, to Bishop's *History of American Manufactures*. I should also fail in what was justly their due did I not acknowledge my indebtedness to Miss C. V. Young and Mr. S. C. Armstrong, the chief assistants in my office, to whose patient endeavors and constant care I am under so many obligations.

Very respectfully,

JOS. D. WEEKS,
Special Agent.

CHAPTER I.—STATISTICS.

SCOPE OF THE REPORT.

The investigations which form the basis of this report were confined exclusively to those works which manufacture glass from the crude material or make the "metal", as it is termed, and do not include any statistics of those establishments in which manufactured glass is a raw material; or, in other words, this report only covers establishments in which glass is made, not those in which it is reworked, and does not, therefore, include statistics of manufactories of painted or stained glass, mirrors, chemists' ware, etc. In cases, however, where the glass is reworked in the same establishment in which it is made, as where rough plate is polished or glassware is engraved or decorated, the tables include the statistics of such reworking, it being regarded as only a part of the manufacture of glass in these works, or as having such a close relation with its manufacture as to make it practically impossible to separate the statistics of the crude from the reworked glass.

CLASSIFICATION OF GLASS IN THE TABLES.

The classification adopted in the collection of the statistics is not to be regarded as a complete classification of glass, but as one made necessary by the conditions of its manufacture in this country. This classification is as follows:

I. Plate-glass factories, including those making rough, ribbed, or polished plate for window-glass, mirrors, skylights, partitions, etc. This class also includes rolled cathedral plate.

II. Window-glass factories, including those manufacturing cylinder or sheet window-glass.

III. Glassware factories, including those manufacturing flint (lead or lime) glass, both blown and pressed, lamp-chimneys, and flint druggists' and chemists' ware.

IV. Green-glass factories, including those producing green, black, amber, etc., bottles, fruit-jars, carboys, demijohns, and other hollow ware, and green druggists' ware.

If it had been possible to make a still further subdivision of these classes, it would have been done; but after very earnest efforts it was found impracticable, and the attempt was abandoned.

Under each of these classes three tabulations have been made.

A.—Including all establishments in existence in the census year, whether active, idle, or building.

B.—Including all furnaces that were idle during the entire census year. All the furnaces in this table are included in Table V. The amount of capital given, however, is only that of factories no part of which was in operation during the census year. If a glass works having two furnaces run one, the other being idle, the latter would appear in this table as an idle furnace, and no capital would be set against it.

C.—Including all furnaces that were building and were not completed during the census year. The amount of capital given in this table is that of such establishments as are entirely new, and includes no statement of capital invested in such new furnaces as are additions to old works.

SUMMARY OF STATISTICS FOR 1880.

The complete statistical results of the census of 1880 will be found in the accompanying tables. For convenience of reference, and to give a connected statement of the results of the present census, as also to compare the same as far as possible with those of previous censuses, these results have been summarized. The condensed aggregate statements for all classes of glass included in this report are as follows:

Total number of establishments		211
Total capital invested		$19,844,699
Total number of furnaces		348
Total number of pots in same		2,982
Males above 16 years	17,778	
Females above 15 years	741	
Children and youths	5,658	
		24,177
Total amount paid in wages during the year		$9,144,100
Total value of materials		8,028,621
Total value of product		21,154,571

COMPARISON WITH PREVIOUS CENSUSES.

It is impossible to make a comparison between the results given above and those for the earlier censuses. The classification differs materially from that adopted in the present investigation, so that in any event it would be impracticable to make a comparison by classes. In addition to this, however, in the statistics of glass in previous censuses there are in some cases gross omissions, (*a*) while in others the statistics of glass-cutting and decorating establishments are summarized with those making the metal, so that any comparison would be of but little value. It is possible, however, to make an approximate comparison of the aggregate of all classes between the present census and that of 1870. Assuming that the classes "plate-glass", "glassware not specified," and "window-glass" of the Ninth Census include the same establishments as are classified in this report as plate- and window-glass, glassware, and green-glass factories, the result is as follows:

	1880.	1870.
Number of establishments	211	154
Employés	24, 177	15, 367
Capital	$19, 844, 699	$13, 826, 142
Wages paid	9, 144, 109	7, 589, 110
Amount of materials used	8, 028, 621	5, 904, 365
Value of product	21, 154, 571	18, 470, 507

It will be seen that the increase in the number of establishments in ten years is 37 per cent.; in employés, 57 per cent.; in capital invested, 44 per cent.; in wages paid, 20 per cent.; in materials used, 36 per cent.; and in value of product, 15 per cent. It will also be noted that the percentage of increase in all of the details is greater than in the value of the product, that being hardly 15 per cent., while the increase in the others ranges from 20 to 57 per cent.

WORKS IDLE IN THE CENSUS YEAR.

From the returns received it appears that 34 establishments were idle, in whole or in part, during the entire census year. The capital invested in the works that were idle entirely was $591,000, and the number of furnaces idle was 41. The following table gives the statistics of these idle establishments for each of the four kinds of glass:

Classes.	No. of establishments.	Capital.	FURNACES.				
			Kind and number.				Total number of pots.
			Gas.	Tank.	Other kinds.	Total number.	
Plate-glass	1	....	....	....	1	1	8
Window-glass	10	$90, 000	....	....	10	10	82
Glassware	15	267, 000	3	....	19	22	201
Green glass	8	234, 000	1	....	7	8	58
Total	34	591, 000	4	....	37	41	349

Some of the establishments shown in this table at which furnaces were idle also had furnaces that were in operation, and, as is before remarked, the capital of only those establishments at which no glass was made is included.

Of the 58 window-glass factories of the country, 6, with 6 furnaces, containing 48 pots, were entirely idle during the census year. Four works were also in part idle, and in these were 4 furnaces, with 34 pots, idle the entire year.

Of the 91 glassware factories, 9, with 13 furnaces and 109 pots, were entirely idle; and in factories that were operated in part, 9 furnaces, with 92 pots, were not run in the census year.

Of the 56 green-glass establishments, 8, with 8 furnaces and 58 pots, were entirely idle.

It has been almost impossible to determine in a few instances whether a glass factory should be regarded as dismantled or idle with the prospect of renewing operations. In such cases I have assumed that the owner knew the facts and have accepted his decision. Notwithstanding this, some furnaces reported as idle will probably never be in blast again, and should not have been reported at all.

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a Seybert, in his *Statistical Annals of the United States*, Philadelphia, 1818, which summarizes and corrects the census of 1810, says, page 6, regarding the statistics of glass, that "returns for glass works for five states only are given, omitting Massachusetts, in which very extensive establishments existed, from which glass of a superior quality had long been exported to the other states".

WORKS BUILDING IN THE CENSUS YEAR.

The following table gives for each of the four kinds of glass the statistics of furnaces building and not completed in the census year:

Classes.	No. of establishments.	Capital.	FURNACES.				
			Kind and number.				Total number of pots.
			Gas.	Tank.	Other kinds.	Total number.	
Plate-glass	1	....	1	....	....	1	16
Window-glass	4	$80,000	....	....	4	4	36
Glassware	12	235,000	4	....	8	12	129
Green glass	5	54,100	....	....	5	5	31
Total	22	369,100	5	....	17	22	212

From the returns received it appears that furnaces were building at 22 establishments, 22 furnaces, with 212 pots, being in course of erection. As it will be noticed, 5 of these were gas furnaces, which would equal a little less than one-fourth of all the gas furnaces built or building in the census year. Of those building of all kinds, 1, with 16 pots, was building in a plate-glass works, not completed; 4 were in window-glass factories; 2, with 20 pots, were in new establishments, and 2, with 16 pots, additions to old factories; 8, with 8 furnaces and 84 pots, were entirely new glassware establishments, while 4 furnaces, with 45 pots, were built at two old works. Three entirely new green-glass works, with 3 furnaces and 16 pots, were built, and 2 furnaces, with 15 pots, were built at two old green-glass factories.

ESTABLISHMENTS IN WHICH GLASS WAS MADE IN THE CENSUS YEAR.

Consolidating these tables of idle and building, and making the necessary deductions from those giving the aggregate statistics of the production of the several classes, we have the following statement regarding the statistics of the works at which glass was made during the census year:

Classes.	No. of establishments.	Capital.	No. of furnaces.	Total number of pots.
Plate-glass	5	$2,587,000	[illegible]	84
Window-glass	49	4,703,155	76	665
Glassware	73	6,907,278	130	1,247
Green glass	42	4,607,166	74	443
Total	169	18,804,599	288	2,439

The number of hands employed and the value of materials and wages paid, as well as the total of the product, would, of course, be the same as the totals given under the heads of the different kinds of glass in the general tables, as an idle or building works would detract nothing from these items.

Regarding the table on plate-glass, it should be noted that of the 6 establishments making plate-glass 5 produced rough plate, 1 rolled cathedral plate; and 3 of the 5 producing rough plate polished the larger part of their product, the 2 others making no polished plate, though 1 had the machinery necessary to the work.

The column headed "rough, sold", under "plate-glass", gives the amount that was sold or entered into consumption without being polished, or as rough, ribbed, and cathedral plate. It should also be noted that while the first column under "product" gives the total amount of plate-glass cast at the several works, the column of "value" gives only the value of that part that was polished and what was sold as rough plate, the balance being in process of manufacture.

CAPITAL.

The total capital invested in the manufacture of all kinds of glass is $19,844,699. Of this, $2,587,000, or 13 per cent., is invested in plate-glass; $4,953,155, or 25 per cent., in window-glass; $7,409,278, or 37 per cent., in glassware; and $4,895,266, or 25 per cent., in green glass.

The state having the largest amount of capital, as well as the largest number of establishments, is Pennsylvania, which has $7,639,706, or 38 per cent. of the whole. This is followed by New Jersey, with $2,728,021, or a little less than 14 per cent. of the whole. New Jersey is followed, in their order, rating them by capital invested, by New York, Indiana, Missouri, Ohio, Massachusetts, Kentucky, West Virginia, Illinois, Maryland, Connecticut, California, Michigan, and New Hampshire, while the Mississippi works, which was building, and the District of Columbia works, which was idle, both ranked the same.

FURNACES.

The total number of furnaces in the different works was 348, containing 2,982 pots. Of these, 10 furnaces, with 116 pots, were in plate-glass works; 88 furnaces, with 767 pots, were in window-glass works; 162 furnaces, with 1,559 pots, were in glassware works; and 88 furnaces, with 540 pots, in green-glass works. Of the total number of furnaces, 21 are reported as gas, 5 as tank, and 322 as all other kinds, these other kinds being, as a rule, the ordinary direct-firing furnace. Of the 21 gas furnaces built and building, 3 are reported as Siemens, 6 as Gill, 6 as Nicholson, 2 as Burgin, the balance being of various kinds. Of the tank furnaces, 1 was a Siemens furnace, built, and the other 4 were of various kinds, the inventions generally of the parties operating them.

The fuel used in glass-making in the United States is chiefly coal, though at all works more or less wood is used for various purposes, as also considerable petroleum and benzine for fire-polishing, annealing, and other like operations. One or two furnaces, however, are reported as being wood furnaces. Some are coal furnaces, using blast, and some few, instead of being direct-firing, use a patent method of charging the coal to the fire-grate.

THE PLANT OF FACTORIES.

Under this head are included statements showing that part of the plant about a glass works not included under the head of furnaces and pots. The following tables show the statistics of the different factories:

TABLE SHOWING THE PLANT OF PLATE-GLASS FACTORIES IN THE UNITED STATES.

Casting tables	16
Annealing ovens	186
Grinding-machines	26
Smoothing-machines	44
Polishing-machines	70
Grinding-mills	10
Steam-engines	25
Horse-power	1,570
Boilers	24
Horses	11
Mules	9
Wagons	11
Carts	7
Drays	5

TABLE SHOWING THE PLANT OF WINDOW-GLASS FACTORIES IN THE UNITED STATES.

Flattening ovens	68
Monkey ovens	16
Clay-grinding mills	52
Steam-engines	34
Horse-power	577
Boilers	35
Horses	156
Mules	56
Wagons	120
Carts	50
Drays	21

TABLE SHOWING THE PLANT OF GLASSWARE FACTORIES IN THE UNITED STATES.

Glory-holes	358
Presses	522
Annealing ovens	479
Shops worked	1,353
Grinding- and engraving-machines	716
Clay-grinding mills	63
Steam-engines	85
Horse-power	2,327
Boilers	121
Horses	162
Mules	64
Wagons	124
Carts	66
Drays	29

TABLE SHOWING THE PLANT OF GREEN-GLASS FACTORIES IN THE UNITED STATES.

Glory-holes	79
Annealing ovens	1,039
Grinding-machines	44
Clay-grinding mills	46
Steam-engines	55
Horse-power	1,198
Boilers	58
Horses	189
Mules	102
Wagons	152
Carts	64
Drays	30

TABLE SHOWING KINDS AND NUMBER OF MACHINES USED IN THE GLASS WORKS OF THE UNITED STATES.

Kind of glass.	Casting tables.	Grinding-machines.	Smoothing-machines.	Polishing-machines.	Grinding-mills.	Clay-grinding mills.	Grinding-and engraving-machines.	Presses.	Grinding-machines.
Plate-glass	16	26	44	70	10				
Window-glass						52			
Glassware						63	716	522	
Green glass						46			44
Total	16	26	44	70	10	161	716	522	44

TABLE SHOWING KINDS AND NUMBER OF OVENS USED IN THE GLASS WORKS OF THE UNITED STATES.

Kinds of glass.	Flattening ovens.	Monkey ovens.	Annealing ovens.
Plate-glass			186
Window-glass	68	16	
Glassware			479
Green glass			1, 039
Total	68	16	1, 704

TABLE SHOWING POWER USED IN THE GLASS WORKS OF THE UNITED STATES.

Kinds of glass.	Steam-engines.	Horse-power.	Boilers.
Plate-glass	25	1, 570	24
Window-glass	34	577	35
Glassware	85	2, 327	121
Green glass	55	1, 198	58
Total	199	5, 672	238

TABLE SHOWING NUMBER AND KINDS OF DRAFT ANIMALS USED IN THE GLASS WORKS OF THE UNITED STATES.

Kinds of glass.	Horses.	Mules.
Plate-glass	11	9
Window-glass	156	56
Glassware	162	64
Green glass	189	102
Total	518	231

TABLE SHOWING NUMBER AND KIND OF VEHICLES USED IN THE GLASS WORKS OF THE UNITED STATES.

Kinds of glass.	Wagons.	Carts.	Drays.
Plate-glass	11	7	5
Window-glass	120	50	21
Glassware	124	66	29
Green glass	152	64	30
Total	407	187	85

EMPLOYÉS.

The total number of persons employed about the glass works of the United States in the census year was 24,177. Of these 17,778 were males above 16 years, 741 females above 15 years, 5,566 males under 16 years of age, and 92 females under 15 years of age. Many of the operations about a glass works, especially in the packing and the gathering of the glass, are of such character that they can be performed by women, children, and youths. This is especially true of glassware, and, as is shown by the tables, 513 of the 741 females above 15 years and 3,874 of the 5,658 children and youths are employed in glassware manufactories, the larger proportion of the balance being employed in the manufacture of green glass, in which many of the operations are analogous to those of glassware.

WAGES PAID.

The total amount of wages paid during the year to all classes of employés in the works was $9,144,100. As I have already stated in my "Report on Coke", any attempt to deduce the average daily earnings of each person employed from the figures given in the tables annexed would not only be useless, but the result obtained would convey a decidedly wrong impression. The total amount of wages paid, $9,144,100, divided by the total number of hands employed, 24,177, would give a quotient of $378. Though such a quotient is often regarded as the average yearly earnings of each employé, a little consideration will make it evident that it does not represent such earnings; that it really represents nothing but the result of the division of one number by another. The only circumstances under which a division of the total amount of wages received in any industry by the total number of men employed in that industry would be a correct statement of the earnings of the persons so employed are when the same number of men were employed during the whole year, and when, if the works were idle during any part of that year, the men were also idle, glass-making being their only occupation. It would also be necessary to know, in order that such an average might be a fair one, what the occasion of such idleness was—whether it was the fault of the manufacturer or of the men. In a word, the only way in which it would be possible to show what were the yearly earnings of each man at the glass works of the United States during the census year would be to ascertain directly from the books what each man received, and for such a statement there are no data.

A somewhat similar difficulty exists in any attempt to arrive at the average wages paid in the different classes of labor employed. This is a most difficult statement to make under any circumstances in this or in any other industry. It is very easy to give an average of the different rates of wages paid; but to get at the real average rates—that is, an average which shall consider not only the several rates, but the number of men employed at each rate, by a consideration of both of which the average rate can only be reached—is more difficult.

However, an endeavor has been made in the accompanying tables to arrive, as nearly as may be, at the range of wages paid the different classes of labor and the average wages; and if it is distinctly understood that this is only approximate, and does not claim to be the exact average wages of the different classes, no one need be led astray by the statement.

These tables show in the first column the classes of employés, in the second column the number of each class for which wages are given in the returns, in the third column the range of wages, or the highest and lowest wages paid the members of this class, and in the fourth column the average wages. This average is obtained by multiplying each rate of wages by the number of persons employed at that rate and dividing the sum of the products so obtained by the number of men employed, so that the average represents the real average wages of the different classes as returned:

RANGE AND AVERAGE RATES OF DAILY WAGES IN THE MANUFACTURE OF WINDOW-GLASS.

Classes.	Number.	Range.	Average.	Classes.	Number.	Range.	Average.
Managers	23	$1 16 to $6 00	$3 90	Cutters	144	$2 00 to $4 50	$3 14
Boss blowers	44	2 57 to 12 00	5 47	Packers:			
Blowers	424	2 18 to 12 00	5 30	16 years and upward	52	1 15 to 5 68	2 14
Gatherers or tending-boys:				Under 16 years	2	50	50
16 years and upward	424	1 76 to 6 00	2 72	Drivers	80	1 00 to 2 50	1 36
Under 16 years	34	30 to 39	35	Laborers	251	1 00 to 1 50	1 18
Master teasers	56	2 11 to 5 00	3 35	Box makers	26	75 to 1 75	1 31
Master teasers' helpers	55	1 17 to 2 50	1 83	Blacksmiths	13	1 17 to 2 50	1 95
Teasers	158	1 00 to 2 36	1 74	Engineers	5	1 50 to 3 15	1 83
Lime sifters	34	1 00 to 2 16⅔	1 70	Watchmen	5	1 00 to 1 50	1 23
Mixers	65	1 00 to 3 00	1 72	Assorters	5	2 00 to 3 00	2 40
Batch wheelers or fillers-in	55	1 00 to 2 00	1 75	Sawyers	2	1 12½ to 2 00	1 56
Coal wheelers	46	96 to 2 25	1 63	Clay grinders	2	1 00 to 1 46	1 23
Flatteners	109	2 50 to 5 77	3 82	Carpenters	6	1 75 to 1 80	1 78
Layers-out	67	77 to 2 25	1 80	Warehouse men	2	2 00 to 2 50	2 25
Layers-in	73	77 to 2 33⅓	1 61	Clerks	7	1 66 to 4 00	1 88
Leer tenders	71	96 to 2 26	1 64	Blow-furnace teasers	1	2 00	2 00
Roller-boys:				Masons	4	2 00	2 00
16 years and upward	70	38 to 1 50	78	Bookkeepers	1	4 00	4 00
Under 16 years	22	75 to 1 00	88	Pot-arch men	2	1 12⅔	1 12⅔
Pot makers	36	1 54 to 5 00	2 96	Teamsters	2	1 25	1 25
Clay trampers	89	1 00 to 2 00	1 25				
Boss cutters	22	2 88 to 7 00	4 21	Secretary	1	5 00	5 00

RANGE AND AVERAGE RATES OF DAILY WAGES IN THE MANUFACTURE OF GREEN GLASS.

Classes.	Number.	Range.	Average.
Managers	21	$2 00 to $6 73	$4 74
Boss blowers	21	3 00 to 8 00	4 86
Bottle blowers	515	2 65 to 5 50	3 94
Vial blowers	163	2 50 to 4 50	3 38
Demijohn blowers	10	2 90 to 5 00	3 78
Carboy blowers	3	3 30 to 10 00	5 53
Other blowers	32	3 00 to 3 25	3 23
Gatherers:			
16 years and upward	326	54 to 1 50	97
Under 16 years	17	75	75
Sticker-up boys:			
16 years and upward	121	32 to 1 25	42
Under 16 years	29	38 to 88	51
Finishers:			
16 years and upward	63	45 to 4 50	2 73
Under 16 years	4	50	50
Carrying-in boys:			
16 years and upward	182	38 to 75	59
Under 16 years	301	38 to 83	54
Laying-up boys:			
16 years and upward	150	50 to 1 50	96
Under 16 years	26	50 to 1 00	79

Classes.	Number.	Range.	Average.
Master teasers	32	$1 25 to $7 25	$3 33
Fillers-in	61	1 00 to 2 00	1 51
Coal wheelers	30	1 00 to 2 25	1 46
Batch wheelers	26	1 00 to 2 00	1 36
Teasers	66	1 00 to 4 17	1 63
Mixers	45	1 00 to 2 50	1 56
Lime sifters	10	50 to 2 00	1 29
Ware boys	62	58⅓ to 2 00	1 27
Pot makers	16	1 50 to 4 00	2 61
Pot makers' assistants	26	1 00 to 2 00	1 36
Clay trampers	41	1 00 to 1 50	1 16
Grinders:			
16 years and upward	35	83⅓ to 5 00	1 30
Under 16 years	3	60	60
Boss packers	22	1 16⅔ to 3 50	2 02
Demijohn coverers:			
16 years and upward	31	75 to 2 00	1 06
Under 16 years	10	1 00	1 00
Packers	119	83⅓ to 2 25	1 37

RANGE AND AVERAGE RATES OF DAILY WAGES IN THE MANUFACTURE OF PLATE-GLASS.

Founders	13	$2 00 to $3 85	$3 39
Gas makers	7	1 25 to 2 00	1 76
Teemers or pourers	11	1 15 to 2 50	1 95
Roller men	12	1 15 to 1 80	1 53
Kiln firemen	8	1 15 to 1 83	1 50
Furnace men	58	1 15 to 1 83	1 39
Grinders:			
16 years and upward	55	1 67 to 3 00	2 18
Under 16 years	6	50	50
Smoothers:			
Males 16 years and upward	52	2 00 to 2 29	2 06
Males under 16 years	3	50	50
Females 15 years and upward	13	75	75
Females under 15 years	4	50	50
Polishers:			
16 years and upward	65	2 00 to 3 13	2 49
Under 16 years	6	50	50

Mixers	13	$1 25 to $2 00	$1 40
Pot makers	6	2 31 to 3 33	2 94
Crocus men	4	1 67 to 2 00	1 84
Cutters	16	2 00 to 3 08	2 54
Glass packers	12	1 35 to 2 33	1 78
Machinists	23	1 25 to 3 00	2 39
Blacksmiths	6	1 73 to 4 00	2 87
Firemen	10	1 25 to 1 80	1 57
Engineers	16	1 25 to 3 00	2 41
Carpenters	13	1 25 to 2 25	1 91
Bricklayers	9	2 00 to 3 00	2 64
Furnace builders	1	3 85	3 85
Teamsters	13	1 00 to 1 33	1 14
Sand-quarry men	10	1 50	1 50
Mill men	4	1 67 to 1 75	1 71
Plaster burners	5	1 00 to 1 50	1 31

RANGE AND AVERAGE RATES OF DAILY WAGES IN THE MANUFACTURE OF GLASSWARE.

Managers	52	$3 00 to $8 11	$4 46
Pressers	306	2 00 to 5 00	3 53
Finishers:			
Males 16 years and upward	563	76 to 6 00	3 55
Males under 16 years	134	76 to 80	79
Gatherers:			
Males 16 years and upward	890	67 to 3 50	1 93
Males under 16 years	6	55 to 1 50	1 34
Stickers-up:			
Males 16 years and upward	338	42 to 1 80	87
Males under 16 years	543	42 to 1 00	78
Cleaning-off boys:			
Males 16 years and upward	192	50 to 1 35	82
Males under 16 years	414	50 to 1 00	64
Females 15 years and upward	3	80	....
Females under 15 years	12	50 to 62⅔	58
Carrying-in boys:			
Males 16 years and upward	156	48 to 1 20	62
Males under 16 years	762	33⅓ to 80	56
Mold-holders:			
Males 16 years and upward	132	50 to 2 75	83
Males under 16 years	285	45 to 1 00	62
Blowers	1, 147	1 66⅔ to 5 60	3 47

Cutters:			
Males 16 years and upward	223	$1 35 to $4 16⅔	$2 29
Females 15 years and upward	7	50	50
Engravers	33	1 66⅔ to 4 00	2 58
Mold makers	120	1 50 to 6 00	3 05
Machinists *	30	1 50 to 6 50	2 30
Mixers	135	1 33⅓ to 2 66⅔	1 76
Teasers	166	1 50 to 2 66⅔	2 11
Pot fillers	56	1 00 to 2 50	1 67
Pot makers	41	1 16⅔ to 3 33⅓	2 35
Clay trampers	74	1 00 to 2 50	43
Packers:			
Males 16 years and upward	340	60 to 4 00	1 72
Males under 16 years	19	45 to 65	53
Females 15 years and upward	19	50 to 2 33⅓	98
Drivers	103	1 00 to 2 50	1 72
Laborers:			
Males 16 years and upward	573	1 00 to 2 00	1 35
Males under 16 years	7	67 to 83	69
Females 15 years and upward	82	60 to 75	67
Females under 15 years	9	50 to 67	61
Engineers	54	1 16⅔ to 3 00	2 15

* The machinist receiving highest rate is probably a mold maker.

INTERVALS OF PAYMENT.

In the annexed table will be found a statement showing the intervals of payment at the different glass works in the United States so far as returns have been received. In connection with each interval of payment is also given the number of employés so paid:

Kind of glass.	WEEKLY.		EVERY TWO WEEKS.		MONTHLY.		ON APPLICATION.		NO STATEMENT.	
	Number of works.	Number of employés.	Number of works.	Number of employés.	Number of works.	Number of employés.	Number of works.	Number of employés.	Number of works.	Number of employés.
Plate-glass	2	513	....	....	4	443	....	....	....	....
Window-glass	37	2,575	2	100	12	919	3	178	4	118
Glassware	47	7,023	28	5,419	1	1[illegible]0	....	....	15	68
Green glass	28	4,033	4	745	12	1,423	2	296	10	194
Total	114	14,144	34	6,264	29	2,915	5	474	29	380

The frequency with which the workmen are paid is a matter of considerable importance, and determines in some degree the value of wages. When workmen are paid once a year, as they were at one time in New England, being allowed to take goods from the store in the meantime and have the same charged to their account, but being compelled to pay interest on any cash advanced, it is evident that such intervals of payment would not make the purchasing power of their wages as great as though the employé was paid weekly or every two weeks. In some of the occupations about a glass works where the men are paid by the piece, as in window-glass blowing, owing to the peculiar character of the business it is almost impossible to ascertain at the end of each week or each two weeks what amount of money is due to the blower or flattener, they being paid in accordance with the quality of the glass produced, as this can only be ascertained when the glass has been flattened and cut, or at least inspected. This sometimes takes weeks, especially in dull seasons. It is therefore customary in these works to advance to men what is termed "market money", equaling a certain amount a week, and to have final settlements at the end of the "fire". In the window-glass report, therefore, it will be understood that most of the skilled workmen, such as the blowers, gatherers, cutters, and flatteners, are paid weekly or every two weeks on account, and full settlements are had at the end of the "fire", generally in June. This is also true in some few cases in glassware manufactories, and to a greater extent in green-glass factories.

From the above table it will be noticed 4 plate-glass works, employing 443 hands, pay monthly, and 2, employing 513 hands, pay weekly. In window-glass, 37 works, employing 2,575 hands, pay weekly; 2, employing 100 hands, every two weeks; 12, employing 919 hands, pay monthly; 3, employing 178 hands, on application; and from the balance, employing 118 hands, no statement has been received. In glassware, 47 works, employing, 7,023 hands, pay weekly; 28, employing 5,419 hands, every two weeks; and 1, employing 130 hands, every month; from the balance, employing 68 hands, no returns have been received. In green glass, 28 works, employing 4,033 hands, pay every week; 4, employing 745 hands, every two weeks; 12, employing 1,423 hands, every month; 2, employing 296 hands, on application, and from the rest, employing 194 hands, no returns have been received. It will thus be seen that of all the employés in glass works 14,144 are paid weekly, 6,264 every two weeks, 2,915 monthly, 474 on application, and as to 380 no statement has been received.

METHODS OF PAYMENT.

In the following table will be found a condensed statement showing the number of establishments that had stores connected with them, the number that had no stores, and the number from which no statement has been received:

Kinds of glass.	STORES.		NO STORES.		NO STATEMENT.	
	Number of works.	Number of employés.	Number of works.	Number of employés.	Number of works.	Number of employés.
Plate-glass	2	376	4	580	....	....
Window-glass	12	1,028	36	2,493	10	369
Glassware	1	900	76	11,565	14	175
Green glass	12	2,259	30	3,896	14	536
Total	27	4,563	146	18,534	38	1,080

The establishments concerning which there is no statement are generally idle works or works that are building, which will account for the small number of employés concerning which no statement has been obtained.

It should not, however, be inferred from this table that at the works having stores the men are always obliged to deal at them. While this may be true in some instances—to what extent, however, I am not able to say—in other cases it is not true, as it is entirely optional with the employé whether he trades at the store or not. In a number of cases the store is only kept as an accommodation to the men, the works being so situated that this is a necessity. The returns also show that at most of the works having stores a considerable portion of the wages of the men are paid in cash.

While all the above is true, and while the small number of establishments having stores is exceedingly gratifying, this question of "truck" is a burning one between employer and employed. In most states "store-pay" is illegal, and the existence of stores in many cases is a violation or an evasion of the law.

PRODUCT.

The total value of all the glass produced in the United States during the census year was $21,154,571. The following table shows the value of the several kinds of glass produced and the percentage of each kind to the whole:

Kinds of glass.	Value of product.	Percentage of total value.
Plate-glass	$868, 305	4. 10
Window-glass	5, 047, 313	23. 86
Glassware	9, 568, 520	45. 23
Green glass	5, 670, 433	26. 81
Total	21, 154, 571	100. 00

MATERIALS.

The total value of all materials and the value of the materials used in each kind of glass is shown in the following tabulated statement:

Kinds of glass.	Total value of materials.	Percentage to whole.
All kinds	$8, 028, 621	100. 00
Plate-glass	438, 457	5. 46
Window-glass	1, 849, 530	23. 04
Glassware	3, 292, 380	41. 01
Green glass	2, 448, 254	30. 49

In Table VIII of this report are given, so far as they were ascertained, the quantities of the different materials used in all kinds of glass.

RELATIVE PRODUCTIVE RANK OF THE STATES.

The following table shows the relative productive rank of the several states and the percentage that the production of each bears to the total product:

States.	Value of production.	Percentage of value of production of each state to whole.	States.	Value of production.	Percentage of value of production of each state to whole.
The United States	$21, 154, 571	100. 00	Indiana	$790, 781	3. 74
			West Virginia	748, 500	3. 54
Pennsylvania	8, 720, 584	41. 22	Maryland	587, 000	2. 77
New Jersey	2, 810, 170	13. 28	Kentucky	388, 405	1. 84
New York	2, 420, 796	11. 44	Connecticut	160, 000	0. 76
Ohio	1, 549, 320	7. 32	California	140, 000	0. 66
Missouri	919, 827	4. 35	Michigan	90, 000	0. 43
Illinois	901, 343	4. 26	New Hampshire	70, 000	0. 33
Massachusetts	854, 345	4. 04	Iowa	3, 500	0. 02

It will be noted that Pennsylvania stands first as a producer of glass in the United States, its percentage in value being more than three times that of any other state. About 65 per cent. of this amount is credited to Allegheny county. The pre-eminence of Pennsylvania as a glass-manufacturing state is due to some extent to its extensive supplies of mineral coal, which affords very cheap fuel to the glass houses.

The following tables give the relative productive rank of the several states in the manufacture of the several kinds of glass:

PLATE-GLASS.

State.	Value of production.	Percentage of value of production of each state to whole.
The United States	$868, 305	100. 00
Indiana	496, 400	57. 17
Missouri	322, 550	37. 15
Massachusetts	45, 843	5. 28
Kentucky	3, 512	0. 40

WINDOW-GLASS.

State.	Value of production.	Percentage of value of production of each state to whole.
The United States	$5,047,313	100.00
Pennsylvania	2,222,513	44.03
New Jersey	729,155	14.45
New York	540,903	10.72
Illinois	373,343	7.40
Ohio	358,000	7.09
Maryland	332,000	6.58
Indiana	229,397	4.54
Massachusetts	104,002	2.06
Michigan	90,000	1.78
Missouri	68,000	1.35

GLASSWARE.

State.	Value of production.	Percentage of value of production of each state to whole.
The United States	$9,568,520	100.00
Pennsylvania	4,881,312	51.01
New York	1,157,571	12.10
Ohio	1,076,320	11.25
West Virginia	748,500	7.82
Massachusetts	704,500	7.36
New Jersey	400,000	4.18
Kentucky	215,330	2.25
Connecticut	160,000	1.67
Missouri	136,487	1.43
Maryland	85,000	0.89
Iowa	3,500	0.04

GREEN GLASS.

State.	Value of production.	Percentage of value of production of each state to whole.
The United States	$5,670,433	100.00
New Jersey	1,681,015	29.64
Pennsylvania	1,616,759	28.51
New York	722,322	12.74
Illinois	528,060	9.31
Missouri	392,790	6.93
Maryland	170,000	3.00
Kentucky	169,563	2.99
California	140,000	2.47
Ohio	115,000	2.03
New Hampshire	70,000	1.23
Indiana	64,984	1.15

PRODUCTION OF PLATE-GLASS.

As stated, the total value of the plate-glass produced and sold in the census year was $868,305; the total amount cast was 1,700,227 square feet. Of this amount, 1,042,000 square feet, valued at $794,000, were polished and sold, and 484,543 square feet, valued at $113,555, were either sold as rough plate-glass or were in the process of completion at the works on the 31st of May. The balance, 173,684 square feet, represents the cast plate that had been destroyed in the process of manufacture. The amount of plate-glass sold unpolished, or as cathedral plate, was 377,227 square feet. This would make the total sold, including rough plate and polished plate, 1,419,227 square feet, valued at $868,305. From the returns received it appears that the value per square foot of the polished plate-glass sold was 76⅕ cents.

PRODUCTION OF WINDOW-GLASS.

The total production of window-glass in the United States was 1,864,734 boxes of 50 square feet, valued at $5,047,313, or an average of $2 70⅔ per box. No attempt was made to ascertain the number of square feet of each size sold, nor what proportion was single and what proportion double thick, as upon inquiry it was found that such an attempt would be useless.

PRODUCTION OF GLASSWARE.

An attempt was made to arrive at the total number of pieces of certain kinds of glassware made; but though returns were received from a large number of works giving the number of tumblers, goblets, lamps, lamp-chimneys, and flint bottles or "prescriptions", they were by no means complete. Some of the figures received, however, were quite suggestive. In Massachusetts, for example, no flint bottles or "prescriptions" were made, but in this state 46,415 dozen tumblers, 111,712 dozen lamp-chimneys, and 14,087 lamps were made. In New York the returns show 388,639 dozen lamp-chimneys and 75,301 lamps. This return, however, is imperfect. In Ohio the reports show 409,713 dozen tumblers, 743,140 dozen lamp-chimneys, and 19,426 lamps. The returns from Pennsylvania in this regard are very imperfect. So far as returns have been received, the make of tumblers was 2,500,000 dozen, of lamp-chimneys 2,719,649 dozen, and of lamps 128,090 dozen.

PRODUCTION OF GREEN GLASS.

The same lack of statement of detailed production as obtains in flint glass also exists as regards green glass. The chief productions, however, are green and black bottles, beer-bottles, fruit-jars, demijohns, carboys, and vials. In New Jersey the number of green and black bottles is given as 107,547 gross; of fruit-jars, 51,749 gross, and of beer-bottles, 32,060 gross. In New York, 49,882 gross of green and black bottles, 28,752 gross of fruit-jars, and 12,049 gross of beer-bottles are reported as made. In Pennsylvania the reports show 55,846 gross of green and black bottles, 67,770 gross of fruit-jars, and 27,198 gross of beer-bottles.

LOCALITIES IN WHICH GLASS WAS PRODUCED.

The states ranking highest in the production of glass are Pennsylvania, New Jersey, New York, and Ohio, each of them producing glass to the value of more than a million and a half dollars during the census year. The following table will show the rank of those counties producing more than $50,000 in aggregate product:

Counties.	States.	Value of production of county.	Percentage of value of production of county to total value.	Counties.	States.	Value of production of county.	Percentage of value of production of county to total value.
Allegheny	Pennsylvania	$5,668,212	26.79	Portage	Ohio	$168,298	0.80
Philadelphia	do	1,621,959	7.67	Middlesex	Connecticut	160,000	0.76
Kings	New York	1,318,081	6.24	Berkshire	Massachusetts	149,845	0.71
Cumberland	New Jersey	1,132,450	5.35	Oswego	New York	149,735	0.71
Gloucester	do	947,805	4.48	Clark	Indiana	140,400	0.66
Belmont	Ohio	794,920	3.76	Oneida	New York	140,000	0.66
Ohio	West Virginia	714,000	3.38	San Francisco	California	140,000	0.66
Floyd	Indiana	650,381	3.07	Orange	New York	127,182	0.60
Saint Louis	Missouri	597,277	2.82	Bristol	Massachusetts	125,000	0.59
Baltimore	Maryland	587,000	2.77	Jefferson	Kentucky	123,075	0.58
La Salle	Illinois	523,343	2.47	Steuben	New York	120,000	0.57
Beaver	Pennsylvania	503,587	2.38	Onondaga	do	116,940	0.55
Salem	New Jersey	447,530	2.12	Lawrence	Pennsylvania	102,511	0.48
Fayette	Pennsylvania	361,315	1.71	Rock Island	Illinois	93,000	0.44
Jefferson	Missouri	322,550	1.52	Wayne	Michigan	90,000	0.43
Jefferson	Ohio	309,102	1.46	Monroe	Pennsylvania	80,000	0.38
Middlesex	Massachusetts	307,500	1.45	Suffolk	Massachusetts	72,000	0.34
Madison	Illinois	285,000	1.35	Montgomery	Pennsylvania	72,000	0.34
Kenton	Kentucky	265,330	1.25	Hillsborough	New Hampshire	70,000	0.33
Wayne	Pennsylvania	257,000	1.22	Ulster	New York	70,000	0.33
Muskingum	Ohio	232,000	1.10	Tompkins	do	60,000	0.28
Barnstable	Massachusetts	200,000	0.95	Niagara	do	55,000	0.26
Wayne	New York	180,664	0.85	Tioga	Pennsylvania	54,000	0.26

TABLE I.—THE PLATE-GLASS WORKS OF THE UNITED STATES AT THE CENSUS OF 1880.

States.	No. of establishments.	Capital.	NUMBER OF FURNACES.					NUMBER OF HANDS EMPLOYED.					Total amount paid in wages during the year.	Total value of materials.	PRODUCTS.			Total value of products.
			Total.	Gas.	Tank.	Other kinds.	Pots.	Total.	Males above 16 years.	Females above 15 years.	Males 16 years and under.	Females 15 years and under.			Total cast.	Total polished.	Sold rough.	
															Square feet.	*Square feet.*	*Square feet.*	
The United States	6	$2,587,000	10	2	....	8	116	956	822	91	36	7	$292,253	$438,457	1,700,227	1,042,000	377,227	*$868,305
Indiana	2	1,142,000	5	....	....	5	64	513	419	53	35	6	160,850	298,733	970,000	642,000	130,000	496,400
Kentucky	1	250,000	2	...	....	2	16	35	32	1	1	1	1,008	2,750	20,684	....	20,684	3,512
Massachusetts	2	45,000	2	1	....	1	20	58	57	1	......	......	10,395	24,049	209,543	....	209,543	45,843
Missouri	1	1,150,000	1	1	....	....	16	350	314	36	......	......	120,000	112,925	500,000	400,000	17,000	322,550

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* This does not include the value of cast plate in process of manufacture, nor of rough plate broken up and used as cullet, but includes only the value of polished plate and that part of the rough plate that was sold.

TABLE II.—THE WINDOW-GLASS WORKS OF THE UNITED STATES AT THE CENSUS OF 1880.

States.	No. of establishments.	Capital.	Number of furnaces.					Number of hands employed.					Total amount paid in wages during the year.	Total value of materials.	Products.	Total value of products.
			Total.	Gas.	Tank.	Other kinds.	Pots.	Total.	Males above 16 years.	Females above 15 years.	Males 16 years and under.	Females 15 years and under.			Boxes of 50 square feet each.	
The United States	58	$4,953,155	88	......	......	88	767	3,890	3,755	1	132	2	$2,139,536	$1,849,530	1,864,734	$5,047,313
Illinois	4	235,000	6	......	......	6	58	225	222	......	3	......	145,703	101,474	115,271	373,343
Indiana	1	175,000	3	......	......	3	30	169	169	......	......	......	103,000	105,000	91,759	229,397
Iowa*	1	25,000	1	......	......	1	8	......	......	......	......	......	......	......	......	......
Maryland	4	305,000	5	......	......	5	42	222	222	......	......	......	131,454	147,277	141,000	332,000
Massachusetts	2	75,000	4	......	......	4	32	99	98	1	......	......	44,947	39,245	41,866	104,002
Michigan	1	65,000	1	......	......	1	8	54	50	......	4	......	30,000	35,113	30,000	90,000
Missouri	1	40,000	2	......	......	2	14	48	48	......	......	......	32,000	27,706	24,000	68,000
New Jersey	9	723,355	15	......	......	15	116	699	622	......	77	......	266,294	289,803	296,685	729,155
New York	9	575,000	11	......	......	11	96	410	409	......	1	......	195,576	224,568	216,748	540,903
Ohio	6	455,000	6	......	......	6	56	273	269	......	4	......	146,861	106,510	127,122	358,000
Pennsylvania	20	2,279,800	34	......	......	34	307	1,691	1,646	......	43	2	1,043,701	772,834	780,283	2,222,513

* Not in operation during the census year.

TABLE III.—THE GLASSWARE WORKS OF THE UNITED STATES AT THE CENSUS OF 1880.

States.	No. of establishments.	Capital.	Number of furnaces.					Number of hands employed.					Total amount paid in wages during the year.	Total value of materials.	Total value of products.
			Total.	Gas.	Tank.	Other kinds.	Pots.	Total.	Males above 16 years.	Females above 15 years.	Males 16 years and under.	Females 15 years and under.			
The United States	91	$7,409,278	162	17	2	143	1,559	12,640	8,253	513	3,824	50	$4,452,417	$3,292,380	$9,568,520
Connecticut	1	130,000	1	......	......	1	10	160	130	2	28	......	65,000	70,000	160,000
District of Columbia*	1	25,000	1	......	......	1	6	......	......	......	......	......	......	......	......
Illinois*	1	20,000	2	......	......	2	16	......	......	......	......	......	......	......	......
Iowa	2	32,000	2	1	......	1	20	35	24	2	9	......	2,000	3,248	3,500
Kentucky	1	250,000	2	1	......	1	22	209	106	10	92	1	105,292	60,466	215,330
Maryland	2	55,000	2	......	......	2	17	85	60	......	25	......	22,000	26,000	85,000
Massachusetts	6	603,000	15	......	......	15	143	789	673	56	60	......	328,000	266,570	704,500
Missouri	2	100,000	[illegible]	......	......	2	21	217	120	......	97	......	61,339	43,035	136,487
New Jersey	3	310,000	10	......	......	10	89	900	525	25	350	......	250,000	100,000	400,000
New York	14	775,600	24	......	......	24	215	1,847	1,157	30	653	7	591,576	426,826	1,157,571
Ohio	10	579,750	18	5	......	13	191	1,225	781	81	363	......	452,659	309,270	1,076,320
Pennsylvania	44	3,978,406	75	8	2	65	727	6,227	4,062	207	1,919	39	2,262,901	1,778,901	4,881,312
West Virginia	4	550,522	8	2	......	6	82	946	615	100	228	3	311,650	208,064	748,500

* Not in operation during census year.

TABLE IV.—THE GREEN-GLASS WORKS OF THE UNITED STATES AT THE CENSUS OF 1880.

States.	No. of establishments.	Capital.	Number of furnaces.					Number of hands employed.					Total amount paid in wages during the year.	Total value of materials.	Total value of products.
			Total.	Gas.	Tank.	Other kinds.	Pots.	Total.	Males above 16 years.	Females above 15 years.	Males 16 years and under.	Females 15 years and under.			
The United States	56	$4,895,266	88	2	3	83	540	6,694	4,948	136	1,574	33	$2,259,894	$2,448,254	$5,670,433
California	1	75,000	1	......	......	1	7	113	80	......	33	......	45,924	48,070	140,000
Illinois	2	190,000	4	......	......	4	36	507	410	......	97	......	196,324	196,368	528,000
Indiana	1	125,000	2	......	......	2	14	180	107	......	73	......	20,357	30,000	64,984
Kentucky	3	295,000	3	......	......	3	17	278	226	......	52	......	44,022	70,888	169,563
Maryland	2	76,000	3	......	......	3	17	305	242	......	63	......	80,800	66,405	170,600
Massachusetts*	1	100,000	1	......	......	1	11	......	......	......	......	......	......	......	......
Mississippi†	1	25,000	1	......	......	1	8	......	......	......	......	......	......	......	......
Missouri	2	140,000	4	......	......	4	24	350	227	......	123	......	167,759	168,205	392,790
New Hampshire	1	50,000	2	......	......	2	8	102	80	8	14	......	25,600	34,000	70,000
New Jersey	15	1,694,666	31	......	1	30	172	1,979	1,615	21	341	2	783,744	698,543	1,681,015
New York	9	583,000	13	1	1	11	62	821	550	20	245	6	259,660	293,297	722,322
Ohio	4	160,100	5	......	......	5	30	190	120	......	70	......	45,000	43,553	115,000
Pennsylvania	14	1,381,500	18	1	1	16	134	1,866	1,291	87	463	25	590,704	798,925	1,616,759

* Not in operation during the census year.

† Building.

BLE V.—GLASS WORKS IDLE AND BUILDING IN THE UNITED STATES AT THE CENSUS OF 1880.

1.—FURNACES THAT MADE NO GLASS IN THE CENSUS YEAR.

Classes.	No. of establishments.	Capital.	Furnaces.				
			Kind and number.				Total number of pots.
			Gas.	Tank.	Other kinds.	Total number.	
Plate-glass	1	....	....	....	1	1	8
Window-glass	10	$90,000	....	....	10	10	82
Glassware	15	267,000	3	....	19	22	201
Green glass	8	234,000	1	....	7	8	58
Total	34	591,000	4	....	37	41	349

2.—ALL FURNACES BUILDING AND NOT COMPLETED IN THE CENSUS YEAR.

Classes.	No. of establishments.	Capital.	Furnaces.				
			Kind and number.				Total number of pots.
			Gas.	Tank.	Other kinds.	Total number.	
Plate-glass	1	....	1	....	....	1	16
Window-glass	4	$80,000	....	....	4	4	36
Glassware	12	235,000	4	....	8	12	129
Green glass	5	54,100	....	....	5	5	31
Total	22	369,100	5	....	17	22	212

PLATE-GLASS.

3.—FURNACES THAT MADE NO GLASS IN THE CENSUS YEAR.

States.	No. of establishments.	Capital.	Furnaces.				
			Kind and number.				Total number of pots.
			Gas.	Tank.	Other kinds.	Total number.	
Kentucky	1	....	....	....	1	1	8
Total	1	....	....	....	1	1	8

4.—FURNACES BUILDING AND NOT COMPLETED IN THE CENSUS YEAR.

States.	No. of establishments.	Capital.	Furnaces.				
			Kind and number.				Total number of pots.
			Gas.	Tank.	Other kinds.	Total number.	
Missouri	1	....	1	....	....	1	16
Total	1	....	1	....	....	1	16

WINDOW-GLASS.

5.—FURNACES THAT MADE NO GLASS IN THE CENSUS YEAR.

States.	No. of establishments.	Capital.	Furnaces.				
			Kind and number.				Total number of pots.
			Gas.	Tank.	Other kinds.	Total number.	
Illinois	1	....	....	....	1	1	10
Iowa	1	$25,000	....	....	1	1	8
Massachusetts	2	....	....	....	2	2	16
Missouri	1	....	....	....	1	1	8
New Jersey	2	10,000	....	....	2	2	14
New York	1	10,000	....	....	1	1	8
Pennsylvania	2	45,000	....	....	2	2	18
Total	10	90,000	....	....	10	10	82

WINDOW-GLASS—Continued.

6.—FURNACES BUILDING AND NOT COMPLETED IN THE CENSUS YEAR.

States.	No. of establishments.	Capital.	FURNACES. Kind and number. Gas.	Tank.	Other kinds.	Total number.	Total number of pots.
Illinois	1	$35,000			1	1	10
New Jersey	1				1	1	6
New York	1				1	1	10
Ohio	1	45,000			1	1	10
Total	4	80,000			4	4	36

GLASSWARE.

7.—FURNACES THAT MADE NO GLASS IN THE CENSUS YEAR.

States.	No. of establishments.	Capital.	FURNACES. Kind and number. Gas.	Tank.	Other kinds.	Total number.	Total number of pots.
District of Columbia	1	$25,000			1	1	6
Illinois	1	20,000			2	2	16
Massachusetts	3	6,000			7	7	70
New Jersey	2	110,000			3	3	26
New York	2	30,000			2	2	11
Ohio	2		2			2	24
Pennsylvania	4	76,000	1		4	5	48
Total	15	267,000	3		19	22	201

8.—FURNACES BUILDING AND NOT COMPLETED IN THE CENSUS YEAR.

States.	No. of establishments.	Capital.	FURNACES. Kind and number. Gas.	Tank.	Other kinds.	Total number.	Total number of pots.
Iowa	1	$20,000	1			1	13
Maryland	1	30,000			1	1	8
Massachusetts	1				1	1	10
New Jersey	1				1	1	8
Ohio	3	95,000	2		1	3	38
Pennsylvania	5	90,000	1		4	5	52
Total	12	235,000	4		8	12	129

GREEN GLASS.

9.—FURNACES THAT MADE NO GLASS IN THE CENSUS YEAR.

States.	No. of establishments.	Capital.	FURNACES. Kind and number. Gas.	Tank.	Other kinds.	Total number.	Total number of pots.
Massachusetts	1	$100,000			1	1	11
Ohio	2	44,000			2	2	12
New Jersey	4	80,000			4	4	29
Pennsylvania	1	10,000	1			1	6
Total	8	234,000	1		7	8	58

10.—FURNACES BUILDING AND NOT COMPLETED IN THE CENSUS YEAR.

States.	No. of establishments.	Capital.	FURNACES. Kind and number. Gas.	Tank.	Other kinds.	Total number.	Total number of pots.
Ohio	1	21,100			1	1	6
New Jersey	1	10,000			1	1	5
New York	1	23,000			1	1	5
Pennsylvania	2				2	2	15
Total	5	54,100			5	5	31

TABLE VI.—CONSOLIDATED STATISTICS OF ALL THE GLASS WORKS OF THE UNITED STATES AT THE CENSUS OF 1880, BY STATES.

States.	No. of establishments.	Capital.	NUMBER OF FURNACES AND POTS.					NUMBER OF HANDS EMPLOYED.					Total amount paid in wages during the year.	Total value of materials.	Total value of products.
			Total.	Gas.	Tank.	Other kinds.	Pots.	Total.	Males above 16 years.	Females above 15 years.	Males 16 years and under.	Females 15 years and under.			
The United States	211	$19, 844, 699	348	21	5	322	2, 982	24, 177	17, 778	741	5, 566	92	$9, 144, 100	$8, 028, 621	$21, 154, 571
California	1	75, 000	1	......	......	1	7	113	80	......	33	......	45, 924	48, 070	140, 000
Connecticut	1	130, 000	1	......	......	1	10	160	130	2	28	......	65, 000	70, 000	160, 000
District of Columbia *	1	25, 000	1	......	......	1	6	......	......	......	......	......	......	......	......
Illinois	7	445, 000	12	......	......	12	110	732	632	......	100	......	342, 027	297, 842	901, 343
Indiana	4	1, 442, 000	10	......	......	10	108	862	695	53	108	6	284, 207	433, 733	790, 781
Iowa	3	57, 000	3	1	......	2	28	35	24	2	9	......	2, 000	3, 248	3, 500
Kentucky	5	795, 000	7	1	......	6	55	522	364	11	145	2	150, 322	134, 104	388, 405
Maryland	8	436, 000	10	......	......	10	76	612	524	......	88	......	234, 254	239, 682	587, 000
Massachusetts	11	823, 000	22	1	......	21	206	946	828	58	60	......	383, 342	329, 864	854, 345
Michigan	1	65, 000	1	......	......	1	8	54	50	......	4	......	30, 000	35, 113	90, 000
Mississippi †	1	25, 000	1	......	......	1	8	......	......	......	......	......	......	......	......
Missouri	6	1, 430, 000	9	1	......	8	75	965	709	36	220	......	381, 098	351, 871	919, 827
New Hampshire	1	50, 000	2	......	......	2	8	102	80	8	14	......	25, 600	34, 000	70, 000
New Jersey	27	2, 728, 021	56	......	1	55	377	3, 578	2, 762	46	768	2	1, 300, 038	1, 088, 346	2, 810, 170
New York	32	1, 933, 600	48	1	1	46	373	3, 078	2, 116	50	899	13	1, 046, 812	944, 691	2, 420, 796
Ohio	20	1, 194, 850	29	5	......	24	277	1, 688	1, 170	81	437	......	644, 520	459, 333	1, 549, 320
Pennsylvania	78	7, 639, 706	127	9	3	115	1, 168	9, 784	6, 999	294	2, 425	66	3, 897, 306	3, 350, 660	8, 720, 584
West Virginia	4	550, 522	8	2	......	6	82	946	615	100	228	3	311, 650	208, 064	748, 500

* Not in operation during census year. † Building.

TABLE VII.—CONSOLIDATED STATISTICS OF ALL THE GLASS WORKS OF THE UNITED STATES AT THE CENSUS OF 1880, BY STATES AND COUNTIES.

CALIFORNIA.

Counties.	Number of establishments.	Capital.	NUMBER OF FURNACES AND POTS.					NUMBER OF HANDS EMPLOYED.				Total amount paid in wages during the year.	Total value of materials.	Total value of products.
			Total.	Gas.	Tank.	Other kinds.	Pots.	Total.	Males above 16 years.	Females above 15 years.	Children and youths.			
San Francisco	1	$75, 000	1	......	......	1	7	113	80	......	33	$45, 924	$48, 070	$140, 000

CONNECTICUT.

Middlesex	1	$130, 000	1	......	......	1	10	160	130	2	28	$65, 000	$70, 000	$160, 000

DISTRICT OF COLUMBIA.

Washington *	1	$25, 000	1	......	......	1	6	......	......	......	......	......	......	......

* Not in operation during census year.

ILLINOIS.

Total for State	7	$445, 000	12	......	......	12	110	732	632	......	100	$342, 027	$297, 842	$901, 343
Cook *	1	20, 000	2	......	......	2	16	......	......	......	......	......	......	......
La Salle	4	235, 000	6	......	......	6	60	387	337	......	50	195, 508	168, 755	523, 343
Madison	1	140, 000	2	......	......	2	14	280	230	......	50	101, 519	92, 707	285, 000
Rock Island	1	50, 000	2	......	......	2	20	65	65	......	......	45, 000	36, 380	93, 000

* Not in operation during census year.

TABLE VII.—STATISTICS OF GLASS WORKS, BY STATES AND COUNTIES, ETC.: 1880.

Counties.	Number of establishments.	Capital.	NUMBER OF FURNACES AND POTS.					NUMBER OF HANDS EMPLOYED.				Total amount paid in wages during the year.	Total value of materials.	Total value of products.
			Total.	Gas.	Tank.	Other kinds.	Pots.	Total.	Males above 16 years.	Females above 15 years.	Children and youths.			
INDIANA.														
Total for State	4	$1,442,000	10	......	......	10	108	862	695	53	114	$284,207	$433,733	$790,781
Clark	1	142,000	2	......	......	2	16	163	131	13	19	56,850	70,133	140,400
Floyd	3	1,300,000	8	......	......	8	92	699	564	40	95	227,357	363,600	650,381
IOWA.														
Total for State	3	$57,000	3	1	......	2	28	35	24	2	9	$2,000	$3,248	$3,500
Johnson *	1	20,000	1	1	......	......	13	......	......	......	......	......	......	......
Keokuk	1	12,000	1	......	......	1	7	35	24	2	9	2,000	3,248	3,500
Scott †	1	25,000	1	......	......	1	8	......	......	......	......	......	......	......
* Building.												† Idle.		
KENTUCKY.														
Total for State	5	$795,000	7	1	......	6	55	522	364	11	147	$150,322	$134,104	$388,405
Jefferson	3	295,000	4	......	......	4	28	169	132	1	36	32,917	37,079	123,075
Kenton	2	500,000	3	1	......	2	27	353	232	10	111	117,405	97,025	265,330
MARYLAND.														
Total for State	8	$436,000	10	......	......	10	76	612	524	......	88	$234,254	$239,682	$587,000
Allegany *	1	30,000	1	......	......	1	8	......	......	......	......	......	......	......
Baltimore	7	406,000	9	......	......	9	68	612	524	......	88	234,254	239,682	587,000
* Building.														
MASSACHUSETTS.														
Total for State	11	$823,000	22	1	......	21	206	946	828	58	60	$383,342	$329,864	$854,345
Barnstable	2	206,000	5	......	......	5	50	217	180	25	12	100,000	85,000	200,000
Berkshire	4	120,000	6	1	......	5	52	157	155	2	......	55,342	63,294	149,845
Bristol	1	110,000	2	......	......	2	20	130	124	4	2	50,000	32,000	125,000
Middlesex	3	300,000	7	......	......	7	70	352	306	24	22	151,000	125,500	307,500
Suffolk	1	87,000	2	......	......	2	14	90	63	3	24	27,000	24,070	72,000
MICHIGAN.														
Wayne	1	$65,000	1	......	......	1	8	54	50	......	4	$30,000	$35,113	$90,000
MISSISSIPPI.														
Jackson *	1	$25,000	1	......	......	1	8	......	......	......	......	......	......	......
* Building.														
MISSOURI.														
Total for State	6	$1,430,000	9	1	......	8	75	965	709	36	220	$381,098	$351,871	$919,827
Jefferson	1	1,150,000	1	1	......	......	16	350	314	36	......	120,000	112,925	322,550
Saint Louis	5	280,000	8	......	......	8	59	615	395	......	220	261,098	238,946	597,277
NEW HAMPSHIRE.														
Hillsborough	1	$50,000	2	......	......	2	8	102	80	8	14	$25,600	$34,000	$70,000

TABLE VII.—STATISTICS OF GLASS WORKS, BY STATES AND COUNTIES, ETC.: 1880.

NEW JERSEY.

Counties.	Number of establishments.	Capital.	NUMBER OF FURNACES AND POTS. Total.	Gas.	Tank.	Other kinds.	Pots.	NUMBER OF HANDS EMPLOYED. Total.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Total value of materials.	Total value of products.
Total for State	27	$2, 728, 021	56	......	1	55	377	3, 578	2, 762	46	770	$1, 300, 038	$1, 088, 346	$2, 810, 170
Atlantic *	1	......	1	......	......	1	8	......	......	......	......	......	......	......
Burlington *	3	130, 000	4	......	......	4	34	......	......	......	......	......	......	......
Camden	4	290, 000	5	......	......	5	34	244	198	......	46	106, 622	104, 880	282, 385
Cumberland	10	805, 021	24	......	......	24	172	1, 783	1, 232	45	506	586, 632	407, 335	1, 132, 450
Gloucester	5	1, 175, 000	14	......	1	13	84	1, 051	854	1	196	426, 900	373, 908	947, 805
Hudson *	1	30, 000	1	......	......	1	8	......	......	......	......	......	......	......
Salem	3	298, 009	7	......	......	7	37	500	478	......	22	179, 884	202, 231	447, 530

* Idle.

NEW YORK.

Counties.	Number of establishments.	Capital.	NUMBER OF FURNACES AND POTS. Total.	Gas.	Tank.	Other kinds.	Pots.	NUMBER OF HANDS EMPLOYED. Total.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Total value of materials.	Total value of products.
Total for State	32	$1, 933, 600	48	1	1	46	373	3, 078	2, 116	50	912	$1, 046, 812	$944, 691	$2, 420, 796
Broome *	1	23, 000	1	......	......	1	5	......	......	......	......	......	......	......
Columbia	1	10, 000	1	......	......	1	1	12	6	......	6	6, 000	6, 377	13, 140
Duchess	1	50, 000	1	1	......	......	......	104	68	......	36	11, 625	13, 755	27, 145
Erie	1	30, 000	1	......	......	1	5	60	42	......	18	22, 166	16, 974	42, 909
Jefferson †	1	10, 000	1	......	......	1	8	......	......	......	......	......	......	......
Kings	12	930, 600	22	......	1	21	185	1, 854	1, 158	36	660	630, 857	489, 593	1, 318, 081
Monroe †	1	25, 000	1	......	......	1	6	......	......	......	......	......	......	......
Niagara	1	45, 000	1	......	......	1	7	120	76	3	41	18, 000	23, 055	55, 000
Oneida	2	160, 000	2	......	......	2	20	83	83	......	......	63, 179	68, 518	140, 000
Onondaga	1	130, 000	2	......	......	2	16	73	72	......	1	41, 388	40, 589	116, 940
Orange	2	70, 000	4	......	......	4	29	220	119	......	101	51, 962	49, 773	127, 182
Oswego	3	160, 000	4	......	......	4	32	152	152	......	......	47, 394	63, 156	149, 735
Steuben	1	75, 000	2	......	......	2	18	108	107	1	......	51, 000	48, 000	120, 000
Tompkins	1	40, 000	1	......	......	1	10	60	60	......	......	20, 000	23, 257	60, 000
Ulster	1	25, 000	2	......	......	2	13	100	60	10	30	25, 000	41, 010	70, 000
Wayne	2	150, 000	2	......	......	2	18	132	113	......	19	58, 241	60, 634	180, 664

* Building.

† Idle.

OHIO.

Counties.	Number of establishments.	Capital.	NUMBER OF FURNACES AND POTS. Total.	Gas.	Tank.	Other kinds.	Pots.	NUMBER OF HANDS EMPLOYED. Total.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Total value of materials.	Total value of products.
Total for State	20	$1, 194, 850	29	5	......	24	277	1, 688	1, 170	81	437	$644, 520	$459, 333	$1, 549, 320
Belmont	9	485, 350	15	3	......	12	151	829	528	51	250	335, 805	225, 872	794, 920
Franklin	1	50, 000	1	......	......	1	10	50	50	......	......	16, 000	13, 200	45, 000
Jefferson	3	210, 000	5	2	......	3	56	386	253	30	103	122, 202	90, 843	309, 102
Licking *	1	22, 000	1	......	......	1	6	......	......	......	......	......	......	......
Muskingum	3	272, 000	4	......	......	4	28	250	180	......	70	90, 000	72, 318	232, 000
Portage	3	155, 500	3	......	......	3	26	173	159	......	14	80, 513	57, 100	168, 298

* Idle.

PENNSYLVANIA.

Counties.	Number of establishments.	Capital.	NUMBER OF FURNACES AND POTS. Total.	Gas.	Tank.	Other kinds.	Pots.	NUMBER OF HANDS EMPLOYED. Total.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Total value of materials.	Total value of products.
Total for State	78	$7, 639, 706	127	9	3	115	1, 168	9, 784	6, 999	294	2, 491	$3, 897, 306	$3, 350, 660	$8, 720, 584
Allegheny	51	5, 481, 000	85	5	3	77	797	6, 053	4, 442	141	1, 470	2, 686, 425	2, 139, 658	5, 668, 212
Armstrong *	1	30, 000	1	......	......	1	10	......	......	......	......	......	......	......
Beaver	4	256, 487	7	2	......	5	79	544	375	11	158	193, 000	211, 000	503, 587
Fayette	3	171, 800	5	......	......	5	44	313	310	......	3	137, 959	84, 043	361, 315
Lawrence	2	62, 000	2	......	......	2	18	125	122	......	3	46, 900	42, 638	102, 511
Montgomery	1	100, 000	2	......	......	2	13	75	70	......	5	26, 000	40, 000	72, 000
Monroe	1	30, 000	1	......	......	1	5	80	65	......	15	25, 000	36, 120	80, 000
Philadelphia	11	1, 212, 419	18	2	......	16	158	2, 237	1, 358	128	751	655, 022	696, 393	1, 621, 959
Tioga	2	66, 000	2	......	......	2	16	45	43	......	2	23, 000	29, 515	54, 000
Wayne	2	230, 000	4	......	......	4	28	312	214	14	84	104, 000	71, 293	257, 000

* Building.

WEST VIRGINIA.

Counties.	Number of establishments.	Capital.	NUMBER OF FURNACES AND POTS. Total.	Gas.	Tank.	Other kinds.	Pots.	NUMBER OF HANDS EMPLOYED. Total.	Males above 16 years.	Females above 15 years.	Children and youths.	Total amount paid in wages during the year.	Total value of materials.	Total value of products.
Total for State	4	$550, 522	8	2	......	6	82	946	615	100	231	$311, 650	$208, 064	$748, 500
Brooke	1	50, 000	1	......	......	1	10	128	90	13	25	15, 200	15, 500	34, 500
Ohio	3	500, 522	7	2	......	5	72	818	525	87	206	296, 450	192, 564	714, 000

TABLE VIII.—CONSOLIDATED STATISTICS OF THE MATERIALS USED IN THE MANUFACTURE OF GLASS, AS REPORTED AT THE CENSUS OF 1880.

States.	Mixing sand.	Grinding sand.	Soda-ash.	Nitrate of soda.	Salt-cake.	Salt.	Lime.	Lime-stone.	Litharge.	Pearl-ash.	Arsenic.	Manganese.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Bushels.*	*Tons.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Grand total	155, 447	39, 500	49, 626	2, 859	7, 877	1, 909	869, 886	2, 597	2, 313, 203	592, 932	713, 974	191, 146
California	1, 200	....	520	....	....	55	6, 875	....	....	....	....	....
Connecticut	....	....	....	....	....	....	....	....	....	....	....	....
Illinois	9, 767	....	2, 495	....	648	611	49, 607	300	....	....	26, 100	....
Indiana	7, 124	32, 300	2, 854	....	....	83	47, 842	....	....	....	32, 000	....
Iowa	25	....	10	2	....	....	650	....	....	....	....	400
Kentucky	3, 543	....	840	49	337	25	10, 300	12	7, 000	20, 000	302	1, 600
Maryland	5, 344	....	1, 902	36	36	40	62, 865	....	....	....	2, 710	1, 500
Massachusetts	2, 205	....	392	75	255	....	2, 348	346	298, 260	130, 111	6, 697	9, 049
Michigan	650	....	225	....	....	2	3, 500	....	....	....	930	....
Missouri	8, 042	7, 200	3, 071	31	....	233	47, 275	360	....	....	24, 000	3, 960
New Hampshire	500	....	200	....	200	....	2, 800	....	....	....	....	....
New Jersey	26, 282	....	8, 274	120	1, 320	163	174, 680	455	20, 000	100	38, 453	12, 000
New York	16, 122	....	5, 865	194	26	204	98, 854	....	559, 257	142, 456	6, 600	27, 505
Ohio	10, 008	....	3, 244	332	233	101	45, 635	....	210, 000	28, 000	28, 916	16, 436
Pennsylvania	61, 452	....	18, 419	1, 841	4, 822	392	309, 122	1, 124	1, 218, 686	268, 496	547, 266	110, 178
West Virginia	3, 183	....	1, 315	179	....	....	7, 533	....	....	3, 769	....	8, 518

States.	Fire clay, American.	Fire clay, English.	Fire clay, German.	Pots.	Coal.	Coke.	Wood.	Lumber.	Casks and barrels.	Nails.	Straw and hay.
	Pounds.	*Pounds.*	*Pounds.*	*Number.*	*Tons.*	*Tons.*	*Cords.*	*M. feet.*	*Number.*	*Kegs.*	*Tons.*
Grand total	9, 196, 655	110, 000	7, 927, 236	13, 655	646, 898	28, 410	63, 867	53, 585	914, 619	15, 150	21, 298
California	120, 000	24, 000	56, 000	60	1, 650	....	375	128	100	50	72
Connecticut	....	....	....	16	1, 800	300	50	....	....	....	....
Illinois	817, 000	....	16, 000	627	35, 242	400	4, 212	2, 012	4, 500	544	941
Indiana	662, 000	....	30, 000	1, 100	61, 050	71	460	1, 767	....	1, 040	467
Iowa	37, 500	....	....	1	400	40	....	18	800	10	1
Kentucky	165, 000	....	1, 000	202	12, 829	982	60	1, 115	400	690	1, 155
Maryland	68, 000	....	624, 000	587	15, 723	....	1, 848	2, 210	1, 200	593	409
Massachusetts	253, 679	60, 000	152, 800	150	10, 899	1, 017	1, 184	301	53, 475	148	325
Michigan	75, 000	....	100, 000	120	3, 600	....	600	300	....	60	40
Missouri	951, 350	....	....	601	36, 070	781	3, 203	1, 154	1, 500	512	617
New Hampshire	....	....	25, 000	75	1, 000	200	1, 000	80	....	25	25
New Jersey	629, 000	....	2, 251, 998	2, 118	61, 530	....	29, 144	10, 529	31, 000	3, 596	3, 002
New York	242, 000	....	1, 595, 650	1, 661	52, 266	2, 484	11, 247	5, 201	147, 977	1, 698	2, 328
Ohio	700, 425	....	147, 600	835	54, 945	3, 935	1, 488	3, 098	86, 835	670	1, 375
Pennsylvania	3, 541, 981	26, 000	2, 927, 188	5, 170	278, 575	16, 277	8, 996	24, 834	516, 520	5, 062	9, 787
West Virginia	933, 720	....	....	332	19, 319	1, 923	....	838	70, 312	452	754

CHAPTER II.—GLASS: ITS COMPOSITION, CLASSIFICATION, AND PROPERTIES.

DIFFICULTY OF DEFINITION.—It is extremely difficult, if not impossible, to give a definition of glass that shall be simple and yet embrace all substances to which the term is properly applied.

GLASS, CHEMICAL AND COMMERCIAL.—In chemistry many compounds of silica, borax, tin, antimony, and other substances are called glass, being known as "silicate glass", "phosphate glass", or "borax glass", according to the material of the compound. Indeed, any product of fusion that is hard and brittle and has the peculiar luster called vitreous is chemically known as glass. Commercially, however, the word glass is, with few exceptions, chiefly the enamels applied only to the silicates, or the compounds of silica, generally in the form of sand, with lime, soda, potash, the oxide of lead, and similar bases. The manufactured glass of commerce, however, is not a simple silicate, but, with one exception (water glass), is a fused mixture of two or more simple silicates. Flint glass, for example, is a double silicate of potash and lead; window-glass a tersilicate of potash, soda, and lime. In the process of manufacture, however, these simple silicates are not first separately produced and then fused, but the making of the "metal", as the fused glass is termed, is a double process, though a continuous one, the simple silicates of lime, or soda, or lead, or potash, as the case may be, being first formed in the pot of the glass-maker from the materials charged, and then, without any break in the continuity of the process, these simple silicates are fused in the same pot, and at the same melting, into the vitrified, non-crystalline material we know as glass.[a]

CHIEF CONSTITUENTS.—It will thus be seen that the principal and essential constituents of glass are silica or sand and an alkali, or sometimes a metallic oxide. The chief alkalies used are soda, lime, and potash, and the chief oxide is that of lead. Other oxides, as those of zinc, tin, and antimony, are sometimes used; and other materials, as manganese, oxide of iron, arsenic, etc., are found in glass, but they are there as impurities, or as materials used to correct impurities.

VARIABILITY OF COMPOSITION.—While these are the chief constituents, and while it is possible to indicate approximately the composition of the different kinds of glass, this composition, even in different specimens of the same kind, is by no means definite. The relative quantities of silica and the alkalies vary greatly. Flint or lead glass, for example, is made harder or softer as the proportion of sand is increased or decreased, though in these varying degrees of hardness it would be termed a silicate of potash and lead. The crystal, flint glass, and Strass of Ure's classification differ greatly in their properties, appearance, and composition, but each is regarded as a silicate of potash and lead. In a word, while glass is regarded as a chemical compound—a silicate—unlike most chemical compounds, it has no fixed definite composition in the several varieties. Indeed, though constant attempts have been made to produce as a commercial article a glass of that fixed, definite composition that experience has shown to be the best for a given kind, but little success has been attained, except, perhaps, at times at the celebrated plate-glass works of Saint-Gobain, France. The conditions of manufacture, especially in melting and the varying quality of the ingredients, preclude this.[b]

APPROXIMATE COMPOSITION.—Keeping in mind this variability in the composition of glass, the proportion of the essential ingredients in the chief varieties included in the report of the special agent may be given approximately as follows:

Kinds of glass.	Silica.	Soda.	Lime.	Potash.	Oxide of lead.	Oxide of iron.	Alumina.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Cast plate	74.0	12.0	5.5	5.50	....	....	....
Window	73.0	13.0	13.0	....	....	....	....
Lead flint	52.0	....	....	13.67	33.28	....	....
Lime flint	73.3	14.5	12.7	....	....	....	....
Green bottle	60.0	....	20.0	3.00	....	4	10

DIFFICULTY OF CLASSIFICATION CHEMICALLY.—It has been as difficult to make a classification of glass as to define it. This difficulty chiefly arises from the variability of composition, already noted, as well as from different writers considering glass from different standpoints, some regarding it chemically, others commercially. The classification used in late English works, that of Ure, (*a*) is not at all satisfactory, as while it professes to be a chemical classification, it is neither that nor a commercial classification. It seems well-nigh impossible to make a chemical classification that shall be satisfactory. (*b*)

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[a] Ure defines glass as "a transparent solid formed by the fusion of siliceous and alkaline matter". (See *Ure's Dictionary*, article, Glass.) Fownes, in his *Chemistry*, says: "Glass is a mixture of various insoluble silicates with excess of silica, altogether destitute of crystalline structure." Lardner, in his *Cabinet Cyclopædia*, includes "all mineral substances which, on the application of heat, pass through a state of fusion into hard and brittle masses, and which, if then broken, exhibit a lustrous fracture". The definition of Dr. Benrath, of Germany, recently published, is perhaps the best. He says: "By glass, in the technical sense of the term, we understand a silicate or silicate mixture which at a high temperature is thin fluid, and which, as the temperature falls, passes gradually through the tenaciously fluid into the solid condition; in which, furthermore, the unassisted eye can perceive no crystalline structure, and which is impenetrable to both liquid and gaseous fluids."

[b] A discussion of the reasons for this lack of uniformity of composition belongs properly to chemistry.

DIFFICULTY OF CLASSIFICATION COMMERCIALLY.—A similar difficulty, though from other causes, presents itself in any attempt to classify glass on any basis, especially on a commercial basis. The names that have attached themselves to the different kinds of glass are almost innumerable. Without attempting a classification, then, that shall be complete, it will be sufficient for the purposes of this report, as it chiefly considers glass as an article of commerce, to mention some of the most prominent of these commercial varieties. (*c*)

CLASSIFICATION.—In gathering the statistics of glass at the present census a classification into four general varieties was used. This classification, somewhat extended, to include sub-varieties not made in this country, is as follows:

1. PLATE-GLASS is glass which is cast upon a flat, smooth, cast-iron table and immediately rolled into sheets or plates of a required thickness by heavy rollers. Without being allowed to cool, the plates are laid in annealing ovens. It is chemically a silicate of lime and soda or potash.

Rough plate is the crude plate-glass as it comes from the annealing oven.

Rolled plate, or *rolled cathedral plate*, is rough plate from one-eighth to one-quarter of an inch in thickness.

Ribbed plate is a rough plate, with regular corrugations or ribs.

Polished plate, to which the term plate-glass is usually applied, is the rough plate that has been submitted to the successive operations of grinding, smoothing, and polishing to prepare it for use for windows, mirrors, etc.

These are the only varieties of plate-glass produced in this country, and are all the varieties that are produced from cast glass. Formerly a blown glass, made somewhat heavier than sheet or window glass, and called *blown plate*, was made in England, and is still made in Germany to some extent.

Patent plate is also a name applied in England to ordinary sheet glass ground and polished by Chance's patent process.

2. WINDOW-GLASS.—This is more properly termed *sheet* or *cylinder glass*. It is the ordinary window-glass of commerce, and is blown in cylinders, which are opened and flattened out into sheets, some as large as 60 by 40 or 80 by 30 inches. It is a silicate of lime and soda or potash.

Colored or *painted glass*, so far as the same is used for windows, may be included in this class. This is a silicate of lime and soda with the necessary coloring matter. It receives different names, according to the method of applying the color. It is termed *pot metal* (*d*) when the color permeates the whole body of the glass, *flashed* or *double glass* (*d*) when the colors are confined to the surface, and *stained glass* when the colors are burned into the surface in the glass-stainer's kiln.

Crown-glass is also a variety of blown window-glass that is no longer made in this country, though it is still made in England. It is first blown, and then by peculiar and very skillful manipulations formed into a circular table with a bullion or bull's-eye in the center. From this table moderate-sized window-plates are cut which show a crowned surface.

3. FLINT GLASS.—This term has a wide application, and includes table and other glassware, both blown and pressed, chimneys, and a large class of bottles and vials, articles often differing widely in chemical composition.

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a This classification is as follows (see *Dictionary of Arts*, etc., article, "Glass").

1. Soluble glass: a simple silicate of potash or soda, or both of these alkalies.
2. Crown-glass: a silicate of potash and lime.
3. Bottle-glass: silicate of lime, soda, alumina, and iron.
4. Common window-glass: silicate of soda and lime, sometimes also of potash.
5. Plate-glass: silica, soda or potash, lime, and alumina.
6. Ordinary crystal glass: silicate of potash and lead.
7. Flint-glass: silicate of potash and lead.
8. Strass: silicate of potash and lead, still richer in lead.
9. Enamel: silicate and stannate, or antimoniate of potash, or soda and lead.

We must remember with regard to this table that crown-glass always contains soda, that alumina and iron are accidental, not essential, constituents of bottle-glass, and that enamels vary greatly in their composition. Tin is not present in transparent enamels.

b Tomlinson's classification, quoted in *Lippincott's Encyclopædia of Chemistry*, vol. ii, page 3, is one of the best.

c It may be well to note that glass is divided into two general classes, natural and artificial glass, and these are again subdivided. Natural glass is that produced entirely by natural agencies, without any assistance from man. It includes the mineral obsidian, an impure, semi-transparent glass, varying in color from gray to black, found in the vicinity of volcanoes, and which was used in the manufacture of works of arts by the ancient Romans and Egyptians, and in later times by the Mexicans; and the fine capillary glass called Pelé's hair, found at the volcano of Kilauea, in the Sandwich Islands, and water glass, found in certain springs. Water glass is also found absorbed in certain basaltic rocks, and attempts have been made, with considerable success, to use decomposed basalt for manufacturing bottle-glass. Artificial glass is that produced in the arts. It includes, in addition to that made in the glass houses, various slags resulting from metallurgical operations, as blast-furnace slag, which is a lime glass with an excess of lime, and slag-wool, which is an artificial Pelé's hair. It also includes many chemical glasses. A classification of glass according to method of manufacture is also sometimes made as "cast glass", "blown glass," and "pressed glass". A classification according to use also sometimes obtains as window-glass, bottle-glass, chemical glass, and one, according to place of manufacture, as Venetian, Egyptian, etc.

d Pot metal and flashed glass are also made in flint glass.

It includes *lime glass* or the *common flint*, sometimes also called *German flint*, and, by many American manufacturers, *crystal glass.* It is a silicate of lime and soda or potash. The celebrated Bohemian glass is a lime glass, as is also the "*Gobcleterie*" of the French, which is a silicate of lime and soda, potash being used only in a better glass.

A second general subdivision of flint glass is:

Lead glass.—This is a silicate of potash and lead which has literally the ring of mètal, and is distinguished from the lime glass by this ring and its greater specific gravity. It is also, as a rule, more brilliant. This glass is the crystal (*cristaux*) of the French and the true flint of the English.

Strass is a glass very rich in lead, used in the manufacture of artificial gems.

Optical glass is both a lead and lime glass, the former known in instrument-making as flint, and the latter as crown, but differing from the "crown" mentioned under "window-glass". These glasses are of different densities and refractive powers, and are used in the manufacture of achromatic object-glasses. The terms "flint" and "crown" glass are, according to Bontemps, applied on the continent of Europe exclusively to optical glass.

4. GREEN GLASS.—This is a coarse, greenish glass, often termed bottle-glass, it being used chiefly for common bottles. It is called in this country hollow ware, though the German *hohlglas*, or hollow glass, comprises all glass worked into the form of vessels or tubes. The American green glass is a silicate of lime, soda, alumina, and iron, the last two ingredients being found as impurities in the sand, the iron giving the glass its greenish hue.

To these varieties might be added many others, which it would exceed the scope of this report to mention. There are some varieties, however, that deserve notice. Among these are water glass, or soluble glass, a silicate of soda or potash, or both, which is highly alkaline, and is used in the manufacture of soap, as a vehicle in painting, a mordant in fixing colors, in the preparation of artificial hydraulic cement, and in the silification of calcareous stone.

Enamel is a silicate, borate, stannate, or antimoniate of potash or soda and lead.

Hardened, toughened, or *tempered glass* is not annealed, as is usual with glass, but is tempered in a hot, oily mixture, as in M. de la Bastie's process, or in peculiarly constructed molds, as in Siemens' process.

Spun glass is a glass drawn into threads finer than silk and woven into small articles.

Ground glass.—The obscuring of the surface of sheet glass or flint-glass is accomplished by the friction of a stone wheel, or a movable rack with pebbles or little stones, water, and sand, or by the sand-blast, or by the fumes of hydrofluoric acid.

In *figured* and *cut glass* the ground surface is removed in set forms and designs by the use of wheels of stone, wood, or cork, or by the use of hydrofluoric acid, producing both—

Etched and embossed glass.

Iridescent glass is a reproduction by art of the beautiful iridescent colors of ancient glass that has been long buried.

To these varieties may be added the beautiful products of ancient and modern Venetian glass mentioned in the chapter on modern glass.

SPECIFIC GRAVITY.—The specific gravity of glass is a property of considerable importance in connection with the manufacture of object-glasses for achromatic telescopes and of artificial gems, though in the production of common glass but little attention is given to it. In general the power of refracting light increases with the increase of its specific gravity, though density and power of refraction are not strictly parallel.

The specific gravity of glass, as well as its brilliancy, varies with its composition, the heavier glasses being the most brilliant, as well as the softest. Lime glass is the lightest, bottle-glass comes next, and lead glass is the densest. Its density is also influenced by the degree of heat to which it has been exposed during its vitrification, being always least when the temperature has been greatest. The following are the specific gravities of the glasses named:

Lime glass:	
Bohemian	2.396
Plate-glass:	
Saint-Gobain	2.488
Cherbourg	2.506
Window-glass	2.732
Bottle-glass	2.732
Lead glass:	
Common flint	2.9 to 3.255
Optical	3.3 to 3.6

CONDUCTIVITY AND TENSION.—Glass is a bad conductor of heat and electricity, but all kinds are not equally adapted to become insulators, glasses rich in alkali being bad insulators. The tension and enforced equilibrium in the interior of a mass of glass rapidly cooled, as exhibited, for example, in Prince Rupert's drops, is well known.

TENSILE AND CRUSHING STRENGTH.—The tensile strength of glass is given at from 2,500 to 9,000 pounds per square inch, according to kind; crushing strength, 6,000 to 10,000 pounds per square inch. A sample of Millville

(New Jersey) flooring glass, one inch square and one foot between the end supports, broke under a certain load of about 170 pounds. These facts would indicate that glass is considerably stronger than granite, except as regard crushing, in which the two are about equal.

Devitrification.—The devitrification of glass is one of its most important properties, not only because of its bearing on the manufacture and manipulation of glass, but because the devitrified glass, often called Reaumur's porcelain, can replace porcelain for most of its uses. Devitrification is a crystallization of glass, the ordinary glass being non-crystalline. In the manufacture of glass by the ordinary process it is cooled suddenly, the excessive brittleness and internal tension thus caused being reduced by annealing. On the other hand, when the fused metal is cooled slowly, the mass assumes a crystalline structure, becomes tough, fibrous, opaque, much less fusible, so hard as to cut other glass, is not so easily filed, and is a better conductor of electricity and heat.

Devitrification in its relation to manipulation.—This property exerts a great influence in the manufacture of glass. It explains, indeed, why, in the making of bottles, so much care is taken to avoid the repeated reheating of the mass which is to be formed into these articles. It would be thoroughly devitrified in a short time; the glass would become hard, difficult to fuse, and would present a multitude of solid grains disseminated in a matter still soft. In the same manner it is evident why green glass, and even common white glass, and still more so bottle-glass, can only be shaped by the lamp of the enameler, when the work is performed with great dispatch. If he work so slowly that he is obliged to reheat several times the glass tube which he is blowing, the mass devitrifies, and all the phenomena show themselves which have just been described. In vain does he then try to blow a bulb, as all the force of his lungs will not avail, and the glass is no longer soft. Beside, the material then becomes striated, semi-opaque, and almost infusible.

Other properties.—These and the other properties of glass, together with its wide range of uses in the arts, contribute to render it one of the most curious and interesting of manufactured articles. Composed of materials that are opaque and of but little luster or brilliancy, it is itself exceedingly brilliant and of a most beautiful polish. Perfectly transparent, unless impure, and transmitting light freely, it may readily be obscured or ground so as to soften and diffuse the light. It can be cut in various forms, increasing its richness and brilliancy; it may be engraved in most charming and delicate tracery and figure-work, or it may be tinted with any color, either opaque or transparent, without the least loss of brilliancy or polish. Though not malleable, (*a*) its ductility is so great that it may be spun in a moment into filaments as small as a spider's web and miles in length, or blown to such gauze-like thinness as to float upon the air. The synonym of brittleness itself, its elasticity as spun glass permits of its being readily bent and woven into cloth, and even tied into knots, while a ball of glass dropped upon an anvil will rebound two-thirds the distance of its fall. Though hard and brittle when cold and incapable of being wrought, when heated it is softened, tenacious, and pliable, and is capable of being molded into any form, while it retains in cooling its beautiful polish. In ordinary use glass resists the action of water and alkalies, and, with a single exception, of all acids, preserving all its beauty, retaining its surface, and not losing the smallest portion of its substance by the most frequent use. (*b*)

Extent of the uses of glass.—For many centuries these properties of glass have caused it to be admired and sought for by all classes. It was the material of many of the most common utensils in the Roman household in the days of the empire, when porcelain was unknown, as it is of our homes to-day. Not only is it thus devoted to common uses, but art, taking advantage of its properties, has given us the grace and beauty of the Portland, Naples, and Milton vases, the almost unearthly splendor of the emblazoned windows of the mediæval churches, and the rare color and graceful design of the well-nigh imperishable mosaics. To use the words of Dr. Johnson:

> Who, when he first saw the sand and ashes by casual inteneseness of heat melted into a metalline form, rugged with excrescences and clouded with impurities, would have imagined that in this shapeless lump lay concealed so many conveniences of life as would in time constitute a great part of the happiness of the world? Yet, by some such fortuitous liquefaction, was mankind taught to procure a body at once in a high degree solid and transparent, which would admit the light of the sun and exclude the violence of the wind, which might extend the sight of the philosopher to new ranges of existence, and charm him at one time with the unbounded extent of the material creation and at another with the endless subordination of animal life, and, what is yet of more importance, might supply the decay of nature and succor old age with subsidiary sight. Thus was the first artificer of glass employed, though without his own knowledge or expectation. He was facilitating and prolonging the enjoyments of light, enlarging the avenues of science, and conferring the highest and most lasting pleasures, and was enabling the student to contemplate nature, and the beauty to behold herself. (*c*)

Analyses of glass.—In the accompanying tables will be found analyses of plate-, window-, flint-, and bottle-glass.

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[a] One of the problems regarding glass alleged to have been asked by Aristotle was, "Why is glass not malleable?" The statements about malleable glass may be regarded as fables.

[b] This is strictly true of glass only under circumstances of ordinary use. All glass is affected by caustic alkalies, especially in concentrated solutions, as it is thus deprived of silicic acid. The action of mineral acids upon well-compounded glass is less energetic, though not only such acids, but even pure water, exerts a decomposing influence upon glass, producing its effect, however, very slowly under ordinary circumstances.

[c] *Rambler*, No. IX.

ANALYSES OF PLATE-GLASS.

Kinds of glass.	Analysts.	Silica.	Soda.	Potash.	Lime.	Magnesia.	Manganese.	Sesquioxide of iron.	Alumina.
French:									
Saint-Gobain	Peligot	73.00	11.50	......	15.50	......	......	......	......
Saint-Gobain (sulphate)	Pelouze	73.05	11.79	......	15.10	......	......	......	......
French	Dumas	75.90	17.50	......	3.80	......	......	......	2.80
Do	do	73.80	12.10	5.50	5.60	......	......	......	3.50
English:									
Chance's	Benrath	70.71	13.25	......	13.38	......	......	1.92	
Chance's (second quality)	do	72.90	12.45	......	13.26	......	......	1.93	
British Plate-Glass Company	Mayer and Brazier	77.36	13.06	3.01	5.31	......	......	0.91	Trace.
London-Thames Plate-Glass Company	do	78.68	11.36	1.34	6.09	......	......	Trace.	2.68
Belgian:									
Charleroy	Benrath	73.31	13.00	......	13.34	......	......	0.83	
German	Jaeckel	72.31	11.42	14.96	......	......	......	......	0.81
Hanoverian	Emmerling	73.79	13.94	0.60	8.61	0.12	0.32	0.68	0.58
Venetian	Berthier	68.60	8.10	6.90	11.00	2.10	0.10	0.20	1.20

ANALYSES OF WINDOW-GLASS.

Kinds of glass.	Analysts.	Silica.	Soda.	Lime.	Alumina.	Sesquioxide of iron.
French	Dumas	68.00	10.10	14.30	7.60	......
Do	do	69.65	15.22	13.31	1.82	......
English	do	69.00	11.10	12.50	7.40	......
Chance's	Cowper	71.40	15.00	12.40	0.60	......
Russian	Benrath	71.27	20.10	8.14	1.98	

ANALYSES OF FLINT-GLASS.

Kinds of glass.	Analysts.	Silica.	Soda.	Potash.	Lime.	Lead.	Magnesia.	Manganese.	Sesquioxide of iron.	Alumina.
LIME GLASS.										
French	Pelouze	72.10	12.40	......	15.50	......	......	......	......	......
Do	do	77.30	16.30	......	6.40	......	......	......	......	......
French tubes	Berthier	69.20	3.00	15.80	7.60	......	2.00	......	0.50	1.20
Bohemian tubes	Rowney	73.13	3.07	11.49	10.43	......	0.26	0.46	0.13	0.30
Bohemian drinking-glass	Berthier	71.70	2.50	12.70	10.30	......	0.20	......	0.30	0.40
Bohemian common glass	Dumas	69.40	......	11.80	9.20	......	......	......	......	9.60
American, O'Hara Glass Company, Pittsburgh	De Brunner	71.92	14.55	......	5.14	......	2.04	Trace.	Trace.	6.22
LEAD GLASS.										
English crystal	Faraday	51.93	......	13.67	......	33.28	......	......	......	......
English crystal, London	Berthier	59.20	......	9.00	......	28.20	......	......	0.40	......
Do	Salvétat	57.50	1.00	9.00	......	32.50	......	......	......	......
English crystal, Newcastle	Berthier	51.40	......	9.40	......	37.40	......	......	0.80	1.20
French crystal	Sauerwein	48.10	......	12.50	0.60	38.00	......	......	0.50	......
Do	Salvétat	51.00	1.70	7.60	......	38.30	......	......	1.30	
Do	do	54.20	0.90	9.20	......	34.60	......	......	0.50	
Do	Benrath	50.18	......	11.62	......	38.11	......	......	0.40	
Flint-glass	Faraday	44.30	......	11.75	......	43.05	......	......	......	......
Do	Dumas	42.50	......	11.70	0.50	43.50	......	......	......	1.80
American, New England Glass Company	Fletcher	53.98	6.71	7.60	......	29.78	......	......	1.93	
Do	do	54.12	5.58	7.98	......	31.27	......	......	1.05	

ANALYSES OF BOTTLE-GLASS.

Kinds of glass.	Analysts.	Silica.	Soda.	Potash.	Lime.	Magnesia.	Manganese.	Sesquioxide of iron.	Alumina.
French:									
Sauvigny	Berthier	60.00	3.10		22.30	......	1.20	4.00	[illegible].00
Saint-Étienne	do	60.40	3.20		20.70	0.60	......	3.80	10.40
Épinac	do	59.60	......	3.20	18.00	7.00	0.40	4.40	6.80
Sèvres	Dumas	53.55	......	5.48	29.22	......	......	5.74	6.01
Clichy	do	45.60	......	6.10	28.10	......	......	6.20	14.00
Bohemian champagne bottles	Maumené	58.40	9.90	1.80	18.60	......	......	8.90	2.10
Do	do	62.21	5.69	1.91	22.93	......	......	6.10	1.16
Do	do	63.34	4.17	2.10	21.34	......	......	4.42	4.72
German	Benrath	69.82	18.28	1.50	7.82	......	......	2.58	
Do	do	62.78	19.14	11.24	6.11	......	......	0.73	
Do	do	64.41	15.76	10.50	5.81	......	......	3.72	
Russian	do	65.77	11.75		16.58	......	......	5.90	
Do	do	68.38	19.03		10.19	......	......	2.40	

CHAPTER III.—SAND.

DIFFERENT PROPORTIONS OF SILICA IN GLASS.—The chief constituent of glass, as well as the only one that enters into the composition of all its varieties, is silica. Though present in all glass, its relative proportion differs greatly, not only in the several varieties, but in different samples of the same variety, and sometimes in different specimens from the same pot or "melting". Indeed, as to its content, not only of silica, but of other ingredients, glass is a most capricious substance.

SILICA IN DIFFERENT KINDS OF GLASS.—Lead glass contains the least percentage of silica, ranging from 42 to 60 per cent., and cast-plate contains the greatest percentage, some analyses showing as high as 79 per cent., the average being about 74 per cent. Window-glass averages about 70 per cent., lime-glass 72 per cent., and green bottle-glass 60 per cent.

HARDNESS.—The hardness of glass depends, as a rule, on the percentage of silica it contains, though it is somewhat affected by the alkali or oxide used as a base. Lead, for example, tends to make glass softer and more fusible and lustrous, while lime renders it refractory and less susceptible to the action of acids and alkalies. The relative hardness of different specimens of either lead or lime glass depends, however, on the amount of silica, that being the harder and less liable to melt which has the most. It would follow, from what has been said, that green glass is the hardest, followed in their order by lime-flint glass, window-glass, plate, and, lastly, lead glass, which is the softest.

FORMS OF SILICA USED.—Silica is now used in glass-making almost universally in the form of sand. This also seems to have been the practice at the earlier glass houses. (*a*) In modern glass houses, however, until some fifty years since, silica for the finer grades of glass was procured by an expensive process of crushing and washing flint (*b*) and quartz. This process is still used to some extent, especially in those districts where good sand either cannot be obtained or is too expensive to permit of its use. Bohemian glass, for example, is made almost entirely from quartz so prepared. In some parts of Germany and Austria, especially in the making of bottles, certain siliceous rocks, as basalt and trachyte, containing large percentages of soda and potash, are used, but at the present time, and for many years, sand has supplied most of the silica used in glass. Sand is generally less expensive, and in many cases is of greater purity and value as a material, glass made from many native sands being superior in every respect to that made from the artificially-prepared flint and quartz sands. (*c*)

USES OF THE DIFFERENT GRADES.—For the finer grades of glass, especially where freedom from color, perfect transparency, and great brilliancy are essential, only the purest qualities of sand can be used, as slight impurities, especially small amounts of iron, will seriously impair all of these desirable properties. When, however, color is secondary to cheapness of production, as in the manufacture of green bottles, sands with considerable iron and clay are not only used, but in some cases are preferred, as these materials are fluxes, and consequently require less flux in the "batch" or mixture of materials.

IMPURITIES AND THEIR REMOVAL.—The chief impurities in sand are oxide of iron, alumina, generally in the form of clay, loam, gravel, and organic matter. Most of these can be removed by burning and washing, (*d*) but the iron and part of the organic matter can only be removed or neutralized by the use of chemicals. Of these impurities iron is by far the most dreaded, as it not only destroys the "color", the limpid whiteness of the glass, giving it a greenish cast, but it is exceedingly difficult to remove or neutralize its effect. Manganese is used to correct this

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a This is not universally true. Agricola says, in Book XII of *De Re Metallica*, that "white stones, when melted, are the best ingredients for glass". Pliny states that "of white stones very transparent glass is made".

b From this use of flint in its composition is derived the term "flint-glass".

c As showing what but a few years ago was regarded as nearly pure sand, it may be mentioned that Dr. Lardner, in his *Cabinet Cyclopædia*, London 1832, article, "Porcelain and Glass," page 28, gives an analysis of flint which he terms "silica in a state nearly approaching to purity". This flint contained 98 per cent. of silica and 0.25 per cent. of iron. Compared with the Berkshire sand, which contains 99.78 per cent. of silica and virtually no iron, this flint was very impure silica.

d Burning is necessary where the sand contains much organic matter. Generally the heat of the furnace in the melting of glass is sufficient, the carbonized matter being carried away as carbonic acid by the aid of arsenic. In washing the sand to remove the clay, gravel, loam, and similar impurities, it is first crushed and pulverized, if necessary. The pulverizer used at some of the works of this country is the well-known ore-mill of the rolling-mills, which consists of a large circular pan, in which revolve, like wagon-wheels, two large cast-iron wheels four feet in diameter. Running water pouring into the pan facilitates the grinding and carries the sand to a sieve, where the larger pieces and the gravel are separated. The sieve is cylindrical or octagonal, made of brass wire, about three feet in length and a foot and a half in diameter, and revolves like a flour-bolting machine. After passing through the sieve the sand is carried along a trough by water into the washer, where it settles to the bottom of the box, while the water "wastes" over the top, carrying away the clay and loam. The sand is then elevated and discharged into another trough at a higher level, where it is again washed. Sometimes this operation is repeated several times. The sand is finally carried to the draining-room, where it is drained of water, and then to the drying-room, where it is dried by artificial heat. As the sand dries it drops into a funnel-shaped trough, and from that passes into a conveyer, and thence to an elevator. The sand comes from the drier fine and almost as white as flour.

greenish color, and is often termed "glass-maker's soap", but glass so decolorized is liable under the action of sunlight to acquire a purplish tint or "high color". Window-glass in which manganese has been used often assumes this tint to such an extent as to lead to the belief that it was originally colored. The only safeguard against this "high color" is the use of sand containing little or no iron, and therefore not requiring any "doctoring" of the batch. (*a*) As to the amount of iron allowable in sand for glass-making, it may be said that that containing more than one-half of one per cent. is not considered suitable for any glass, while for plate- and window-glass and the finer grades of table ware the less the amount of iron the better. That used at the table-glass houses in the neighborhood of Pittsburgh and near Boston contains only a trace of iron.

USE OF ARSENIC.—The organic matter which carbonizes in the pot during the melting of the glass materials is removed as carbonic acid by the use of arsenic, which is the great "decarbonizer" in glass-making, as manganese is the "decolorizer". The arsenic is added to the batch prior to charging it into the pots.

TESTS OF SAND.—In examining sand as to its value for glass-making the best test is microscopic examination. Sand should be perfectly white, not very fine, uniform, even grained, with angular rather than rounded grains. Sand which is very fine, or the grains of which are smooth and rounded, can only be used with difficulty and great uncertainty as to the result. Such sand is liable to settle to the bottom of the batch, preventing an even mixture, of the materials and producing an uneven glass. Sand should not effervesce or lose color when heated with an acid, as loss of color indicates the presence of clay, loam, or other foreign substances, while effervescence indicates the presence of lime. Oxide of iron can be discovered by boiling the sand in hydrofluoric acid and dropping into the solution thus formed a few drops of yellow prussiate of potash in solution. The beautiful blue precipitate indicates the presence of iron, even in the most minute quantities.

ANALYSIS AND COLOR NOT ALWAYS INDICATIVE OF THE QUALITY OF SAND.—These are simple, qualitative tests, but only indicate in a general way the quality of the impurities present. For an accurate knowledge of the quantity a quantitative analysis is necessary. It should, however, be noted that while such an analysis, aided by the appearance and color of the sand, indicates in some measure its purity and value, it is by no means conclusive as to its adaptability for glass-making, as a sand of a yellowish tint may be purer than one much whiter. Mr. Henry Chance, of Birmingham, England, whose two papers on crown and sheet glass are the best in the language, speaking of color and analysis as indications of purity and value, says:

> The sand used by our firm is obtained from Leighton Buzzard, and, although of a yellowish tint, is more free from iron than many kinds of sand which are whiter in appearance. The whiteness of a sand is a very uncertain test of its purity. Again, two kinds of sand which are shown by analysis to be precisely similar in their composition may produce different results as regards both color and quality of glass. (*b*)

Mr. Chance suggests that this may be due to a difference in the power of the sands, arising from the condition in which the silica exists, to neutralize the bases.

MODE OF OCCURRENCE OF SAND.—Most of the sand used in glass-making occurs as sandstone, and is quarried in blocks, and must be crushed and prepared for use. The Fontainebleau (France) sand and some of the Berkshire (Massachusetts) and Juniata (Pennsylvania) sands are of this character. In other cases, while the sand occurs as rock and must be quarried, it rapidly disintegrates on exposure to air and moisture, as at some of the Juniata (Pennsylvania) mines. At other quarries, where the formation is saccharoidal or sugar-like, the sand-rock has a very weak bond, and is readily detached from place with a pick, rapidly falling into fine sand. This is the nature of the sand at Crystal City, Missouri, and at some of the Berkshire (Massachusetts) mines.

SEA OR RIVER SAND.—While most of the sand used is quarried or mined, some glass is still made, as was the earliest glass, from river or sea sand. As a rule, however, this is only employed for the coarser and cheaper kinds.

IMPORTANCE OF GOOD SAND.—The quality of the sand has always been an item of great importance to glass manufacturers, and the possession of a pure sand well adapted to glass-making has determined in many cases the location and successful operation of the glass houses, not only of antiquity, but of modern times. The sand used in the earliest glass works was river or sea sand, and these ancient factories were, therefore, generally placed at the mouths of rivers, as at Belus, Alexandria, Cumes, and Volterno. These locations were selected, not only because they furnished an abundance of good sand, but because they were the great doorways of commerce, and offered a ready market for the products of the glass-makers' art.

SAND FROM THE RIVER BELUS.—The most remarkable and widely-used deposit of glass sand known to the ancient world, as well as the purest, was that of the river Belus, which flows from Mount Carmel and enters the sea near Tyre and Sidon, the sand made famous by Pliny's oft-repeated fable of the discovery of glass. Not only was glass made in great quantities from this sand by the skillful Sidonians (*c*)—the lovely Greek and other vases, the varied beads and amulets found in the tombs so thickly scattered over every shore "washed by the Mediterranean

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[a] For the results of a most ingenious and long-continued series of experiments on the action of sunlight on glass those interested are referred to the monographs of Mr. Thos. Gaffield, of Boston, Massachusetts, especially to his paper on "The Action of Sunlight on Glass", read before the American Association for the Advancement of Science at Boston in 1880.

[b] *On the Manufacture of Glass.* A lecture delivered before the members of the Chemical Society, March 19, 1868, by Henry Chance, M. A. London. Harrisons & Sons: 1868.

[c] Homer ascribes every object of art or ornament to the skill or genius of a god or a Sidonian.

sea"—but many of the glass works of other countries drew their supplies of sand for their best glass from this river of the Phœnicians. The Venetian glass works sent boats thither in the days of their greatest renown to collect sand for the factories of Venice and Murano, and it is more than probable that the brilliant mosaics of Saint Mark, and the delicate and precious vases and wares that have reflected so much honor upon Venetian glass, owe some of their marvelous color and beauty to the purity of the Phœnician sand; indeed, it was believed at one time that it was the only sand that could be vitrified. (*a*)

OTHER RIVER AND SEA SANDS.—The sands from the banks and coasts of other rivers and seas were also used largely in the ancient glass-houses. Those of Egypt used Nile sand; the Volterno and the rivers of Gaul and Spain furnished sand for the glass made on their banks, while in latter times the Tyne, in England, has been a source of supply for the bottle houses of that district. Pliny mentions that in his time a fine white sand was found on the shore between Cumæ and Liternum which produced "*vitrum purum ac massa vitri candidi*". He adds that in Gaul and Spain sand was similarly used.

EARLY USE OF FLINT AND QUARTZ.—Though sea and river sand was thus the earliest form of silica used in the manufacture of glass, flint and quartz were employed at least before the beginning of the Christian era. Pliny states that glass of the most excellent quality was made in India from white stones. If any glass was made in India in Pliny's time, the use of quartz was probably exceptional, as most of the glass of that time and for some centuries after was made from native sand. From the fourteenth to the nineteenth century, however, it was made from flint or quartz. Agricola, who wrote in the sixteenth century, declares that white stones make the best glass, and should only be employed in the manufacture of crystal. Neri, who wrote in the seventeenth century, notes:

> That those stones which strike fire with a steel are fit to vitrify, and those which strike not fire with a steel will never vitrify; which serves for advice to know the stones that may be transmuted from those that will not be transmuted into glass.

Blancourt, who wrote at the close of the same century, states that the Venetians make use of a white flint from the river "Ticinus, where there is a great abundance of them; as also in the river Arnus, both above and below Florence, and in other places". He also mentions the use of a hard white marble which is found in Tuscany, and gives directions that "that ought to be chosen out which is very white, which has no black veins, nor yellow nor red stains in it".

Ferrandus Imperatus makes mention of a glass stone called "quocali", "like in appearance to white marble, being somewhat transparent, but hard as flint, and put into the fire it turns not to lime. It is of a light green, like a serpentine stone, and having veins like Venice talc. This being cast into the fire, ceases to be transparent, and becomes white and more light, and at length is converted into glass."

When Blancourt wrote, sand was displacing flint, a degeneracy in the art of glass-making which he laments "Nothing," he says, "but the Parcimony and Covetousness of the times has brought sand into use again, because glasses made of that may be afforded cheaper."

SUPERIORITY OF AMERICAN SAND.—As has already been stated, sand is almost universally used in the glass houses of to-day, quartz or flint being used only when good sand cannot be readily obtained. The superiority of the deposits of glass sand in the United States is universally conceded. At the London exposition of 1851 Messrs. Thomas Webb & Son, of Stourbridge, England, exhibited some glass of remarkable beauty and transparency made from Berkshire (Massachusetts) sand. They write me regarding this sand: "It was the *finest* we have *ever* used". Bontemps, whose eminence as an authority on all matters pertaining to glass cannot be questioned, in his report to the English government on the Paris exposition of 1855 states that a "magnificent sample of English flint-glass", Osler's candelabrum, the glass of which he asserts to be far superior to that of any other exhibitor, "was made with American sand." (*b*) In his *Guide du Verrier*, one of the best works on glass in any language, M. Bontemps also several times speaks of American sand as superior to the best French. (*c*) Mr. Henry Chance, in a lecture on glass, speaks of American sand as the "finest of all", and states that the best flint-glass exhibited at the Paris exposition of 1867, that of Messrs. Copeland, of Stourbridge, "surpassing in purity of color all other specimens of glass, whether British or foreign, (*d*) was made from American sand." But little of this sand, however, has been used in England. The great expense of importing, and the discovery of the excellent German sands, which are referred to on page 27, which can be supplied to the English glass works at a much less cost, have interfered with the use of the American sand.

ENGLISH SAND.—But little sand suitable for the finest grades of glass, such as plate-glass and the lead flint, is found in Great Britain. One of the earliest used in modern times in England was obtained from the commons near Lynn, in Norfolk, and was used by the manufacturers of the north and the midlands for many years. This was displaced by sand from Alum bay, in the Isle of Wight, which furnished for fifty years most of the silica used for flint-glass. An analysis of this sand shows only 97 per cent. of silica, 2 per cent. of alumina, magnesia, and oxide of iron, and 1 per cent. of moisture. Stony Stratford, Aylesbury, Reigate, and Hastings have

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a See *Strabo Geography*, Book XVI.

b *Reports on the Paris Universal Exposition*, Part II, *Report on Glass*, by G. Bontemps, pages 384 and 385. London, 1856.

c See *Guide du Verrier*, G. Bontemps, pages 46 and 532. Paris, 1868.

d *On the Manufacture of Glass*, by Henry Chance, page 3.

contributed sand to the English glass houses at different periods, and perhaps the best England has produced, except the Alum Bay variety, was that from Hastings; but an unfortunate advance in price drove the trade to France, which at that time took off its export duty, and so opened the markets of England to the French sand. (*a*)

SAND FOR ENGLISH PLATE-, WINDOW-, AND FLINT-GLASS.—The makers of the best flint-glass now use the French and German sands exclusively. The magnificent exhibit at the Paris exhibition of 1878 of Thomas Webb & Son, of Stourbridge, was made from these sands. Some of the manufacturers of plate-glass use Belgian sand; others the sand which is found in large quantities in Lancashire. (*b*) Messrs. Pilkington Bros., the large makers of blown window-glass at St. Helen's, use the Lancashire sand. Messrs. Chance, of Birmingham, obtain the sand for most of their glass from Leighton Buzzard, about 40 miles north of London; but for their optical glass, which is very noted, they use French sand. Most of the English sand requires washing. A fair average analysis of the Leighton Buzzard sand, which may also be regarded as showing the composition of the Lancashire, is 99 per cent. of silica, 0.30 per cent. of alumina, 0.20 per cent. of carbonate of lime, and 0.50 per cent. of oxide of iron. Large deposits of sand are found in Wales as sandstone, but the glass produced from it does not seem to be good in quality or in color.

SAND FOR BOTTLE-GLASS.—Regarding sand for the English bottle works, Ure states that—

> The laws of this country (England) till lately prohibited the use for making common bottles of any fine materials. Nothing but the common river sand and soap-boilers' waste (manganese) was allowed. (*c*)

As to the present practice, Mr. Chance writes:

> I believe that bottle-glass makers, color being a matter of minor importance, use whatever sand of a suitable character may be nearest to their works. Or, to put it in another form, a bottle-glass maker will place his works where he can have his sand and other materials as near at hand as possible.

FRENCH SAND.—Of the French sands, that taken as sandstone from the quarries in the forests of Fontainebleau is the best and the most widely used. Much of the finest glass of England and Belgium, and, until recently, of Germany, is made from it, and it is to its purity that the beautiful color of the French and Belgian plate-glass is attributed. One analysis shows: silica, 98.8 per cent.; magnesia and oxide of iron, 0.7 per cent.; moisture, 0.5 per cent. Another, and one that Mr. Henry Chance regards as an average analysis, shows: silica, 99 per cent.; alumina, 0.50 per cent.; carbonate of lime, 0.50 per cent.; oxide of iron, trace. Sand from the quarries in the forest of Compiègne, and also from the vicinity of Nemours, is largely used, and is stated to be "almost chemically pure and scarcely inferior to that imported at great cost from the United States". (*d*) In the south of France prepared quartz is still used. (*e*) The same statement as to sand for bottle-glass made in connection with English sand will apply to the French bottle houses as well. French manufacturers of this kind of glass locate their works where the materials are the cheapest, without reference to the purity of the sand. (*e*)

BELGIAN SAND.—Concerning Belgian sand but little has been learned. Bontemps mentions a locality near Namur which he classes with the French sands of Fontainebleau, Compiègne, and Nemours. (*f*) While the quality of the Belgian sand is on the whole good, it does not equal the French, and as a result considerable of the latter sand is used in the Belgian works.

GERMAN SAND.—For many years the best German glass was made either from French sand or prepared quartz and flint. Certain glass works on the Bohemian border still use the prepared quartz or flint for making window-glass and a good white glass for table ware, and a few, by reason of shorter and cheaper carriage, still draw their supplies from France. All the other works, with the exception of certain bottle houses, use German sand.

BEST GERMAN SANDS.—The sand for the plate-glass, window-glass, and the glassware houses of Germany comes chiefly from two very extensive deposits, one at Herzogenrath, near Aix-la-Chapelle, and the other in the Niederlausitz, near Hohenbocka, in the province of Brandenburg, in Prussia. These sands are exceedingly pure, one rivaling the Berkshire (Massachusetts) sands, as will be seen from the analyses on page 34.

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a A recent English journal contains the approximate dates at which these several deposits of sand became available.

Lynn	1750
Alum bay	1820
Aylesbury	1835
Stony Stratford	1835
Reigate	1835
Hastings	1856
Brooklyn	1851
Fontainebleau (France)	1860

It further remarks that it is more than probable that some of the northern manufacturers on the Tyne and Wear used sea-borne sand at the earliest period of glass-making. "It is possible that Venice may have sent us a supply when she sent us her glass-makers."

b For this and the following facts regarding the sand used by English glass-makers I am indebted to the kindness of Mr. Henry Chance, who has written to me very fully on this subject.

c *Ure's Dictionary*, vol. 1, page 925. New York, 1854.

d Bontemps' *Report on the Exhibition of* 1855, page 385.

e See Bontemps' *Guide du Verrier*, page 48.

f *Idem.*, page 46.

HERZOGENRATH SAND.

	Per cent.
Silicic acid	99.24
Alumina	0.20
Lime	0.053
Magnesia	0.033
Oxide of iron	0.005
Water	0.469

HOHENBOCKA SAND.

[Analysis by Bischof.]

	Per cent.
Silicic acid	99.760
Alumina	0.040
Lime	0.011
Magnesia	0.012
Oxide of iron	0.055
Oxide manganese	0.015
Potassium	0.039
Loss by ignition	0.240

Some of the German flint-glass works still use the Fontainebleau sand, and a few window-glass and lamp-chimney works, especially in Silesia and Westphalia, find it more profitable to use a white sand found near their works; but most of the German glass, with the exception of green glass, is made from sand from the two deposits of which analyses are given above.

USE OF ALKALINE ROCKS FOR BOTTLE-GLASS.—For bottle-glass the same conditions hold as noted before, only the German bottle-glass makers endeavor to find material containing as much alkali as possible. Mr. Julius Fahdt, the editor of *Die Glashütte*, Dresden, to whose courtesy I am indebted for much of the information regarding German sand, writes regarding the siliceous material used in bottle works:

> The most favorable deposits are of thanolite, found on the frontiers of Bohemia, on the banks of the Elbe; granite is also used, and is found frequently with 5 per cent. of alkalies (potassium and sodium); basalt, fluor-spar, and trachyte are used. Granite and trachyte are calcined and ground; basalt, fluor-spar, and thanolite are not calcined. Sometimes for light-colored glass a small proportion of white sand is used.

Mr. Friederich Siemens, who, in addition to his well-known scientific attainments, is the largest manufacturer of bottles in Germany, if not in the world, writes as follows regarding the use of these rocks:

> For common green bottle-glass the German and Austrian glass-makers use natural stones, such as granite, feldspar, basalt, thanolite, and trachyte. These rocks, containing a certain quantity of alkali, with 65 to 75 per cent. of silica, are a most valuable material, being both cheap and fusible. I began the use of these rocks for making bottle-glass at the time of the introduction of my continuous glass-melting tanks, some ten years ago, and other glass-makers very soon adopted my method of making glass from these rocks.

The success that has attended the use of these alkaline rocks in Germany and Austria should lead our glass-makers to attempt their use.

AUSTRIAN SAND.—For native sand, for its finest grades of glass, the works of Austria-Hungary depend almost entirely upon Germany, the Hohenbocka deposit furnishing the larger part, the Herzogenrath bed not being so situated as to supply them. This German sand is so well adapted to glass-making that it is carried long distances, and is used in close proximity to extensive quartz mines. This is true of certain glassware factories in Styria, which use this sand exclusively. This German sand is not only as pure as the best and most carefully prepared quartz, but, notwithstanding the great distance over which it is transported, it is much cheaper than the prepared quartz. Mr. Fahdt gives the relative cost of sand and prepared quartz in Vienna as follows: 1 centner (123.46 pounds) sand, including freight, 1 reichsmark (24 cents); prepared quartz, 1.47 florin (72 cents) per centner; that is, 3 to 1 in favor of the sand. Many Austrian glass works, however, still use quartz. In Bohemia, for example, the most renowned manufacturers use only the prepared quartz sand.

SAND FOR COMMON AUSTRIAN GLASS.—For the common grades of glass the works depend on the sand-beds in their immediate vicinity. The remark in regard to the use of thanolite, basalt, etc., in Germany, will apply to Austrian bottle manufacture as well.

SWEDISH SAND.—In Sweden quartz is still used to some extent, the glass houses having been located with reference to the supply of this material. Most of the native sand used comes from the shores of lake Wetter, the best from the north end of the lake. The sand for the best glass is imported from France.

QUALITY OF AMERICAN SAND.—The superiority of American sand has already been referred to. Not only does this country furnish the purest and best sand, but extensive deposits of a grade suitable for the manufacture of the finest glass exist in many localities. If in the quality of the metal, or in brilliancy of our glass, we are behind our European competitors, it is not attributable to our sand. These deposits are also in many cases well situated in reference to fuel and to transportation. As examples of these deposits, those of Berkshire county, Massachusetts; Juniata county, Pennsylvania; Hancock county, West Virginia; Fox river, Illinois; and Crystal City, Missouri, may be instanced. These are all exceedingly pure sands, as the analyses given will show. The first named is used very extensively by the flint-glass makers of the East. The Juniata and the Hancock sands supply many of the works of Pittsburgh and Wheeling. Fox River sand supplies the plate-glass works of New Albany, Jeffersonville, and Louisville, and Crystal City furnishes the sand for the fine plate-glass made at that place.

NEW ENGLAND SAND.—At present all of the sand used in the glass works of New England comes from Berkshire. In this section sand for some works, being of a good quality, was at one time procured from Demerara, brought as ballast. The war of 1812 cut off this source of supply, and Plymouth beach furnished sand until a better was discovered at Maurice river, New Jersey. This was in turn superseded by the Berkshire sand. (*a*) It is stated that an embargo put upon the exportation of flint stones from England to this country at a time when it was believed that no flint was to be found here led to the suspension for a time of certain factories in which prepared flint was used. Berkshire county also furnishes most of the sand for the best flint-glass made in New York, New Jersey, and eastern Pennsylvania. The sand for the window and green glass made in the interior of New York, as well as part of that used in Ontario, comes from Oswego and Oneida counties; that used for common glass near New York city, as well as all through New Jersey and eastern Pennsylvania, is mined in New Jersey. Some sand for the Philadelphia glass houses is procured in West Virginia.

NEW JERSEY SAND.—The sand used in the southern part of New Jersey is chiefly derived from a deposit of sand which can be traced through the state. This sand is uniform, and is often used, without washing, for the manufacture of window-glass.

MARYLAND SAND.—A good glass sand is found at Will's mountain, near Cumberland, Maryland, of which Dr. Chandler, of the School of Mines, Columbia College, New York, says: "I am satisfied that the sandstone is in every respect well fitted for the manufacture of glass of the best quality."

SAND FOR THE PITTSBURGH AND WHEELING GLASS HOUSES.—The large quantities of sand required in Pittsburgh and Wheeling and the factories in their neighborhood come from various points in the Allegheny mountains, mainly from Juniata and Fayette counties, Pennsylvania, and Hancock county, West Virginia. A new deposit is reported from the latter place, which it is claimed analyzes 99.90 per cent. of pure silica.

ILLINOIS SAND.—The Fox River sand, some 60 miles from Chicago, is also a very valuable deposit. No analysis of this sand has been made, but it supplies the plate-glass works at New Albany, Jeffersonville, and Louisville, and some of the flint-glass works of the West. It is a beautiful sand, needs no washing, and has given the very best results in use.

MISSOURI SAND.—The Crystal City deposit is also one of the most important beds in the West, and is of great purity and inexhaustible in quantity, and the cost of mining is merely nominal. There is also a deposit of considerable importance at Pacific, Missouri, which seems to be of the same formation as that at Crystal City. The sandstone from this mine hardens instead of disintegrating by the action of air, but water, to a certain extent, breaks the bond. This sand is regularly supplied to the glass works at Cincinnati and many of the works in the West, except those making plate-glass. The mine produces about 1,750 tons per month.

EXTENT AND LOCALITY OF OTHER AMERICAN SANDS.—I have only referred to the most important of the sand-mines from which our glass houses draw their supplies. The extent of the deposits of sand suitable for glass-making that are not developed, or, if opened, worked only to a limited extent, is almost incalculable. The saccharoidal sandstone of Missouri, for example, has been traced for miles through some ten counties, the vein varying from 80 to 133 feet in thickness. At Minneapolis and Saint Paul a rock 175 feet thick is found, furnishing a good quality of glass sand. (*b*) In many states other than those named glass sand has been discovered and reported upon by the state geologists and chemists, and these reports contain descriptions and analyses of many excellent glass sands, of which, as yet, no use has been made. To those reports those desiring information as to the character and extent of these deposits are referred.

ANALYSES OF GLASS SAND.—In the following table will be found analyses of the most prominent glass sands in Europe and this country:

ANALYSES OF FOREIGN GLASS SANDS.

Constituents.	FRANCE.		ENGLAND.		GERMANY.	
	Fontainebleau.*	Fontainebleau.†	Leighton Buzzard.*	Alum Bay.†	Herzogenrath.‡	Hohenbocka.§
Silica	99.00	98.80	99.00	97.00	99.240	99.760
Alumina	0.50		0.30		0.200	0.040
Lime					0.053	0.011
Magnesia					0.033	0.012
Manganese						0.015
Sesquioxide of iron	Trace.		0.50		0.005	0.055
Carbonate of lime	0.50		0.20			
Magnesia and sesquioxide of iron		0.70				
Water		0.50		1.00	0.469	
Alumina, magnesia, and sesquioxide of iron				2.00		
Phosphorus						0.039
Loss						0.240
Total	100.00	100.00	100.00	100.00	100.00	100.172

*Authority: H. Chance. †Authority: Spon. ‡Authority: Julius Fahdt. §Authority: Bischof.

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[a] *Reminiscences of Glass Making*, by Deming Jarves, second ed., page 111. New York, 1865.

[b] *Report on Glass*, by Mr. Charles Colné, assistant secretary of United States commission to the Paris Exposition of 1878, page 314.

ANALYSES OF GLASS SANDS OF THE UNITED STATES.

Constituents.	MASSACHUSETTS, BERKSHIRE COUNTY.					NEW JERSEY.		PENNSYLVANIA.		Will's Mountain, Cumberland, Maryland.‖	Speer, Hancock county, West Virginia.‡	MISSOURI.	
	Gordon's.*	Gordon's.*	Brown's.*	Cheshire quartz, A.	Cheshire quartz, B.	Downer's, Glassborough.†	Hilliard's, Maurice river.†	Speer's, Fayette county.‡	Juniata county.§			Crystal City.¶	Lincoln county.**
Silica	99.78	99.61	99.69			98.824	98.850	99.720	98.84	98.35	99.90	99.62	99.55
Alumina	0.22	0.39	0.31			0.935	0.980	0.080	0.17				0.33
Lime						0.056	0.056	0.110	Trace.				0.08
Magnesia						0.015	0.022	0.06	Trace.				
Chlorine						0.0054	Trace.						
Manganese									Trace.			0.07	
Sesquioxide of iron		Trace.	Trace.			0.165	0.130	Trace.	0.34	0.42			Trace.
Iron												0.09	
Various												0.22	
Undetermined													
Loss								0.030	0.23				
Total	100.00	100.00	100.00			100.0004	100.038	100.000	99.48			100.00	99.96

* Authority: S. Dana Hayes.

† Authority: Professor Cook.

‡ Authority: Otto Wuth.

§ Authority: A. S. McCreath.

‖ Authority: C. F. Chandler.

¶ Authority: Crystal City Plate-Glass Company.

** Authority: Chauvenet.

CHAPTER IV.—ALKALIES AND OTHER MATERIALS.

CHIEF BASES USED IN GLASS-MAKING.—As has already been stated, the essential elements of glass are silica, which acts the part of an acid, and some one or more bases, either alkaline or metallic. The bases most commonly found in glass are soda, potash, lime, and oxide of lead. These bases, however, are not mixed in the "batch", as the combined materials ready for melting are termed, in the form in which they are found in the glass. Soda, for example, is not used in the glass houses as soda, but as the carbonate (soda-ash) or sulphate of soda (salt-cake), or as chloride of sodium (common salt) or nitrate of soda. In the process of melting these compounds are decomposed, the soda uniting with the silica, forming the glass, the balance of the compound passing off as gas or in the "glass-gall" or "sandiver", as the scum on the top of the melted glass is called.

ANCIENT GLASS A SODA GLASS AND PERISHABLE.—Glass is frequently named from the base that enters most largely into its composition, as "soda glass", "potash glass," "lime glass," and "lead glass". Ancient glass was a soda glass containing from 3 to 8 per cent. of lime, the lime being present as an impurity, and not as an ingredient purposely used in its manufacture. It is to this impurity, however, as will be seen further on, that we doubtless owe the preservation of many of the specimens of ancient glass that have come down to us. Soda glass, or glass with an excess of soda, is really soluble glass, even dampness in course of time disintegrating it. Blancourt, in the amusing preface to his *Art of Glass*, states that Venetian glass "will dissolve in the earth or in cold and moist places if there be more salt in it proportionately than sand". Bernard Palissy notes the disintegration of the glass in the windows of the churches of Poitiers and Brittany, and ascribes it to "the damp and rain which have melted part of the salt of the glass". As most of the specimens of the glass-makers' art of the ancient world have come to us buried in *tumuli* or tombs, it is probable that even the fragments of most of this ancient soda glass have dissolved, and that only has been preserved which contained considerable lime and was buried in localities calculated to preserve it from dampness.

SOURCES OF SUPPLY OF SODA FOR ANCIENT GLASS HOUSES.—The chief source of supply for soda for the earliest glass houses was Egypt. Phœnicia obtained its supply from that country; and Pliny, in his description of glass-making at Rome, states that "sand and Egyptian soda in the proportion of one part of sand to three of crude soda were used". Not only did these very early glass houses obtain their soda from Egypt, but until a somewhat recent period the "natron of Egypt" was largely used in glass-making in Venice and the south of France. This Egyptian soda, which contained carbonate, sulphate, and muriate of soda, is found native on the banks of the natron lakes that abounded in a valley extending northwest from Memphis, and by reason of its abundance was the seat of a large glass industry, remains of ancient glass works being found there by the scientists of the Egyptian expedition of Napoleon I.

MODERN SOURCES OF SODA.—In modern times, and until within the last few years, the chief source of soda for glass has been the ashes of certain plants, chiefly those of the sea and sea-shore. Among the saline products of these ashes so used were the Spanish barilla from the ashes of the *salsola* plant; the Scottish and Irish kelp, which as late as sixty years ago furnished the soda for the English crown- and sheet-glass; the barec or varec of Bretagne and Normandy; and the Spanish soda of Alicant and rochette of Syria. These products contained potash and some lime as well as soda, and were simply mixed with sand and melted. They were quite impure, and, as a result, the glass produced, compared with that of to-day, was inferior, being exceedingly variable in character and poor in color.

LEBLANC'S DISCOVERY OF SODA-ASH.—The unsatisfactory quality of these impure sodas (the best, the Spanish barilla, containing only from 14 to 30 per cent.), as well as the limited quantity produced and uncertain supply, led the French government to offer a prize of 12,000 francs for the discovery of a method of converting common salt into soda. Leblanc not only secured the prize by his discovery of 1792, but opened a new era in glass-making. (*a*) The plate-glass manufacturers of France were the first of the glass-makers to use the new product, the carbonate of soda or soda-ash, and were soon followed by the makers of window-glass, with a decided improvement in quality and color.

USE OF SALT-CAKE.—The carbonate of soda prepared by Leblanc's method contains a considerable proportion of undecomposed sulphate, and the glass manufacturers soon found some advantage in the cost of glass by the substitution of this sulphate, or "salt-cake", for the carbonate. As early as 1781 experiments were made with sulphate of soda, and in 1803 Baader began its use in the glass houses of the Bavarian forests; but it was not until 1825 that it was employed in the French glass houses. In England kelp was used until 1831, when it was displaced to a large extent by carbonate of soda. The introduction of sulphate was still more recent, but at present nearly all the window-glass of England and the continent is made with salt-cake. The manufacturers of plate-glass still use soda-ash, as they believe that it produces a glass of a somewhat better color. In this country, though many experiments had previously been made, but little sulphate was used until about 1875, soda-ash being the form of soda employed for window-glass. Messrs. Robert C. Schmertz & Co., of Pittsburgh, were the first to use it regularly and continuously, but it is now largely consumed. Sulphate glass is less liable to devitrify or to become "ambitty", and will bear more lime than carbonate glass, and hence gives a harder glass with a better polish and less liability to "sweating". It is of a bluish color, while the carbonate glass is of a yellowish tint.

SOURCE OF SUPPLY OF SODA.—The chief source of supply of the soda of the present day is the alkali works of England, which are mainly located in Lancashire and near Newcastle-on-Tyne. It is estimated that the total annual soda production of the world expressed in terms of pure Na_2CO_3 is 708,725 tons, of which 432,000 tons are manufactured in Great Britain. Twelve per cent. of British soda and 23 per cent. of the total soda of the world are produced by the ammonia method. The English soda enters into the manufacture of the glass of most of the countries of the world, and is almost the only kind used in this country.

THE AMMONIA PROCESS.—In 1866 Mr. Ernest Solvay began at Brussels the manufacture of soda by a process that has since been called by his name, the Solvay, or, as it is sometimes termed, the ammonia process. This method bids fair to supersede the Leblanc. The Solvay soda is fully equal in quality to the Leblanc, and can at present be produced more cheaply. This has had a marked effect on the production of the Leblanc soda. Of twenty-five alkali works which were in operation in the neighborhood of Newcastle-on-Tyne, England, a very few years ago, twelve have been closed, and of these no fewer than eight were actually dismantled, in despair of its ever again being possible, except at a loss, to manufacture soda in them by the Leblanc process. The alkali-making districts of Lancashire have advantages over the Newcastle district in the price of salt, in facilities for supplying the American market, and in nearness to some of the centers of soda consumption; but even there seven or eight of the alkali works are standing idle, and but few of the others are working to their full capacity. In Belgium the production of Leblanc soda has died out, while in France, Germany, and Austria it is only maintained by the aid of import duties and the large demand for the by-product, hydrochloric acid. There are now eighteen ammonia-soda works running in Europe and one in the United States, and seven more are approaching completion. (*b*) This process is not only of interest to this country because of its cheapening the cost of soda, but also because it holds out the prospect that we may make our own soda for our glass works. The importance of such an industry to us may be gathered from a statement of the imports, which, for the three calendar years 1879, 1880, and 1881, were as follows:

	1879.		1880.		1881.	
	Quantity in pounds.	Value.	Quantity in pounds.	Value.	Quantity in pounds.	Value.
Soda-ash	81,072	$1,825,450	96,766	$2,345,461	74,158	$1,555,320
Caustic-soda	44,980	648,269	43,274	635,894	47,180	656,588
Sal-soda	66,471	424,414	53,896	155,497	48,797	138,768

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a A full account of this discovery and its results may be found in Mr. Henry Chance's lecture "On the Manufacture of Crown and Sheet Glass", *Journal of the Society of Arts*, February 15, 1856.

b See paper by Mr. Walter Welden before the English Society of Chemical Industry.

MANUFACTURE OF SODA-ASH AND SALT-CAKE IN THE UNITED STATES.—Though the materials for the manufacture of soda-ash and salt-cake are to be found in great abundance in this country, but little is produced. Mr. Charles Lennig, of the Tacony chemical works, Philadelphia, produces some 1,500 tons annually of the sulphate, and the Merrimac Chemical Company, of South Wilmington, Massachusetts, and E. Gressili & Sons, of Cleveland, Ohio, were also producers at the close of the census year. The product of these works is used for window-glass, and is equal to any of foreign make, that of the Tacony works analyzing from 97 to 98 per cent. of sulphate, 1 per cent. of salt undecomposed, one-half to 1 per cent. of excess of sulphuric acid, and some little insoluble residue. As this sulphate or salt-cake is really a by-product or residuum of the manufacture of muriatic acid, its production in this country is limited by the demand for the acid. Recent developments and the ammonia process, however, promise to change this state of affairs. The salt-wells of Michigan and of New York have been looked upon as the source of a considerable supply, this view being held by British alkali manufacturers who have examined these localities. Recently a small works using the ammonia process in a modified form has been successfully operated in Michigan, and it is stated that the Solvay Process Company is erecting extensive works at Syracuse, New York.

USE OF COMMON SALT.—Both the carbonate and the sulphate of soda are prepared from common salt. This has led to many attempts to effect the direct union of silica and salt without the intervening process, but thus far with but little success. At present the only glass made from common salt is the black bottle-glass of Newcastle, England.

NITRATE OF SODA.—Nitrate of soda is used as an oxidizing agent in the "batch", and is therefore a decolorizer, though the soda enters the composition of the glass. The chief source is the beds in the province of Tarapaca, Peru; but some immense deposits have also been found in Nevada.

POTASH.—The use of potash in glass-making is comparatively recent, though some of the best and most expensive glass now made, such as the Bohemian white and the English flint, are potash glasses. Some few specimens of ancient glass show small quantities, from 1 to 2 per cent., which was probably derived as a chance material from the sodas prepared from plants and weeds, in which some potash is always present. As early as the fifteenth century, if not earlier, the value of potash as a glass-making material was known, and it appears that at that time potash made from the lees of wine was used in the Venetian glass houses. In France, in the middle ages, potash made from fern was used. The enormous forests of America began very soon after the discovery of this continent to furnish large quantities, and enormous tracts of timber have been burned solely for the ashes. Blancourt, at the close of the seventeenth century, speaks of the use of potash from wood-ashes, and mentions Virginia and New England as sources of supply for the latter. The sources of supply at the present time are many. Much of that used in modern glass houses is still made from wood-ashes, about 20,000 tons being thus produced annually, the Canadas and Russia furnishing the larger part, though the Bohemian glass manufacturers procure theirs from the forests of Bohemia and Hungary. This potash, as it is made by lixiviating wood-ashes, is an impure carbonate, which must be calcined and refined, the quality of the glass depending upon the degree of purification. Refined potash is known as pearlash. Pure carbonate is also obtained from the alkaline residuum of the manufacture of nitric acid and from caustic potash. In France beet-molasses and the ashes of beet-cake and grape-cake have considerable value as sources of potash, some 12,000 tons per annum being made in Europe from the beet alone. Carbonate of potash, the form in which it is used in glass-houses, is also prepared artificially from the sulphate by Leblanc's method. Of the remaining salts of potassium, only tartar, the bitartrate of potassa, which is decomposed, when heated, into carbonate of potassium and carbon, finds sporadic application where it is required to use the finely-divided carbon of decomposed nitrate of potash as a reducing agent, for example, in the production of copper, ruby-glass, or ruby-fluor. The sulphate of potassa, though applied as long ago as 1826 by Long, in Constein, on the Danube, has never yet attained to general importance in the glass industry.

LIME is, next to silica, the most important of glass-making materials. It is a constituent of nearly all the glass of all ages and countries, with the exception of that made with lead, and it is even present in many specimens of lead glass, though, as before stated, its presence in ancient glass was probably by chance and not by design. The action of lime is to render the soda or potash glasses harder and less soluble, and, when used in the proper proportion in the "batch", to promote the fusion of the materials and improve the quality of the glass. An excess of lime, however, makes the glass too hard. In the manufacture of table ware lime furnishes a cheap substitute for lead, and, though as a rule the lime-flint is less brilliant than the lead-flint, many of the recent specimens of lime glass, especially those that are "fire-polished", are exceedingly beautiful, approaching in brilliancy the true crystal of the English flint houses. The makers of lime glass, however, do not, as a rule, seek to compete with lead glass in brilliancy, but in lightness and beauty of form, as is the case with the Bohemian glass-workers, or to furnish a cheap substitute for lead glass for articles of utility, as is the case with the pressed-ware manufacturers of this country or the manufacturers of "Gobeleterie" of France. Lime also enters largely into the composition of modern plate- and window-glass, giving it the hardness and insolubility necessary to protect it from the weather and prevent its "sweating", which is so marked a fault of glass with an excess of alkali.

USE OF LIME A MODERN DISCOVERY.—Though the true relation of lime to the manufacture of glass as a hardener and preserver is really a very modern discovery, and though the proper proportion of lime to soda and potash has only been arrived at slowly and by many careful experiments, it is true that it was used to some extent in the glass houses as early as the days of Pliny. He says:

> To the materials of glass they begin to add the magnetic stone; then they joined shiny stones of all kinds; then shells and fossil sands.

He also notes that the use of lime in his time was an advance in the art of glass-making. Ferrantes Imperatus recommends the shells of cretaceous fishes, as the oyster, as "very proper for making glass". Notwithstanding these indications that the use of lime was not entirely unknown from the time of Pliny, it has been but recently that its value as an essential constituent of glass has been recognized. Blancourt was somewhat afraid of it, and declares that "it is much stronger than ordinary salt", but directs that it "being well purified you may put two pounds of it to an hundred pounds of salt of Polverine", or soda. He would think the glass-makers of to-day, who, in some forms of glass use measure for measure, must be guided by "parcimony", of which he elsewhere speaks. It is probable that until very recently lime has been used only as a cheap substitute for soda and potash, the difficulty of using it in furnaces, constructed and heated as the older furnaces were, interfering with its adoption, until recent investigation had shown its value and recent improvements had made its employment possible.

SOURCES OF SUPPLY.—It is unnecessary to speak of the sources of supply of lime, as all glass-making countries have it in abundance, and it is used in the batch as chalk, lime, or limestone. Lime, however, that contains ferrous carbonate of iron must not be used in a mixture intended for white glass. Indeed, except for bottle-glass, it is important to have the lime, as well as all the other materials, as pure as possible. Mr. Chance notes that glass made with limestone is harder and more difficult to grind than that made with chalk, and it moreover causes the glass to cool and set more rapidly. In this country, however, limestone is coming into more general use, some of the Pittsburgh window-glass works using no lime at all, but only powdered limestone.

LEAD.—The use of lead as a glass-making material, except in the production of artificial gems, is an English invention of the seventeenth century, (*a*) and grew out of the use of mineral fuel in the glass houses of that country in the place of wood, which up to that time had been the fuel of glass-making, as it still is in many sections of the world. (*b*) This fuel required covered pots to protect the glass from impurities, which so reduced the amount of heat that reached the materials as to demand a better flux, and lead was substituted. The result was not only to permit the use of the cheaper fuel, but the production of that most beautiful and brilliant of all glasses, the English flint. Lead is used both as litharge and as red lead, and is a most powerful flux, promoting the fusion of materials at a very low temperature. The glass made with it is more dense, has a greater power of refraction, and is less liable to breakage from sudden changes of temperature. It is soft and is easily worked and scratched, but is of surpassing brilliancy, being only excelled by the diamond. The glass used for the manufacture of artificial gems is a lead glass, and it is to the employment of this material that they owe their brilliancy, while at the same time an excess of lead renders them soft and easily scratched; a fact that soon becomes apparent to the wearer of these gems. It is very probable that the use of lead in a small way in the manufacture of these gems, which antedated its use in flint glass, was the suggestion to the English that resulted in the discovery of the latter. Lead is also used in the manufacture of optical glasses, and the history of its use for this purpose is exceedingly interesting, but cannot be repeated here.

LEAD GLASS, WHERE MADE.—Lead is used in the manufacture of glass to a greater extent in England than anywhere else, though France and Belgium, and, to a less degree, Germany, make some true lead flint. In this country lead glass is made but to a limited extent. Some few factories still make lead-flint table ware and chimneys, but most of the table ware is lime glass. In the past, however, considerable lead glass was made here, and red lead of an excellent quality for glass is still made at East Cambridge, near Boston. The first lead furnace in the United States is believed to have been built by Mr. Deming Jarves, of the New England glass works, East Cambridge, in 1818, for the manufacture of lead for glass. This furnace was a success, and enabled the company to continue the manufacture of glass at a period when no foreign red lead was to be procured. (*c*) Red lead is generally preferred to litharge on account of its finer state of subdivision, and because its decomposition in the glass pot assists in purifying the materials, as an excess of lead not only makes the glass soft and gives it a yellowish tinge, but acts injuriously upon the melting vessels.

OTHER INGREDIENTS.—Among the other ingredients found in glass are the following: *Iron*, which is almost always present in several of the materials, especially sand, and is a most unwelcome element, imparting a greenish color to the glass. *Manganese* in the form of the black oxide is introduced to correct the action of the iron, but the researches of Mr. Thomas Gaffield, of Boston, show that the action of manganese as a decolorizer is not permanent. (*d*)

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[a] Dr. Lardner, in his *Cabinet Cyclopædia*, says: "The manufacture of flint glass was begun in England in 1557 at Savoy House, in the Strand, and in Crutched Friars." Bontemps, in his *Report on Glass at the Paris Exposition of* 1855, shows that this is a mistake, so far as relates to lead flint, and states that it could not have been made prior to 1665.

[b] It seems that lead was used in the manufacture of glass much earlier than this, certainly in the Roman period; but it is still true that the English are entitled to the credit of its first use in lead glass as now made.

[c] *Reminiscences of Glass Making*, second edition, page 110.

[d] This is probably the "magnetic stone" of Pliny, and its use as a decolorizer has been known for centuries.

Carbon in the form of powdered charcoal, coke, or anthracite is used in "batch" of sulphate of soda to facilitate the decomposition of the sulphate. *Arsenic* promotes the decomposition of the other ingredients and the removal of carbonaceous matter. In excess, however, it produces milkiness. *Alumina* is almost always present in glass, generally from the action of the materials of the glass on the pots. *Cullet* is the waste glass produced in every manufactory, which, being more fusible than the new material, facilitates the melting.

CHAPTER V.—GLASS FURNACES AND POTS.

EARLY FURNACES AND GLASS HOUSES.—But little is known regarding the form or construction of the furnaces used by the earliest glass-makers. One of the paintings at Beni Hassan, one of the earliest records of the art remaining, pictures an Egyptian glass-melter seated before an upright circular furnace about 2½ to 3 feet high and one-third this in diameter, from which he is evidently gathering the molten glass through a square hole at the bottom. This would indicate that the glass materials were charged at the top of the furnace and drawn at the bottom: an operation somewhat analogous to smelting iron, but one that would give very impure glass. If this was the practice of the early glass-makers, this method probably gave place at an early day to a crucible of some kind, in which the materials were melted, the heat being applied outside and fuel not being in direct contact with the glass. It is quite certain that the early glass-making furnaces contained until long after the beginning of the Christian era but a single small pot, the entire work of mixing, melting, blowing, and finishing being done at each little establishment by a single glass-worker, assisted in the earlier and less skilled part by slaves or servants, and the minute division of labor which is so distinguishing a feature of modern industrial life, and the aggregation of capital and workmen in one large establishment, were unknown in these early days, especially in industries in which so much depended on individual skill, and where the art was regarded as a mystery or secret not to be divulged. The great variety in form and character, and especially in the color of the glass of these works, as evidenced by the very many fragments remaining, would also indicate that glass-making was carried on not in large establishments, producing, as at the present day, quantities of glass of the same form and color, but in many little establishments, each working on a small scale, and each producing glass differing in color and shape.

FURNACES IN AGRICOLA'S TIME.—Though we have but little knowledge of the early glass furnaces, it is well known that those of four hundred years ago did not differ much in principle or in construction from the ordinary direct-firing furnace of to-day. The description given by Agricola, one of the earliest of modern writers on glass, of the furnaces used at the beginning of the sixteenth century is so near like that given in Dr. Lardner's *Cabinet Cyclopædia* of fifty years ago that the latter can almost be regarded as a translation of the *De Re Metallica.* Agricola describes three forms of furnaces as in use in the glass houses of his time. In the first, called the "Fornax Calcaria", a small furnace somewhat resembling a bee-hive coke oven in shape, the materials were dried, purified so far as they could be by heat, and partially combined in a cindery or slaggy mass called "frit", which was afterward broken up and remelted in working furnaces. The greater purity of modern materials and the better methods of working have made this preliminary purifying and "fritting" unnecessary, and the term "frit" is now applied to the unmelted mixture of sand, soda, lime, etc., which is charged into the pots, or, in other words, to the "batch". Fifty years ago, however, this process of fritting was still in use. At the present time the calcar furnace or arch is only used to dry and calcine the sand, unless it may still be retained in some glass-making sections where the old methods are still in vogue, or as an annex to the bottle furnace, where impure materials are used. In some cases the calcar arch is used to heat the "batch" prior to "filling in", it being thought better to charge it heated into the hot pots.

Agricola's second furnace was the melting or working furnace. I quote the description of this as given by Blancourt, with his comments and improvements: (*a*)

> The second furnace or oven Agricola mentions is that where the workmen labor, or the working furnace; but the description he gives us of it is not just, for he makes all these ovens round, whereas they ought only to be round within, but oval without. Moreover, he adds two mouths in form of chimneys, wherein a servant throws coals day and night, which is no more now in use, since we only use dried wood, as I have observed, which also makes the iron grates he mentions for the mouth and ash-hole of no more use among us. This oven, whose diameter ought to be always proportional to the height, is divided into three parts, each of the three parts being vaulted. That below is the place where the servant flings in the wood to keep a continual fire, and without smoke; and this lower oven is called the crown, and the mouth the Bocca; but there is neither grate nor ash-hole, the wood being cast in on the coals, care being taken to take them out when there are too many with a great iron hollow shovel. This oven, made like a crown, to which Agricola allows but one hole in the middle

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[a] See Blancourt, *Art of Glass*, London, MDCXCIX. pages 20–23.

of its height, about one foot in diameter, has, notwithstanding, several holes all round it for vent of the flame, which ascends into a second oven through the middle, where are placed the pots filled with the ingredients that make the glass, upon which that flame perpetually reverberates. The second part of this oven, whereof the vault is round, serves for the workmen. Agricola allots to each of these ovens eight arches; nevertheless we commonly make but six. Between each arch there is an opening or hole, made in fashion of a window, archwise, called the great work-hole, through which the pots are put in and those taken out which contain the metal. These great holes are stopped each with a cover made of the same lute and brick that the oven is, to preserve the workmen's eyes from the too vehement heat, and likewise to keep it the stronger in the oven. In the middle of every one of these covers there is a hole somewhat more than a palm wide, which is called the little working-hole, through which the workmen take with their hollow irons the colored or finer metal out of the pots, wherewith they make what sort of vessels they please. It serves also to scald their vessels when they have occasion, and which rest upon hooks made on purpose on the sides of those holes, which are called, according to their terms, the little working-holes. The upper vault of this furnace, which is above that where the metal is melted and the workmen work, serves to put the vessels that are new made upon, there to cool by degrees, that place having only a moderate heat; otherwise the vessels would break if they were too soon exposed to the cold air. We might also divide that upper vault into two, the half of it being enough for cooling the vessels; and on the other might be made *Balnœ Mariœ*, of diverse degrees of heat, sand furnaces, or of ashes for purifications, digestions, distillations, and other uses, and may serve for the preparation of the ingredients wherewith we make tinctures for glass and crystal, whereof we shall treat in the sequel of this book. The ovens of the great glass houses are round within and oval without, like those of the little glass houses whereof we have already made mention; but there is this difference: that any ingenious workmen can build those of the little glass houses, but there is only one race of masons in all France who have the secret of building the great ones. They came from Caule, in the county of Eu, and those only can succeed in it. What and how nice observations soever others have made to imitate them, there was never any one yet could arrive to it, insomuch that all those who have any great glass houses throughout the whole kingdom are obliged to have recourse to that family to build their furnaces, and that for want of a due proportion which must be observed, because they must have three degrees more of heat than the little glass houses, and one inch difference in the arch and body of the oven is enough to spoil the whole process. These ovens are built like those we have before mentioned, except as to the proportions which augment the heat three degrees beyond the others; they have six arches—two of which serve to heat the matter before you put it in the pots, and another to heat the pots before you put them into the oven when there is occasion to change them. In this oven each working-hole has but one pot in it, and in the farther end of the oven on the other side of the workmen there is a great pot, wherein the matter (or ingredients) is prepared, out of which you take it with an iron ladle of 10 or 12 feet long, to fill the pots of the gentlemen who work at the rate the pots are emptied; after that the great pot is filled again with other matter to be refined and prepared as before. The materials which serve for building these furnaces are bricks for the outward parts, and for the inner parts a sort of fuller's-earth, which is gotten from Beliere, near Forges, and which is the only earth in France which has the property of not melting in this excessive heat; and it is of this same earth that the pots are also made, which will hold the melted metal for a long time.

It will be noted that this oven of Agricola and Blancourt is virtually the direct-firing wood or coal furnace of to-day with the upper part above the reverberating arch used as an annealing oven. This third division is still in use in Bohemia for the same purposes as described by Blancourt.

MODERN FURNACES.—The glass-melting furnace of modern times is a modified form of the reverberatory furnace, which assumes different shapes, and is built of different sizes, according to the kind of glass to be made or the fuel used. Furnaces for plate-, window-, and bottle-glass are generally oblong or square, the pots being placed in two banks or rows, one on each side, while those for flint-glass are circular or elliptical. In the construction of furnaces the principal ends to be attained are the production and maintenance of an intense heat, (a) its uniform distribution through the furnace and around the pots, and its direct and most intense application to the fusion of the glass-making materials. Without entering into a detailed description of the varying shapes and sizes of the ordinary furnace in use in this country, it may be said in general that these furnaces consist of two parts, the combustion or melting chamber and the cave or ash-pit, which also serves as a draught passage. These are separated by the fire-grate and "siége", the raised bank or narrow platform in the melting chamber on which the pots are placed. The grate or fuel-space is square, and occupies the center of the furnace, and the fuel is charged generally from both ends. The grate is usually on the same level as the floor of the glass house. Under, and connected with it, is the arched subterranean passage or chamber known as the cave or ash-pit, extending the entire length of the furnace, both ends opening outside the building, thus forming a passage by which air for combustion is fed to the grate. Sometimes two of these passages, crossing under the grate-bars at right angles to each other, are built, so that either can be used according to the direction of the wind. There are doors at both ends of these archways to regulate the draught. Within the furnace around the grate space in the case of circular furnaces, or on both sides of it in quadrangular furnaces, is the raised bank or platform termed the "siége", on which the pots are placed. The fire thus lies below the bottom of the pots and in the center of the furnace. The number of pots in a furnace varies from four to eighteen or more. Each pot is reached for charging or working the metal by a small arched opening or working-hole in the side of the furnace, situated directly over the pot, except in the flint furnace, where covered pots are used. In this case the mouth of the pot is on a level with the working-hole, and the number of working-holes in a furnace thus equals the number of pots. Furnaces other than flint frequently have no chimneys or flues, the only exit for the products of combustion being the working-holes. As the fire is in the center, and the pots are around the sides, the flame is thus made to play around the pots, securing a most direct and intense heat. In some furnaces, however, there are as many flues or chimneys as there are pots, the flues

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[a] There is a wide difference of opinion as to the heat of a glass-melting furnace. Sauzay, in *Wonders of Glass Making in All Ages*, New York, 1875, states it to be 1,000° to 1,500° C. The *Encyclopedia of Chemistry*, Philadelphia, gives the proper temperature of a glass furnace at 20,000° F. This last figure is doubtless a "guess", and it might as well have been put at 50,000°. Mr. Page, of the Berkshire (Massachusetts) glass works, gives the heat of a glass furnace as between 2,800° and 3,600° F., or an average of 3,200°.

being placed between. The same result, however, is obtained, the flame striking the pots on its way to the flues. Furnaces are often constructed with a double arch, the lower one the reverberating arch, the upper one forming the top of the furnace, and the space between the two arches forms a chamber for the reception of the products of combustion, which pass out by a common flue at the top. Frequently, instead of this outer arch, the outside walls of the furnace are curved up in the form of a truncated cone or open chimney, and in others the separate flues open into the glass house itself, which thus becomes a chimney, discharging the products of combustion at the top of the house. The roof of the furnace is arched, the arch being built as low as is consistent with stability, in order to reverberate or throw the heat with the greatest intensity upon the pots. The inside dimensions of these furnaces vary so much that it is possible to give only a general idea of their dimensions. A ten 44-inch pot window-glass or green-bottle furnace would be about 20 feet long by 12 feet wide; a ten 36-inch pot flint furnace about 12 to 13 feet in diameter, the materials used being fire-brick or sandstone, or both.

FUEL USED.—The fuel used in the early glass houses was wood, (*a*) which was dried or baked to expel all moisture before using. In view of the fact that even at the present time it is difficult to secure the intense and even temperature necessary to properly melt and "fine" glass with wood, the success of the ancient glass-workers is all the more commendable. It is possible that when only one pot or crucible was used this may have been surrounded with charcoal, and a more intense and even heat produced than with wood; but when furnaces with more than one pot became common, and the glass was thus melted by the flame playing on the pots, it would greatly increase the difficulty of melting with wood, and preclude the use of charcoal. It is generally stated that mineral coal was first used in England in glass-making in 1635 by Sir Robert Mansel, who obtained a monopoly of the manufacture of flint-glass in consideration of his being the first person who employed pit-coal instead of wood in his furnace. This, however, is not correct. Blancourt states:

> In the time of Agricola they made use only of coals in the glass houses; but the use of wood, which is among the moderns, is much better; for, being first of all thoroughly dried, it does not smoke like coal, which always makes the glass dull and obscure.

As Agricola published his *De Re Metallica* in 1546, Mansel's claim to being the first to use pit-coal can hardly be sustained. Indeed, it is disproved by the English records themselves, as before 1611 Sir William Slingsby had obtained a patent for making glass with sea-coal; and in 1615 a royal proclamation was issued prohibiting the use of wood in glass-making and ordering it to be made with sea- or pit-coal only. Sir Robert seems, like many a reputed inventor, to have filched the honor belonging to another. In England at the present time coal is almost exclusively employed, but of late years it has been found that oven-burned coke can be used to advantage, as it produces less smoke and soot, and is therefore better adapted to some of the finer glasses. In France both coal and coke, and sometimes wood, are used. Belgium uses coal exclusively. In Germany wood is largely employed, beside considerable peat and turf. Both coal and lignite are also used. Where wood is used, it is baked until brown, to expel all of the water, and peat must also be dry and afford only a small amount of ash. In this country coal is used almost entirely, though as late as 1865 wood was still used in Boston. It was the excellent quality of the coal at Pittsburgh that led to the erection of the first works in that city.

GAS FURNACES.—So far the description and remarks concerning furnaces apply more properly to what are known as "direct-firing" furnaces, or those heated by fuel charged directly into the fire-pot or hearth of the furnace. In 1861 the first successful gas furnace for glass, the now well-known Siemens furnace, was first used. In this and other forms of the gas furnace the solid fuel is first converted into gas in a producer outside of the furnace, and is then burned, generally in connection with heated air. This application of gas is one of the most marked and important improvements in glass-making of modern times. Beside the saving in fuel and the possibility of using inferior fuel which the gas furnace permits, it reduces the time of melting and increases the production as well as greatly improves the quality of the product.

THE SIEMENS' FURNACE.—The first use to which the Siemens' regenerative gas furnace was put, now so well known in all parts of the world, was the manufacturing of glass in pots. In using this furnace the principle and construction of the ordinary furnace were changed only so far as was necessary to apply the regenerative principle and heat with gas. In these furnaces the gas and air employed are separately heated by the waste heat from the flame by means of what are called "regenerators" placed beneath the furnaces. These are four chambers filled with fire-brick, stacked loosely in checker-work, the waste gases passing through one pair of regenerators and heating them, while the air and gas are being heated, prior to burning, by passing through the other pair, which had been similarly heated. When this second pair has been somewhat cooled the direction of the draught is changed, the waste gas passing through the cooled pair, heating them, while the air and gas are passing through the heated pair. This is again changed when the regenerator is cooled, and so the cool air and gas are passed alternately through each pair of regenerators, which are thus alternately cooled and heated. The economy of fuel is not only great, but the heat produced is intense, and actual working, it is claimed, shows a saving of 47½ per cent. of fuel over the direct-firing furnace in glass-making by the use of this furnace. (*b*) The loss in pots is reduced; and there are no "cutting drafts"

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[a] Plutarch states that "tamarisk wood is the best for the glass furnaces".

[b] The saving of fuel in gas-firing is stated never to be less than 30 per cent., and is often as high as 75 per cent.

on the outside, the pots only cutting from the inside. The durability of the furnace is also increased. The following table shows the extent to which these furnaces were used in 1879:

SIEMENS' FURNACES USING POTS.

Countries.	Plate-glass.	Window- and bottle-glass.	Flint-glass.
Great Britain	5	5	2
France	7	4	11
Belgium	4	1	1
Other countries	6	10	15

SIEMENS' FURNACES WITH TANKS.

Great Britain	6

SIEMENS' FURNACES WITH CONTINUOUS TANKS.

Great Britain	4
France	10
Belgium	1
Other countries	3

USE OF SIEMENS' FURNACES IN THE UNITED STATES.—Though, as this table shows, the Siemens pot-furnaces are used to a considerable extent in all glass-making countries of Europe, but few have been built at the glass houses of this country. One reason, no doubt, is that good coal is so cheap at our glass-making centers as not to make economy of fuel a necessity, and in addition to this the heavy first cost of the furnace and the royalty asked have interfered with its adoption. Their use in this country during the census year was confined almost exclusively to plate-glass works.

Other forms of gas pot furnaces, however, have been recently introduced to some extent, especially in the vicinity of Pittsburgh. These are known locally as the Nicholson and the Gill furnaces. Of the principle of the former I have not been able to secure any description; but it is an improved form of a French furnace, and differs from the Siemens in not having the alternate regenerators. The dimensions of one built in 1880 for Messrs. McKee & Bros., glassware manufacturers of Pittsburgh, were as follows: Height of stack, 80 feet; diameter at the foundation, 22 feet 10 inches; in the furnace at the floor, 18 feet 10 inches in the clear, and contains 12 pots, each 44 by 60 inches, of a capacity of 3,800 pounds each, or 45,600 pounds at a single melt. It is expected to make four rounds and a half per week, equal to 102½ tons of metal. There are three large gas-producers, in which ordinary coal dust or slack, a very cheap material, is used. The so-called Gill glass furnace is an improvement on the Boetius principle, which has been so successfully used in Germany. This furnace has flues arranged around the outer walls of the fireplace, or in the walls between the fireplaces, for the purpose of conveying air to the combustible gases evolved from the fuel. It is claimed that its original cost is much less than the Siemens or any other form of gas furnace; that the direct-firing furnaces can be remodeled; that the heat received is intenser, more uniform, and is more easily controlled, while the quantity of fuel is much reduced below that of the ordinary furnace, and an inferior quality can be used. The life of the pots is also greater.

COMPARTMENT OR TANK FURNACES.—While the application of gas to pot furnaces marks a most important advance in glass-making, the invention of the tank furnace and its use with gas is a still more important and marked improvement, and promises to have a great influence on the future of the industry. In this furnace the use of the melting-pot is entirely abandoned. In the first Siemens tank furnace of 1861 the batch was charged, melted in, and worked from a tank which occupied the whole bed. This in use was found to have some drawbacks, and in 1872 a still further development of the tank furnace was effected by dividing the tank, by means of two transverse floating bridges, into three compartments, in the first of which the batch was melted, in the second the glass was refined, while the third held the thoroughly purified glass, from which it was worked out continuously. These floating bridges, however, were rapidly destroyed by the heat of the molten glass, and a still further improvement, which has largely increased the melting capacity of the furnace, has been made by the substitution of a floating refining vessel in place of the floating bridges. In this latest form the batch is charged from time to time through a door at one end of the furnace. The glass, upon melting, sinks and travels on toward the gathering holes, at the other end, in a partially refined condition. Opposite each gathering hole a refining vessel is floated, which gathers the molten glass at the lowest possible depth in the tank and raises it to the surface to be completely refined in a compartment prepared for that purpose, from whence, on sinking, it can only flow into the working-out compartment. From this last compartment the glass may be worked out continuously, the flow of the metal therein, and its assortment in the different stages of its manufacture, being entirely effected by the varying densities of the particles subjected to the heat of the furnace. Owing to this important feature it will be seen that only the best glass, which is the heaviest, can reach the compartment of the vessels from which it is to be gathered, the imperfectly-melted metal remaining in the tank as long as needful for proper fusion. The refining vessels are made of pot-clay, and vary somewhat in size and form, according to the character and quality of glass intended to be produced. The gathering compartment is sometimes made entirely open, sometimes covered wholly or partially with a hood; but in all cases the vessels are floated on the metal in the tank, and are constructed so as to be easily removed when worn out. By the employment of these refining vessels dividing bridges in the tanks are no longer required, and thus that part of the structure which in the first forms of continuous glass-melting furnaces was subject to the most wear is done away with. Another advantage is found in the circumstance that the ends of the blowing-canes, which sometimes break off in the glass, may be easily picked out from the bottom of a refining vessel, instead of its being necessary from time to time to empty a tank, in order to remove as useless the glass discolored by the accidental introduction of iron. The color of the glass made in a tank may be altered from time to time, as required, without interrupting the blowers; and for this purpose it is only necessary to cease charging batch into the furnace for a few hours, when some of the new glass mixture is introduced, and further charges are made at regular intervals. According to the productive capacity of a tank, the change of color will be effected in from three to five days, and only a few hundred-weight of mixed metal is formed, which has to be ladled out. For works requiring the regular production of glass of different colors or characters, in insufficient quantities of each sort to warrant the erection of a special furnace for each variety, the tank may be divided into two or more compartments, or several large pots may be set in a furnace, each of which shall have the desired number of refining vessels. By surrounding these pots with sand they will be much strengthened, so that they may be made larger than usual, and thus form several small tanks in one furnace, which can easily be removed when required. In this manner the continuous melting process may be applied to both large and small productions, and will therefore be of interest to all glass manufacturers.

The principal advantages resulting from the use of the continuous-melting furnaces are claimed to be:

1. Increased power of production, as the full melting heat may be employed without interruption, while with the old method of melting nearly one-half of the time is lost by cooling and settling the metal, the working out of the glass, and the reheating of the furnace.
2. Economy in working, as only one-half the number of men are required for the melting operations.
3. Durability of the furnaces, owing to the uniform temperature to which they are subjected.
4. Regularity of working and improved quality of the glass made.
5. Convenience to the men and advantage to the manufacturers, as owing to the continuous action the metal is always ready for the blowers, and the gatherers can draw the metal from a practically constant level.
6. For the manufacture of window-glass the working-out end of the furnace may be so arranged that the blowers can work without interfering with the gatherers. This would do away with the separate blowing furnace now in use.

The greater durability of the tank is not only due to the uniform temperature maintained, but also to the circumstance that the batch is charged in such quantities at a time as not to come into contact with either the sides or the bottom of the tank, which, consequently, are not suddenly cooled or eaten away by the mixture. Furnaces containing as few as four gathering-holes, while others of greater capacity—up to thirty-two gathering-holes—are now in operation, the latter being worked with a consumption of one ton of lignite per ton of glass bottles produced, which, having regard to the calorific power of that fuel, is equivalent to the small consumption of 10 hundred-weight of coal to the ton of glass melted, molded into bottles, and annealed. As showing the results obtained with the second style of tank we give the following statement from one of Mr. Siemens' pamphlets, showing the work done during five consecutive weeks in a continuous tank furnace by one of the extensive glass manufacturing companies of England. It should be noted that at the time this statement was taken the furnace was working but two shifts out of the twenty-four hours, whereas it can be as readily worked continously three shifts in twenty-four hours:

Week ending—	COAL USED.			Batch.	BOTTLES DECLARED.		Number of chairs used on all shifts during the week.	Declared bottles per chair per shift.	BOTTLES DRAWN.		PER TON (2,240 POUNDS) OF BOTTLES DRAWN.		
	Producers.	Kilns.	Total.		Dozen.	Weight.			Dozen.	Weight.	Coal in gas-producers, exclusive of kilns.	Total coal, including kilns.	Batch.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*		*Pounds.*				*Pounds.*			
February 19, 1875	90, 720	26, 880	117, 600	70, 000	3, 873	55, 272	40	96. 8	3, 698	51, 828	3, 942	5, 017	3, 146
February 26, 1875	84, 000	26, 880	110, 880	101, 360	4, 124	58, 408	40	103. 1	3, 867	54, 600	3, 449	4, 547	4, 144
March 5, 1875	80, 640	26, 880	107, 520	84, 000	4, 057	57, 008	40	101. 4	3, 733	52, 416	3, 427	4, 592	3, 584
March 12, 1875	73, 920	26, 880	100, 800	88, 480	4, 450	66, 276	45	98. 9	4, 070	56, 364	2, 912	3, 987	3, 516
March 19, 1875	78, 400	33, 600	112, 000	112, 000	4, 960	67, 872	49	* 101. 2	4, 609	62, 608	2, 800	3, 987	3, 987

* One chair missed a journey.

The accompanying diagrams, from drawings kindly furnished me by Messrs. Richmond & Potts, of Philadelphia, give an idea of this furnace, Figs. 1 and 2 showing a four- or six-hole window-glass furnace, which at any time may be doubled in capacity by adding the same number of blowing- and gathering-holes at the other end and charging at the center.

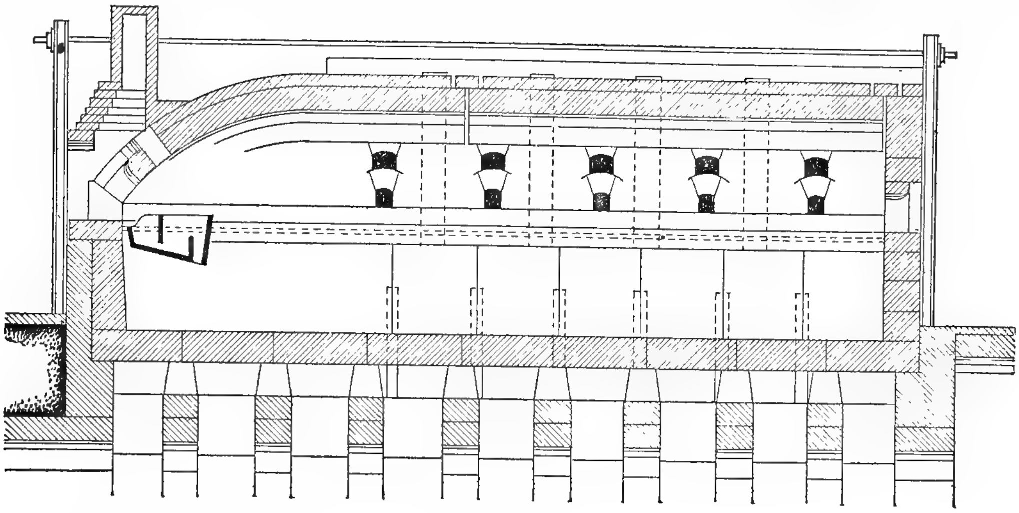


Fig. 1.

These double-end furnaces are in use in Europe with the best satisfaction. No Siemens' tank furnaces were in operation in this country in the census year. One was building at Poughkeepsie, and has since been started, but not with very good results. One has since been built in Illinois, and its operation has been attended with good success. A number of tank furnaces of various designs were in operation or building during the census year, however. These furnaces were generally oblong, resembling an iron-puddling furnace in construction and operation, or were simply a large round pot. I have no specific details of their construction or operation, but they seem to have been quite successful and economical.

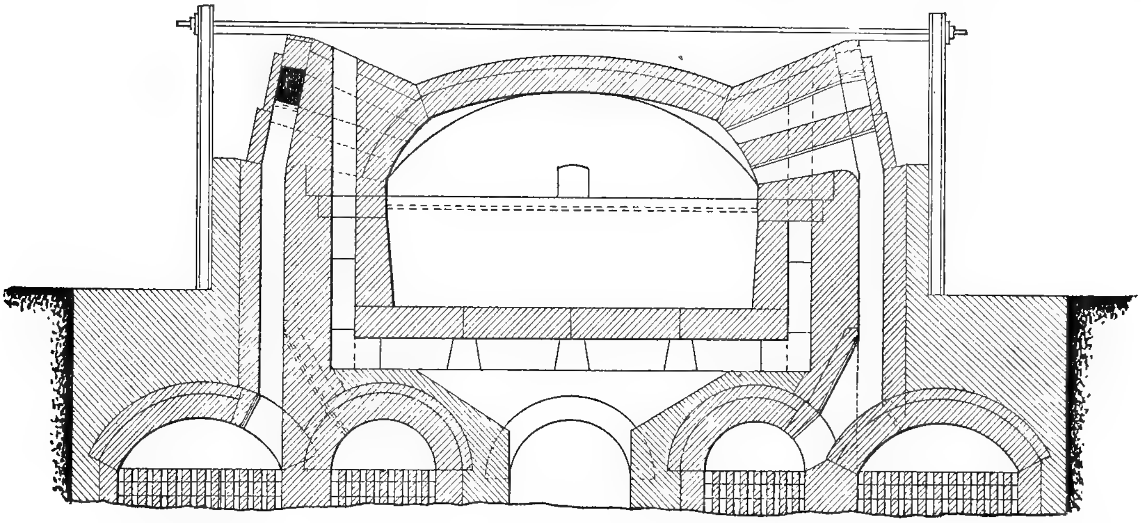


Fig. 2.

Pot-clay.—The pots used in melting are made from certain varieties of fire-clay, termed pot-clay, from its use for this purpose. The clay adapted to the manufacture of pots should be as pure as possible, and be very refractory, breaking with a clear, smooth, bright fracture, unctuous to the touch, free from lime and sulphide of iron, and the less oxide of iron the better. The shale or slate-clay from Stourbridge, England, which is brown in color, has a wide reputation, and is largely used in British glass houses, but the foreign clays most generally employed in this country are German, though American clays are, to a large extent, taking the place of the foreign. The clays most largely used in the European glass houses are those from Forges-les-Eaux, in France; Andennes and Namur, in Belgium; Stourbridge, in England; Glen-borg, in Scotland; Sargenau, in Switzerland; Schwarzenfell, in Bavaria, and Klingenthal, in Germany. In this country there are large deposits of excellent pot-clays in many localities. Those that are used, however, are chiefly drawn from western Pennsylvania, Missouri, and New Jersey, though the clays of Maryland, Ohio, and Indiana are to some extent used. When American clay was first used it did not give the satisfaction that its analysis would indicate. This was owing to lack of skill in its preparation, but as this has been acquired American clay is rapidly gaining in favor. Mr. Thomas Coffin, of Pittsburgh, one of the oldest pot-makers of this country, writes me regarding the use and relative value of German and American clays, as follows:

> About three-fifths of the clay used in this country is foreign clay, principally German. Window-, bottle-, and plate-glass houses use the largest proportion of German clay, some making their pots entirely of German, others of a mixture of German and American. Nearly all the flint houses use pots made entirely of American clay, although a few mix some foreign. It is found by experience that the American (Missouri) clay will stand a more intense heat than any other, but that the German clay resists the action of the flux better; hence the mixture of the two to overcome as nearly as possible the two difficulties. American clay is fast superseding German clay because of the hotter-running furnaces that are now being used.

Our American clay is much purer than the German, and is more refractory, but not as dense. It is much less costly, however, and must eventually supersede the German.

COMPOSITION OF POT-CLAY.—The composition of pot-clay from different localities is given in the following table:

Localities and kinds of clay.	Chemist or authority.	Silica, including sand.	Alumina.	Oxide of iron.	Lime.	Magnesia.	Carbonate of magnesia.	Potassa.	Soda.	Sulphur.	Water.	Total.
Stourbridge, England:		*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Homer's Best	Willis	67.34	21.03	2.03	....	....	....	....	....	....	8.24	100.00
Best Pot	Richardson	64.05	23.15	1.85	....	....	0.10	....	....	....	10.00	100.00
Chance's	Percy	65.10	22.22	1.92	0.14	0.18	....	0.18	....	....	9.86	99.60
Do	C. Tookey	63.30	23.30	1.80	0.73	....	....	....	....	....	10.30	99.43
Scotch Glen-borg	Professor Cook	61.45	24.68	1.67	....	0.10	....	0.20	....	....	10.90	....
Belgium:												
Andennes	Bischof	46.64	34.78	1.80	0.68	0.41	....	0.41	....	....	1.27	96.72
German:												
German	D. Tal Aran	46.44	36.95	1.64	....	0.69	....	....	0.48	....	....	....
Do	....	70.60	23.60	....	0.36	0.45	....	....	1.10	....	3.89	....
Coblentz	Professor Cook	71.31	15.66	1.19	....	0.28	....	0.63	Trace.	....	9.70	....
Ebernhahm	Kerl	46.97	37.95	0.95	0.04	0.11	....	3.00	....	....	10.02	....
Grunstadt	Bischof	47.33	35.05	2.30	0.16	1.11	....	3.18	....	....	10.51	....
French:												
La Bouchade	Percy	55.40	26.40	4.20	....	....	....	....	....	....	12.00	....
American:												
Cheltenham, Missouri:												
Crude	Litton	61.02	25.64	1.70	0.70	0.08	....	0.48	0.05	0.45	9.68	100.00
Washed	do	59.60	26.41	1.61	1.00	0.07	....	0.29	0.16	0.38	10.48	100.00
Dixon, Missouri:												
Crude	Chauvenet and Blair	56.02	28.86	1.67	1.76	0.34	....	....	....	....	11.12	....
Washed	do	55.06	30.02	1.57	2.20	0.41	....	....	....	....	10.54	....
Blue Ridge, Missouri	Weiss	63.75	26.60	0.75	Trace.	0.85	....	0.40	....	2.25	7.40	100.00
Oak Hill, Missouri	Chauvenet and Blair	64.32	22.82	1.75	0.45	0.12	....	0.23	0.54	0.12	10.26	100.58
Christy's, Missouri	....	63.10	23.70	2.20	0.09	0.06	....	0.04	0.08	....	10.73	....
Thomas, Pennsylvania	McKeown	43.88	40.96	0.82	Traces.	Traces.	....	....	....	....	13.99	99.65
Blair county, Pa	....	70.18	20.99	....	0.65	0.13	....	....	0.08	....	7.75	....
Dixon's, New Jersey	Professor Cook	59.93	26.95	1.24	....	0.07	....	Trace.	Trace.	....	10.20	....
Near Newcastle, Delaware.	Salvétat	72.33	16.75	1.29	2.00	0.07	....	....	....	....	7.98	....

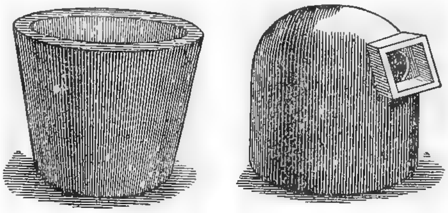
MANUFACTURE OF POTS.—The manufacture of the melting-pots for a glass furnace is one of the most important, careful, and tedious of the operations about a glass works. From the digging of the clay till it is refined, mixed, kneaded, and built into pots, and these are thoroughly dried, heated, and set in the furnace, two or three years often pass. The pots themselves are costly, the setting difficult and expensive, and if they are improperly made or spoiled in drying, heating, or setting, and break, the entire batch frequently is lost, and in many instances consequential damages ensue from the delays and loss of output. The importance of having good pots is so great that many manufacturers are not willing to depend upon outside makers to supply them, though this opposition to outside pot-makers is not so great as it was a few years since. It is estimated now that about one-half of the pots used in the country are not made at the glass works. The clay, having been allowed to ripen or putrefy a sufficient time, is mixed into a thick paste with water and from one-fifth to one-fourth its weight of finely-ground old pots or "potsherds", and is thoroughly kneaded by tramping until it is of the toughness of putty. This mixture dries more rapidly, contracts less when drying, and better resists the action of the fire and materials of the glass than the pure clay. The kneaded clay is then made into long rolls and built up by hand, little by little, into the solid compact pot, no machinery being used, and care being taken to keep it free from air cavities. The pots are not built up at once, but after placing a layer, each pot is permitted to stand and set, being kept carefully covered. A good pot maker and his assistants can furnish one pot a day. After the pots are made, great care is taken to dry them thoroughly. In summer the natural temperature is sufficient, but in winter they are kept at from 60° to 70° F., care being taken not to allow them to freeze. The pots are allowed to dry from four to eight months, and when they are ready for use their temperature is very gradually and cautiously increased, first in a warmer room and then in the annealing arch, until they reach the temperature of the working furnace, when they are immediately placed in the furnace or "set". The soundness of the pots is tested by throwing a small lump of coal against the side. If it rings well, it is regarded as a good pot; but if dull, it will probably be short-lived, though this test is not always conclusive.

THE SETTING OF THE POTS is one of the most difficult and laborious of the operations at a glass works. Mr. Henry Chance remarks:

> The terrible task of setting these pots in the furnace falls upon the glass-house crew, and the nicety with which these enormous vessels are adjusted in their place, in the teeth of a consuming fire, is, perhaps, that operation which, in the many marvels of glass-making, would most astonish a stranger to such scenes.

LIFE OF POTS.—The average duration of open pots when thus fixed is about seven weeks; but some attain the age of ten or twelve weeks, while others, as every manufacturer well knows, terminate their existence prematurely, either from the naturally defective constitution of the pot, or from bad treatment in the pot arch, or, more frequently, from its having been "starved"; that is, exposed to a current of cold air in the furnace through the neglect of the attendant. Flint pots have a much longer life, averaging perhaps three months, single pots sometimes lasting ten months. In a ten-pot lime-flint furnace at Pittsburgh but 21 pots were set in a year. "Misfortunes never come singly" is an adage applicable to the catastrophes of pots, and it was truly remarked to a manufacturer, at a period when such calamities were frequent, "Your pots break because they break." The breakage of a pot often disturbs the furnace to such an extent that the breakage of others frequently follows, and many weeks will sometimes elapse before the disorganization thus produced can be rectified. The loss of a pot and the "metal" contained is nothing as compared with the injury which the glass in the surviving pots, and the pots themselves, are apt to sustain.

SIZE OF POTS.—The size of pots, not only in different countries but in the different works of the same country and in the manufacture of different kinds of glass, varies. The pots for the plate-glass houses of this country range from 30 to 35 inches in diameter; window-glass, from 40 to 44 inches; bottle-glass, 44 to 60 inches, and flint from 38 inches in diameter at the bottom to an oval 52 inches wide by 63 inches long at the bottom and 54 inches high. The English pots for blown window-glass are from 42 to 65 inches outside diameter; the French 1.10 meters (43.41 inches) at top, 0.92 meter (36.223 inches) at bottom, and 1.12 meters (44.09 inches) inside height; the Belgian about 48 inches (say 1.10 by 1.30 meters); the German contain from 140 to 180 cubic feet; and the Austrian from 500 to 600 millimeters. Flint-glass pots are generally smaller, say from 36 to 40 inches, while those used in the Bohemian glass houses are stated by Mr. Colné to hold only 160 pounds of batch. Pots for colored glass are also very small.



SHAPE OF POTS.—Pots for all glass but flint are open truncated cones, the smallest diameter being at the bottom. Even some flint-glass pots are used uncovered in the gas furnaces, but usually they are covered as represented in the accompanying cuts.

CHAPTER VI.—MIXING, MELTING, FINING, AND FAULTS.

INFLUENCES THAT DETERMINE THE CHARACTER OF GLASS.—The materials for the manufacture of glass when properly mixed and ready for melting are technically known as the "batch" or "mix", but it is impossible to lay down any standard and invariable proportion of these materials for the several kinds of glass. As has already been shown, glass is by no means a definite compound when made, and the proportions of materials are subject to even greater variations than the product. The batch not only differs for the several kinds of glass, but makers of the same kind use the materials in widely varying proportions, and even the same maker is often compelled to vary his mixture from day to day, either by reason of the varying character of his materials or the melting power of his furnace. A variation in the sand or alkali will change the color and call for a change of the amount of the decolorizer used. When the furnace draught is good, or the furnace works "hot", as it does on a cold, clear day, the melting is more perfect and less alkali need be used; but when it works "cold", from insufficient draft or heavy atmosphere, more alkali is needed, and the glass is inferior. To properly manipulate the melting, in view of these varying circumstances, is the work of the teaser, and his success in thus manipulating them indicates his skill.

CONSTITUENTS OF THE BATCH.—As indicating the general composition of the batch for the different kinds of glass in different countries we have selected the following receipts, which are given in tabular form. These must, however, be regarded as only approximate, for the reason already given, and for the further reason that manufacturers guard with the utmost jealousy the special composition they use to obtain the best results in their furnaces.

PROPORTION OF MATERIALS USED FOR PLATE-GLASS.

Constituents.	FRENCH.		ENGLISH.	
	Saint-Gobian.*	Saint-Gobain.†	No. 1.‡	No. 2.§
	Pounds.	*Pounds.*	*Parts.*	*Parts.*
Sand	100	100.0	400	720
Sulphate of soda				
Carbonate of soda	35	60.0	250	450
Niter				25
Lime	5			80
Carbonate of lime		13.0		
Chalk			30	
Charcoal				
Arsenic				
Manganese		1.0		
Smolt		0.5		

*Authority: Knapp. †Authority: Bastinaire. ‡Authority: Pellatt. §Authority: Lippincott's Cyclopædia.

PROPORTION OF MATERIALS USED IN WINDOW-GLASS.

Constituents.	Pittsburgh.*	FRENCH.			ENGLISH.†		
		No. 1.†	No. 2.‡	No. 3.‡	No. 1.	No. 2.	No. 3.
	Pounds.	*Parts.*	*Parts.*	*Parts.*	*Pounds.*	*Pounds.*	*Cwt.*
Sand	8,000	100	100	100	560	448	16
Sulphate of soda	2,200		44	58 to 75	63	17	1.25
Carbonate of soda		28 to 35			119	168	5
Lime	§2,500		6	13 to 15			
Chalk		35 to 40			154	146	5
Powdered coal or coke	40		[illegible]	4.5 to 5.5			
Arsenic	50	0.20			2	2	
Manganese		0.25					

* Authority: Pittsburgh manufacturers. † Lippincott's Cyclopædia. ‡ Authority: Dumas.

PROPORTION OF MATERIALS USED FOR FLINT (LEAD) GLASS.

[The usual rule for flint glass is expressed 3:2:1 or 3 of sand, 2 of lead, and 1 of potash.]

Constituents.	Pittsburgh.*	English.†	FRENCH.		
			Optical.‡	No. 1.§	No. 2.‖
	Pounds.	*Parts*	*Parts.*	*Parts.*	*Parts.*
Sand	1,500	336	43.5	100.0	300
Lead	600	224	43.5	80 to 85.0	215
Carbonate of potash	500	112	10.0	35 to 40.0	110
Niter				2 to 3.0	
Saltpeter	150	14 to 28	3.0		10
Manganese	1½	4 to 12 oz.		0.5	
Borax					12
Arsenic	1½				

* Authority: Pittsburgh manufacturers. † Authority: Pellatt. ‡ Authority: Bontemps. § Authority: Loysel. ‖ Autherity: Dumas.

PROPORTIONS OF MATERIALS USED FOR FLINT (LIME) GLASS.

[Sometimes a few hundredths of saltpeter, borax, and red lead are added.]

Constituents.	Pittsburgh.*	Bohemian.†	French.‡	Lime-white.†	Clear white.†	Chemical.†
	Pounds.	*Parts.*	*Parts.*	*Parts.*	*Parts.*	*Parts.*
Sand	1,500		300	100	100.0	100.0
Quartz		100.00				
Carbonate of potash		60.00		30	65.0	41.4
Carbonate of soda	500		170			
Lime	150		75	18	6.0	17.5
Chalk		8.00				
Manganese		0.75			0.5	
Charcoal			10			
Arsenic						
Nitrate of soda	200					

* Authority: Pittsburgh manufacturers. † Authority: Lippincott's Cyclopædia. ‡ Authority: Colné.

PROPORTION OF MATERIALS USED FOR BOTTLE GLASS.

Constituents.	Pittsburgh.*	French. †	English. ‡	Belgian. †
	Pounds.	*Parts.*	*Parts.*	*Parts.*
Sand	8, 000	100	100	10
Sulphate of soda		8		15
Carbonate of soda	2, 200			
Peat-ashes				20
Lime, slacked		24	80	
Limestone	2, 400			5
Salt	250		3	
Soapers' waste			80	
Clay			5	

* Authority: Pittsburgh manufacturers. † Authority: Colné. The sand contains about 20 per cent. of calcareous matter. ‡ Authority: Pellatt.

MIXING THE BATCH.—Upon the thorough mixing of the materials depends in some degree the homogeneity, and, consequently, the structure and value of the glass. These materials differ so much in their specific gravities that the thorough mixing, as well as the melting, is a work of some difficulty. In this country, with the aid of a coarse sieve and shovel, the mixing is generally done by hand. Many attempts have been made to introduce mechanical mixers, but, though some are used, they have been discarded in many works, and the older method is employed. Where manual labor is as high-priced as in this country, the introduction of a satisfactory mixer would seem very desirable. In England several machines are used, that of Mr. Chance being a very simple machine, consisting of a wooden cylinder with a number of revolving oblique beaters; but Cooper's mixer is a revolving barrel, similar to those used in powder works.

FRITTING.—At the present time the materials thus mixed are charged directly into the pot or tank, as the case may be. When the impure alkalies obtained from sea-weed or wood-ashes were used the batch was submitted to a preliminary refining process termed "fritting". This consisted in stirring the materials together under the heat of a reverberatory furnace, called a "calcar arch", which effected a partial decomposition and the burning of any carbonaceous matter that might be present, and the "frit" thus obtained was remelted in the pots. With the use of the purer alkalies made from salt this fritting is not necessary, though heating the batch in the arch may be desirable.

CHARGING.—The pots having been heated to a white heat, the materials, mixed with a proportion, generally one-third, of cullet of the same kind as the glass to be made, are shoveled into them. Mechanical chargers have been used to some extent in this country, but not very successfully. As the melted glass is less in bulk than the materials, the entire batch is not charged at one time. The pots are filled as full as possible at first, about two-thirds of the whole batch being charged, and the remainder is shoveled in as the melting and sinking of materials permit. Two or three shovelings or fillings are sufficient. During the melting the grate-bars are kept well supplied with coal, to prevent a rush of cold air into the furnaces, which might split the pots.

MELTING.—As the melting progresses the teaser (*a*) watches it most carefully, urging the furnaces to their utmost intensity and determining the fitness or unfitness of the metal for working, as there are signs which indicate to the practiced eye when the metal is ready, such as the color of the flame or the appearance of proof specimens taken from the pots with a short rod flattened at one end. The escape of the carbonic-acid gas answers the purpose of stirring the materials. When the disengagement of this gas ceases, especially in the manufacture of window-glass, the mass is stirred with a pole of green wood, or a piece of arsenious acid is thrust into the bottom of the pot, thus causing a forcible expulsion of gas and consequent stirring of the materials. When impure materials were used, the close of the period of melting found the surface of the molten glass covered with a thick scum of unvolatilized salts, called "glass-gall", or "sandiver", which was skimmed off. The relative proportions and the purer materials of modern glass houses render this skimming unnecessary; indeed, the appearance of "sandiver" in any quantity is regarded as an indication of impure materials or wrong proportions.

FUSION AND FINING.—The melting may be divided into two periods, fusion and fining or refining, the first ending when the materials are thoroughly melted, and the second including the after process of freeing the glass from bubbles, lime, and earthy impurities that do not fuse. For this purpose the glass must be brought to the most fluid state possible, and the heat is therefore raised to the highest point. This process of fining, refining, or "hot-stoking", as it is called in this country and in England, or *heiss-schüren*, as it is termed in Germany, involves a very high temperature, which is estimated in certain cases to reach from 10,000° to 12,000° F. (*b*) Though the authority for this statement is very good, it is doubtless too high, about 3,200° to 3,600 F. being the average. The time of fusion and refining should be as short as possible, the shorter the better, as long-continued melting or fining detracts from the brilliancy of the glass and favors the formation of threads. The time occupied in melting varies greatly, depending upon the construction and character of the furnace, the proportion and the character of the materials, and the size of

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[a] The word appears to be derived from the French "*tiseur*".

[b] *Encyclopædia Britannica*, 9th ed., article, "Glass."

the pots. Gas furnaces will, as a rule, make a "melt" in less time than the old style, and those of the old style that use coal as a fuel will melt in less time than those using wood. The larger the proportion of sand the longer will be the time, while lead will hasten the melting. Very large pots, holding, as some English ones do, 5,000 pounds of material, will consume 48 to 50 hours in melting, while the French pots, of from 1,000 to 1,200 pounds, will melt the batch in 12 hours. This is not uniformly true, however, as the pots in the Bohemian furnaces are stated to hold but 160 pounds, and yet the melting occupies 18 hours. This is due to the construction of the furnaces, the use of wood, and the materials used.

TIME REQUIRED TO MELT AND FINE.—In England the time of melting in the plate, crown, and sheet window-glass houses is stated to be from 16 to 20 hours, and the time of fining from 4 to 8 hours. In France and Belgium it is somewhat less. In this country the time of melting is about 12 hours, and of fining from 3 to 4 hours. In green-glass houses the time occupied is about one-third less. This glass is inferior to window-glass, and the perfect fusion and fining is not as necessary for the purposes for which it is used as it is for sheet-glass. The time required to make a melt of flint-glass is much longer than that for either of the other kinds; the pots being covered, the heat is kept out and the melting is retarded. The time is shorter with lead as a flux than with lime, but, as a rule, twice as much time is occupied as in the melting of window-glass. In England the time is from 48 to 60 hours, the batch being very large, the melting consuming about five-sixths of the time; but in France, where pots holding but 1,600 pounds are used, the time of melting is from 8 to 9 hours, and of fining from 1 to 2 more; and, as already stated, the Bohemian houses require 18 hours for a melt of a 160-pound batch. In this country, in lime-glass houses, the melting of a 3,200-pound batch consumes from 20 to 24 hours, the fining from 2 to 4, and the cooling one-half an hour to an hour, the latter process being hastened by opening the mouth of the pot and blowing the blast into it. In France thin pots, with a small amount of batch, have been used to hasten the melting.

COLD STOKING.—When the fining is completed the molten glass is very fluid, and in this condition could not be worked, as it must by cooling be brought to a viscid or plastic condition necessary for working. To accomplish this the draught is stopped and the grate-bars are plastered or the fire is covered with "braize" or fine coke. In some cases the blast is turned into the pots. This is called "cold stoking" or "standing off", or by the Germans "*kalt-schüren*", cold covering. In window-glass works this process requires from one and one-half to three hours; in flint works, from one to two hours.

LOSS IN MELTING.—As already indicated, the process of melting results in the disengagement of the gases that are contained in the materials, as the weight of the glass is considerably less than that of the batch. This loss, however, is chiefly in the gases other than oxygen, though this is expelled to some extent. Mr. Henry Chance (*a*) states "that very little alkali is lost by volatilization during the intense heat to which it is subjected. I do not find in any case a difference of more than 1 per cent. between the alkali in the mixture and that in the glass produced, and this includes the waste that must necessarily arise in mixing, in carrying the materials to the furnace, and throwing them into the pots". By alkali Mr. Chance evidently means the available alkali in the material charged, and not the entire amount of carbonate or sulphate, as the case may be. Some manufacturers think a larger proportion is lost. I am indebted to Mr. Julius Fahdt for the following very interesting and complete table, showing the practice of the Austria-Hungarian glass houses:

DIMENSIONS OF POTS AND TIME OF MELTING AND WORKING.

	EXTERIOR DIMENSIONS.			CONTENTS IN—			DURATION IN HOURS OF—				
	Height.	Diameter.		Weight.	Proportion.		Heating.	Melting.	Fining.	Cooling.	Working.
					Batch.	Cullet.					
	Millimeters.	*Millimeters.*	*Millimeters.*	*Kilograms.*							
Plate-glass (only one factory)*	550	600	500	150	120	30	1	8	6	2	....
Sheet-glass (few exceptions with pots, as in Germany).	550	600	500	150	100	50	1	8	6	1	12.00
Flint with lime†	450	450	400	75	50	25	½	[illegible]	6	½	10.12
Bottles‡	550	600	500	150	120	30	1	10	6	1	10.00

* Small plate of from 50 to 60 square feet.

† According to articles.

‡ Bottles are nearly all made in two large establishments with Siemens' tank furnaces. Lead glass is only manufactured in some works for false jewelry in flint and colors, in very small pots, not exceeding 50 to 60 kilograms, which are worked out in lumps, cut and ground. About one-third of the Austrian glass-melting establishments produce raw glass, which is pressed or worked out in heavy pieces for prisms, chandeliers, and heavy ground articles. These are finished by the so-called refiners, who buy the raw glass and finish and sell it. A good many sheet-glass works only make a very thin sheet-glass, which is used in looking-glass manufacture. The Austrian window-glass, with a very few exceptions, is also very thin, generally not much above one millimeter. This is the reason why the small pots require a much longer time to melt and work out. Austrian factories in general blow their articles much lighter than in Germany. They require a longer time for melting, because their metal is very hard.

FAULTS IN THE METAL.—The faults in glass that occur in connection with its melting are chiefly those from air or gas bubbles, imperfect fusion, and foreign substances. When the fining has been obstructed by too great

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[a] *On the Manufacture of Glass*, a lecture delivered before the Chemical Society, March 19, 1868, page 8.

difficulty of fusion, the mass becomes thick or viscid and the bubbles are retained, giving rise to what are known as "seed", "blibe," or "blister". When the fusion is imperfect, and the glass is not uniform throughout, the density of various parts of the glass varies and refraction of light is not equal, and consequently images of objects seen through the glass are distorted or out of place. These faults are termed "striæ", and when they show on the surface they are termed "waves". "Threads" or "strings" are produced by cold glass dropping into the metal and not undergoing fusion. "Tears" are vitrified portions of the side or roofs of the furnace that drop into the pot. Mr. Henry Chance's *résumé* of the defects of crown glass and their cause is so indicative of the many difficulties in the way of producing perfect glass that I copy it: (*a*)

> Perhaps the glass has been badly melted and is seedy, that is, full of little vesicles, to which the rotary motion has given a circular shape; or the gatherer may have inclosed air within his "metal", and a gatherer's blister is the result—or a pipe blister, or pipe scales, or dust from the pipe-nose, or dust from the marver, or dust from the bottoming-hole, or dust from the nose-hole, or dust from the flashing furnace, or bad bullions, or scratches, or music lines, may disfigure the table, or the glass may be crizzled, or curved, or bent, or hard, or smoky, or small and light, defects to explain which would be a long and dreary task.

CHAPTER VII.—GLASS-WORKING.

METHODS OF GLASS-WORKING.—It is not the intention of this report to enter into the minute details of the various methods of glass-working, as it is not intended that this work shall be a perfect hand-book for beginners or for skilled glass-makers. I have only endeavored, while giving full and correct statistics of the trade in the United States, to glance at the history of glass-making at home and abroad, and to give some general idea of the processes employed and of the materials which enter into the composition of glass. For these reasons I shall here only describe in a general way the most important processes used in the manipulation of the melted glass. The chief methods of working glass are three: (1), casting; (2), pressing; (3), blowing. Casting and pressing are closely related processes, and blowing and pressing are often combined to produce certain forms of glass, but the processes are generally so distinct as to justify the classification adopted. Glass is also manipulated in many ways that do not properly fall under either of these classes, but they are of minor importance, and either are subsidiary to one or more of these three methods, or are, strictly speaking, reworking glass.

PLATE-GLASS.—The most important form of cast glass, and the one most largely produced, is plate-glass, or, as it might more properly be called, cast plate-glass. This is the well-known cast, ground, and polished plate used for windows, mirrors, etc., and should not be confounded with the blown plate and Chance's patent plate, which are blown glass. In the manufacture of cast plate furnaces and pots of the ordinary construction are used, the melting-pots, however, sometimes holding as much as 2 or 2½ tons of batch. In French works, and in some others, two forms of pots are used, which are placed side by side in the furnace: the ordinary melting-pot, and an auxiliary pot, called a "cuvette", large enough to hold sufficient glass to cast a sheet of a given size. The molten glass is ladled from the pot into the cuvette, allowed to clear, if necessary, and is then cast. In most works, however, the practice now is to pour or cast directly from the pot in which the glass is melted, and in other cases it is ladled from the pots to the casting table.

CASTING AND ANNEALING.—The casting table, formerly made of bronze, is now made of one piece of cast-iron, (*b*) heavy and thick, and in width and length exceeding the dimensions of the largest sheet of glass. It is commonly mounted on wheels, running on a track laid down the center of the casting hall or room, on each side of which are the annealing ovens. A heavy cast-iron roller the full breadth of the table is arranged to roll its whole length by means of a spur-wheel on the roller working in gearing on the side of the table. The height from the table at which it rolls, and consequently the thickness of the glass, is regulated by narrow strips of metal placed along the edge of the table, while the width is determined by what is known as the "gun", two plates of cast metal bolted together, adjustable to the breadth desired and moving with the roller and before it. All being ready for casting, a pot filled with the molten glass is removed from the melting furnace, placed on a truck, and run to the casting table. The pot is lifted from the truck by a crane, is suspended over one end of the table and tilted, and the viscid, semi-fluid mass being poured out, the roller is moved forward, flattening the glass and rolling it to a uniform thickness, while the "gun" prevents it from spreading to a greater width than is desired. As soon as the plate has solidified sufficiently to bear moving, it is laid in the annealing oven on the "flat" to slowly cool. All the operations are performed with the greatest rapidity, that the plate may be as hot as possible when laid in the oven. The number of plates that can be put in an oven varies with the size of the plates. But one layer of those

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a Mr. Henry Chance *On the Manufacture of Crown and Sheet Glass.*

b In some cases, in order to overcome the "bowing" of the plate, it is made in a number of pieces.

designed for polishing can be placed in it; consequently a large number of ovens is needed where large plates are made. These ovens are large, shallow, brick reverberatory furnaces, with floors as smooth and as level as possible, as the semi-plastic mass molds itself into the unevenness, and any bending of the plates would make them valueless. As soon as the plate is placed in the oven, all the openings are carefully closed and the oven is allowed to cool gradually to a point where the glass may be safely removed, generally requiring from three to five days.

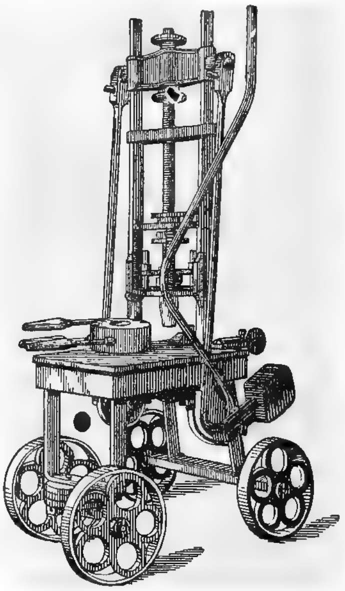
ROUGH PLATE.—The cast plate as it comes from the oven is rough and irregular on its surface, constituting the rough plate of commerce, and in this form it is used for roofs and floors, and even for windows, where light without transparency is desired.

GRINDING, SMOOTHING, AND POLISHING.—The plates having been examined for defects, such as spots, air-bubbles, etc., and, if necessary, cut into such sizes as these defects require, the selected pieces are then polished, which operation consists of three processes: (1), grinding; (2), smoothing; (3), polishing; but it is exceedingly difficult to describe these operations without the aid of drawings. Various machines have been invented for these purposes. The machine originally used for grinding was known as the "fly-frame" machine, the design of which is attributed to James Watt, and in one form of this machine commonly two or more plates, according to their size, are imbedded in plaster of paris, spread upon a table. Other plates are imbedded in the under side of two runner-frames or swing-tables, which by a strong fixed bar are caused to move with a transverse motion backward and forward, a circular motion being at the same time imparted by means of a vertical crank-shift, pivoted to the central and upper part of the table and actuated by bevel gearing. Four other cranks, one at each corner of the frame, serve to guide and limit its motion, causing its central point to describe a circle about 4 feet in diameter, so that different portions of the faces of the upper and lower glass plates are continually applied to each other. Sharp river sand, sifted into two different sizes, is used as an abradant. When the surface of the lower plate has been ground quite flat by the coarser sand it is removed, and after careful washing finer sand is substituted. To this succeeds emery powder, a coarser and then a finer quality being applied, the glass being thoroughly washed previous to each change of material, so that none of the coarser particles previously used may remain to cause scratches on its surface. The plates are then turned over, and the same process is repeated on the other side. The smoothing process is carried on with similar machines, the only difference being that emery powder of increasing degrees of fineness is employed. The polishing is done with reciprocating rubbers covered with fine felt and supplied with rouge. The table on which the glass lies also is given a backward-and-forward transverse movement, so that all parts of the plate are brought under the polishing operation. About 40 per cent. of the weight is removed in these three operations. Ordinary plate-glass varies in thickness from one-fourth to three-eighths of an inch. The largest plate ever made was exhibited by the Saint-Gobain Company at the Paris exposition of 1878, and measured 21 feet 2 inches by 13 feet 6 inches.

ROLLED PLATE.—A form of unpolished plate-glass, known as rolled plate, has been manufactured largely in England for some time, and has latterly begun to be manufactured in France and Belgium. This is used for coverings for hot-houses, for door-panels, for windows, for partitions, and for other places where obscure light is required. The glass is not poured from the pots, but is dipped from them with a large ladle or dipper and poured upon the casting table, which, instead of being smooth and plain, is engraved or indented in fine lines or flutes or in small squares, lozenges, or even ornamental patterns, the glass, of course, taking on its lower surface the impression of the pattern or lines engraved on the table. The roller is passed over the molten glass as in the ordinary cast plate. These plates are usually cast one-eighth of an inch thick, and in annealing a large number are piled on their edges in the annealing oven, instead of a few laid flatwise, as is done with plate-glass which is to be polished. By this ladling process numerous "air-bells" and imperfections are inclosed in the glass, but as it is obscured by its roughness they do not affect its usefulness.

OPTICAL GLASS.—The flint-glass used in the manufacture of optical instruments is also in a certain sense a cast glass, or at least a massive glass, not manipulated by blowing or pressing. For this purpose a glass of the utmost purity, transparency, freedom from color, striæ, and imperfections is of the highest importance. As has been already stated, this glass has a large proportion of lead. It is melted in the furnace in a single pot, and Guinand's secret, by which it was first made successfully, consisted in constantly stirring the mass while in a molten condition to prevent the heavier lead silicate from falling to the bottom. After the glass is thoroughly melted the stirring is continued until the contents are cooled down to little more than a red heat, when the furnace is closed and the metal is allowed to cool and anneal gradually in the pot within. When withdrawn, the pot is broken and the mass of glass removed. Optical glass is also blown into thick cylinders, and sometimes is cast in slabs from one-fourth to one inch in thickness. The crown optical glass is made with as great care as the flint, but it contains no lead, and has about the same composition as window-glass.

STRASS.—This is the glass used in the manufacture of the remarkably faithful imitation of precious stones, which have been and are still so common, and is manufactured somewhat in the same way as optical glass, special precaution being adopted in the melting of the materials. Formerly it was believed that only rock crystal could be used in its manufacture. This belief, however, is wholly without foundation, sand which is pure making equally good Strass.



Pressed glass is, strictly speaking, one form of cast glass, the molten metal being gathered and cast in a mold which would correspond with the table of the plate-glass works, the plunger of the press answering to the roller. There are, however, so many and important variations in the methods of pressing as to justify its classification as a separate process. Pressing by mechanical means in metal molds, which is an American invention, is a most important and valuable improvement in glass-making, and by its adoption comparatively unskilled labor can be substituted for the highly trained workmen demanded by the blowing process, and cheaper materials can be used. Labor as highly skilled as that required in glass-blowing is not necessary, as intelligent men can be trained in a short time to perform the work, and a glass rivaling lead flint in whiteness and clearness, but not in brilliancy, can be made with lime. In the pressing process as usually practiced a metallic plunger is driven into a metallic mold, into which molten glass has been placed by mechanical means, the glass taking the form of the mold upon its outer surface, while the inner is modeled by the plunger itself. The simplest form of mold is a flat slab of iron or other metal with slightly raised sides. For articles of some complexity molds are made in two or more divisions, hinged together (joint molds), and opening outward. The chief parts of the mold are termed the "collar" and the "base". The ordinary form of press used is shown in the accompanying cut, the mold, with its handles, being shown on the table of the press. The molten glass having been gathered and dropped into the mold, a sufficient quantity is cut off, the mold is pushed under the plunger, and the long lever at the right of the press is pulled down. The plunger enters the mold, the glass is pressed into all parts of the same, the plastic mass solidifies, the plunger is withdrawn, the mold opened, and the glass in the required form is withdrawn, to be fire-polished and annealed. If too much glass is cut off, the article is too thick; if too little, it fails to fill the mold, and the article is spoiled. Though this is quite a simple operation, and though as great skill as in the old method of glass-blowing is not required, considerable practice is still necessary to gather the right amount of metal and to cut it off so as not to waste glass, and also to keep the mold at the right temperature. If it is too hot, the glass will adhere to the die and plunger; if too cold, the surface will not be clear and transparent.

Improvements in the pressing process. (*a*)—Since pressing was first introduced many improvements have been made; indeed, the improvements in glass-making during the past ten years in connection with the manufacture of pressed glass have been most marked, one very important one having been what is known as fire-polishing. By this process the outer film of glass is roughened by contact with the mold, and the film is repolished by a slight reheating. Some of the recently invented mechanical devices for this reheating are most ingenious, and have made the production of certain articles possible which it was believed could not be produced by pressing. One of the chief difficulties in pressing glass is the production of sharp angles, which are so easily obtained in cut glass. If these are secured in pressing, they are apt to lose their sharpness in fire-polishing and reheating. This defect has been obviated in some degree by making the angles longer in the molds, so that when they are softened by the heat they still stand enough in relief to give marked and distinct outlines. To obviate the uneven surface of flat or fluted articles the molds have been constructed so as to make the flutes deeper in the middle, and with angles slanting toward this point. It will readily be seen that a flute composed of two angles tending to the center is not as likely to show defects as if it was of a flat surface. Another important improvement in connection with pressing glass is the process of cooling the molds by the use of air, an invention which has doubled their durability.

Mold-marks.—A common defect of pressed ware is the marks left on the glass at points where the different pieces of the mold are joined together. However skillfully the molds may be made, in course of time the joints will work loose through the expansion and contraction of the metal, and the glass will gradually be pressed in the loose spaces of the joints, thereby imprinting on the surface of the articles ribs or sharp threads, marring the beauty of the work. To obviate this molds are made to open at such places and parts of the design that the marks left can scarcely be seen; for instance, in goblets the marks are left on the edges of angles. The parts of the molds are also combined so as to leave the marks on the edge of the scallop made by the top of flutes in a goblet or tumbler. Tumblers, however, are rarely made in "joint molds", but in solid ones.

Molding articles with lateral designs.—Various mechanical devices have been adopted that have permitted of the production of forms that at first seemed beyond the skill or ability of the glass-presser. Pieces requiring to have designs pressed in the side, which would prevent them from coming out of a mold made in one piece, have been made by having sliding lateral pieces. These pieces are moved forward and withdrawn by suitable means, leaving them free to come out of the mold. Improvements in the same order have also been made for molding handles, forming holes in handles by means of sliding pieces, which are pushed through the side of the mold and withdrawn to take the pieces out. When articles are so shaped on the outside as to present a few protuberances, and it is not thought advisable to open the mold, in order to avoid mold-marks the

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[a] Many of the following facts about pressing are condensed from Charles Colné's report on glass and glassware.

molds are so combined that the protuberances are made by sliding lateral pieces, which, when withdrawn, allow the object to be taken out. Letters, monograms, and ornaments have been made by introducing lateral pieces in molds containing the proper designs. These pieces are changeable, and the same shaped article may be made having different lettering, etc.

MOLDING CURVED HOLLOW ARTICLES, LAMPS, GOBLETS, AND TAPER ARTICLES.—Curved tubes and glass slippers are made by giving the plunger a descending curvilinear instead of a vertical motion, and lamps, goblets, and similar articles are frequently made by first pressing the foot, then blowing the head or body upon it, placing the foot in suitable bearings to connect the two together. The upper part may be either blown in a mold or previously shaped with tools and made to adhere while the glass is hot. Bowls are also made by first pressing, then inverting them, and then pressing the foot and stem upon them. Pieces which are wider at the top than at the bottom, as a decanter, cannot be pressed in the usual way, since the plunger is always a cone, which must be pushed into the mold and withdrawn. These pieces are pressed bottom up, and lips or projections sufficient to form the bottom are formed in the mold. The piece, after being pressed, is withdrawn from the mold, the bottom is heated, and with a tool the lips are brought together to close it up.

MOLDING MOUTHS, NECKS, ETC.—In shaping tools for the mouths of bottles, jars, etc., there are several combinations to produce effects not to be obtained by hand. The ordinary neck-shaped tool for making bottle necks is made of a central pivoted piece to form the inside of the neck and two stationary pieces to form the outside. Sometimes the necks of certain jars require to have a screw shape molded in the inside, and to accomplish this the central piece of the shaping tool is made screw-like, the two outside rubbing pieces of the desired shape, according to the style of jar. It is sometimes desired to form cavities or projections in or on the necks of jars, and this is usually done by having laterally-moving pieces attached to the inside former or the outside jaws, as the case may be. These sliding pieces are operated when the tool is at rest after shaping the neck. In the same order of tools may be classed the formers for making pouring-lips on the necks of cruets. These tools have suitably shaped jaws, which are pressed against the neck to give it the proper slant. It is also desirable sometimes to make holes in the side of a jar or jar-cover. This is done by having metallic pegs placed on the outside jaws, which are pushed in through the metal to pierce it. The middle piece fitting the inside of the bottle-neck in some of the forming tools is so made that at the time of entering it is very narrow, but is gradually widened by forcing apart the two sections of which it is made. Molasses-cans are now made with a glass pouring-lip at top and slanting channel to run the dripped molasses into the can again, the whole being closed by a metallic cover. To form the glass lip the piece is molded upside down, with bottom flaps to close up the can. In this position the can forms a cone, and the plunger can therefore be pushed in and withdrawn with facility. The bottom of the mold is made of a suitable shape, and the plunger is so combined with the bottom piece that the opening in the mouth of the can is made at the same time as the body is pressed, the film of metal at the mouth being so thin as to be readily removed by a sharp blow. By this device clock frames, decanters, pipes open at both ends, etc., can be made.

HANDLES.—Handles can be pressed in one mold, and the body of the object subsequently blown upon them in another mold, the operation cementing the parts together while the metal is hot. Small hand-lamps have been blown in ordinary iron molds, and the handle for each formed by allowing hot plastic glass to descend in a channel at the side until the two ends meet the bowl of the lamp and become cemented to it while hot.

LAMP BODIES WITH FEET AND SCREW COUPLING.—Lamps are sometimes made with the foot and bowl fastened together by means of a metallic casing screwed over the two parts. In order to obtain the screw-pegs at the bottom of the lamp bowl and the top of the foot molds have been devised so as to give to the bottom piece a rotary motion, to withdraw it from the formed peg. This style of forming screws is to avoid the mold-marks which are made when the mold opens.

LAMPS WITH METALLIC PEGS OR COLLARS.—Lamps are blown with metallic pegs or collars imbedded in the glass. The pegs are previously heated, set in recesses in the molds, and the lamp blown over it.

INSULATORS.—In telegraph insulators, however, requiring a hollow screw, a rotating retreating bottom piece becomes a necessity, as the plunger cannot be pushed and withdrawn, owing to the projecting screw-threads.

BALLS.—Round glass balls, used for castors or for shooting at, are now made by using molds containing several sections, which leave only a small connection of glass between the balls. A rod of hot glass is prepared, then rolled lengthwise over the different sections of the mold, and is gradually shaped into several balls, slightly attached together by thin connections. These balls are easily severed, and are then perfectly round.

MOVABLE-BOTTOM MOLDS.—Molds have been made with movable bottoms, to allow the surplus glass, when in excess, to force the latter down, thereby increasing the thickness of the bottom piece. In order to equalize the distribution of heat in iron molds, they have been so made that by varying the thickness of the different parts the cooling and heating become equalized.

BATTERY JARS.—To manufacture battery jars having tubular formations running from top to bottom a ring-plate is used having two mandrels attached to it and falling into suitable recesses in the bottom of the mold. This ring-plate being adjusted in the mold, the plunger is made to come down, and by its pressure the hot glass is made to run round the mandrels while the jar itself is being formed. The plunger having been withdrawn, the mandrel plate is pulled out, and the tubular cavities now appear properly formed.

MOLDS FOR FLARING ARTICLES.—Articles wider at the bottom than at the top on the outside may be pressed by introducing between the outer shell of the mold and the plunger a cylinder tapering wider from top to bottom; but the inside of the article must, of course, be made tapering downward toward the center, so that the plunger may be withdrawn. It will be understood that the plunger having been withdrawn, the article being wider at the bottom than at the top, it cannot yet be taken out of the mold. To do this the intermediate cylinder is withdrawn, and the article is now left free to come out.

MOLDING ARTICLES WITH BULGING BODIES.—A combination mold has been made to press molasses-cans and such articles which are wider in the middle than at both ends, and it is plain to be seen that to make such cans no plunger can be used to press the article all the way down, on account of the belly of the can. To obviate this inconvenience molds have been made of several pieces, as follows: The upper part, consisting of the neck and handle, is pressed in a mold having a movable bottom piece, which is run up past the belly of the can, but only to a proper distance, so that the bottom may be left thick enough to furnish sufficient material to form the body. The plunger is provided with air-passages, to admit of the bodies being blown, and the lower part of the mold, through which the bottom piece ascends, is made of the proper shape to form the body and the bottom. The operation is as follows: The mold bottom piece is run up to its proper height, glass is introduced in the mold, the plunger is brought down, thereby forming the neck and the handle of the can and a thick glass bottom. The mold bottom piece is now lowered, and the thick glass bottom is dilated and made to fit the lower mold by the pressure of the air sent through the plunger, thereby finishing the piece.

MOLDING ARTICLES WITH OPENINGS.—It is sometimes desirable to make certain articles with openings, such as on the top of a lamp head to leave an opening for filling the lamp. These holes or openings are produced as follows: After the lamp head has been properly shaped, a small quantity of hot glass is dropped upon the lamp top, which has been previously reheated. The hot glass and top of the lamp being now sufficiently plastic, a tool somewhat in the style of those for forming bottle necks is used. This tool consists of an annular piece, which is brought over the hot lump of glass and shapes the outside. While this annular piece is in contact a central pin is pushed forward and pierces the glass, thus producing the opening. Should it be required to cement a cap over the opening, the shaping tool is provided with two levers, having ends properly shaped for the purpose. These ends are pressed on the outside of the tube and form recesses.

SPRING SNAPS FOR FIRE-POLISHING.—Many articles, after being molded, pressed, or blown, require to be held by the foot for fire-polishing or for giving them a final shape. It has been customary, heretofore, to fix the foot to a piece of hot glass on the end of an iron rod, and then to put on the finishing. To detach the pieces it is necessary to part the two by giving a sharp blow on the iron rod. The foot frequently retains pieces of broken glass, which must be removed by grinding, and to avoid this spring "snaps" are used. These consist of a couple of jaws mounted on springs, so that they can open and shut. These jaws are fastened at the end of an iron rod like a blow-pipe. If a goblet is to be finished the process is as follows: The jaws are made to open, and, by the action of the springs, they immediately close upon the foot and hold the goblet ready to be finished. Sometimes these jaws are so arranged that they can be set forward and back and fastened by screws.

COOLING HEATED MOLDS BY AIR-BLAST.—When pressing glass continuously for a long time the molds often become too highly heated, and in this state glass is very apt to stick to them; but this inconvenience is now done away with by a system of blowing air into the molds. By means of a revolving fan or other device and tin pipes arranged around the furnace a continuous stream of air is furnished. India-rubber pipes are attached to the tin pipes at suitable places, and by this means, after each pressing, or as often as necessary, a stream of air is sent inside of the mold, thereby cooling it. The air circulating in the pipes may also be used for the ventilation and cooling of the glass house.

APPLICATION OF STEAM TO GLASS-PRESSING.—Attempts have been made of late to use presses for pressing glass by steam or compressed air. One of these presses has a set of molds carried on a revolving bed, and is operated by a presser like a hand-press. The power, however, is applied to the presser by means of an auxiliary steam-engine, which is continually at work. Whenever an article is to be pressed, by suitable leverage the presser is forced down, then released, the bed-plate revolves far enough to bring another mold under the presser, and the operation is repeated as often as desired. Mechanism is attached and operated also by steam, so as to push the pieces out of the mold after they are pressed. These are the principal features of the invention.

APPLICATION OF COMPRESSED AIR.—In the other press steam is replaced by compressed air contained in a reservoir, which may be filled by means of an air-compressing engine. The bed-plate carrying the molds has a rectilinear motion. When an article is to be pressed, the mold is brought under the presser, and by means of suitable valves and pipes air is sent to a cylinder piston carrying the plunger, the pressure of the air forcing the presser down into the mold and reversing the valves, and the piston and presser flying back. A new mold is now under the plunger. This operation may be repeated as often as desired by simply opening and closing the air-valves. In this press, as in the other, the pieces are forced out of the molds by rising plugs or bottoms. The different motions are entirely automatic, with the exception of operating the air-valves. Though steam and air have been used, the success reached has not been great.

INCLOSED AIR-BUBBLES.—In order to form the bubbles which are often seen inside of solid pieces of glass these have been pressed with cavities on the outside, and, after being reheated, the cavities are closed by pressing the outside down with suitable tools, thus inclosing the air.

BLOWING is used in the production of cylinder or sheet glass, of table and similar ware, with or without the use of molds and of bottles.

WINDOW-GLASS.—In the production of window-glass a square or an oblong furnace is used. Radiating from the work-holes, and so arranged as to be on the edge of a pit some 7 to 10 feet deep, are long stages, separated by spaces sufficiently wide to allow the workman to swing about his long tube to form his elongated cylinder. When the glass is ready for blowing the workmen take their stations, each having his own pot and stage, and also assistants, and commence gathering the glass, which is done by dipping the end or nose of the pipe or hollow rod of iron into the pot of molten glass, twirling it around to equalize the thickness of the gathering, and collecting a lump of glass at the end. After gathering the amount of metal required, generally about 20 pounds, the workman rolls the gathered glass on a block of wood so hollowed out as to allow the lump when placed upon it to be extended by the blower to the diameter ultimately required. Here it is shaped into a solid cylindrical mass, water in the mean time being applied to the block to keep it from burning and to give brilliancy to the surface of the glass. When the mass of metal is sufficiently formed and cooled, it now being of a pear shape, the blower raises the pipe to his mouth at an angle of about 75°, blowing into the glass and turning it in the wood block until the requisite diameter is reached. It now has the appearance of a hollow flattened globe. This mass is then reheated, and when it is sufficiently softened the workman begins swinging it over his head, reheating and swinging in the pit until it has reached the desired length, which is about 45 inches. This is the most difficult part of the operation, uniformity of substance and diameter being chiefly the result of the skill of the workman, who, when he finds the metal running out too freely, holds the cylinder vertically above his head, still keeping it filled with air, and then by dropping elongates and thins it. The cylinder is now, say, 45 inches long by 12 inches in diameter, one end being closed and the other having the pipe attached to it. The thinner cylinders are opened by the workman blowing into the pipe and then stopping it with his finger, and at the same time applying the lower end to the fire, when the air inside is expanded and the point of the cylinder bursts open, this being the hottest and most yielding part. The aperture thus made is widened out to the diameter of the cylinder by subsequently turning the cylinder to and fro with the opening downward. The thicker cylinders are sometimes opened by attaching a lump of hot glass to the end, which thus becomes the hottest and weakest part. The blower forces it open, as in the case of thin glass. The opening is enlarged by cutting it round with scissors. This method is used in preference to opening it in the furnaces, as it occasions less waste. The other end, which is attached to the pipe, is now cut off by the workman, who, having gathered a small quantity of metal on his pontil, draws it out into a thread and wraps it around the pipe end of the cylinder, letting it remain for an instant, withdrawing it suddenly, and immediately applying a cold iron to the heated part, when it cracks where the hot string of glass had been placed. The weight of the cylinder, as finished, is about two-thirds that of the lump of glass which the gatherer collected. The finished cylinder is now split open either by a red-hot iron or by diamond, which, attached to a long handle and guided by a wooden rule, is drawn along the inside of the cylinder, the edge of the glass being rubbed with a cold iron, as in the case of disengaging the pipe.

FLATTENING.—The cylinder is now ready for the flattening oven, which is generally a circular oven with a revolving bottom, composed of a number of stones as smooth as possible. The cylinder is laid in the oven with the split side uppermost, and is soon opened by the flame passing over it, and falls back in a wavy sheet. The flattener now applies another instrument, called the *polissoir*, which is a rod of iron furnished at the end with a block of wood, and rubs down the waviness into a flat surface, often using considerable force. The flattening-stone is now moved to the coolest portion of the furnace, the sheet is delivered by means of the flattening fork to the cooling-stone, and from this, when sufficiently rigid, it is lifted and is piled on its edge and annealed in an annealing kiln or laid flatwise on iron carriages, which are conveyed through a long annealing chamber, called a leer. When annealed they are examined, cut into a size that the defect will permit, and packed.

DEFECTS OF WINDOW-GLASS.—Mr. Chance thus describes the many vicissitudes through which window-glass passes in the processes of manufacture:

> The manner in which a sheet spared by one process is disfigured by another is sometimes curiously provoking. Standing before the table of the "assorter", your eye lights upon a piece which, blown under an evil star, has imbibed in the glass house every possible defect. The founder, skimmer, gatherer, and blower have all stamped their brand upon it. It is seedy—the vesicles, which were in the crown tables rounded by the rotary motion of the piece, here elongated by the extension of the cylinder; it is stony, disfigured with stony droppings from the furnace; stringy, thin threads of glass meandering over its surface; "ambitty," covered with stony speckles, symptoms of incipient devitrification; conspicuous with gatherers' blisters and blisters from the pipe; badly gathered; badly blown—thin here, thick there, and grooved with a row of scratches; and on this abortion the flattener chances to have exerted his most exquisite skill; it has passed through his hands unscathed, flat as a polished mirror, yet, from its previous defects, entirely worthless. Next comes before you a piece whose beginning was miraculous—no seeds, no blisters; it prospered under the hands of the gatherer and blower, and left the glass house a perfect cylinder. But the croppie of the flattener marked it; the fire scalded it; dust fell upon the lagre and dirtied it; scraps from the edges of the preceding cylinder staid upon the lagre and stuck to it; the stone scratched it; and the heat of the annealing chamber bent it. Such are the difficulties to which every cylinder is subject—those of the glass house and those of the flattening kiln. Not all, however, are such as these; there are good as well as bad, but the good are generally in the minority.

Size of window-glass.—When the manufacture of glass was new in England the size usually blown was 36 by 20 inches. This is now somewhat increased, and cylinders 85 by 49 inches have been blown, and in some cases blown cylinders 158 inches long by 26 inches in circumference and 70 inches long by 60 inches in circumference have been made, but such large sizes, and indeed any over 60 by 40 inches, are exceedingly difficult to make. The thickness is computed by the number of ounces to the square foot. The average size of 15- and 21-ounce glass is 48 inches by 34 or 36 inches.

Blown and patent plate.—In various parts of England thick blown glass is often ground and polished in a manner somewhat similar to the cast plate of commerce, and is known as blown and patent plate. The cheap production of this glass was made possible by the remarkable invention of Mr. James Chance, who conceived the ingenious idea of laying every sheet of glass intended to be ground and polished upon a flat surface covered with damp pieces of soft leather. Two sheets thus placed are turned one against the other in a horizontal position, sand and water being constantly supplied between them by means of a most ingenious machine. The two surfaces are rapidly rubbed one against the other in all directions and ground and afterward polished.

Blowing flint ware.—All glass when in the plastic condition can be blown with greater or less facility. This statement applies not only to the lead flint of England, but to the lime and half crystal of other countries. In blowing and working the various glasses of these countries into the many forms of blown wares the process is essentially the same. The metal is gathered in a manner similar to that described under window-glass. The metal, so gathered, is rolled on the marver (a corruption of the French word *marbre*, marble being formerly employed), which is a slab of cast-iron with a polished surface. Upon this slab the lump of glass is rolled to give it a regular exterior, so that the blowing may give a uniform thickness of the metal. This lump of glass is then expanded by blowing and lengthened by swinging. A pontil, puntee, or ponty, a solid iron rod, tapering and varying greatly in length and strength, is attached to the blown globe of glass, when the blowing rod is removed by wetting the glass near where the tube enters. The workman now takes the pontil from his assistant and lays it on the chair, which is a flat seat of timber about 10 inches wide, each end being fixed to a frame connected with four legs and two arms, the latter being inclined. This pontil is rolled backward and forward by the workman with his left hand, thus forming a throwing-wheel of great delicacy, while with his right he molds the glass into the various shapes required by means of a very few simple tools. By one of these, called pucellas, the blades of which are attached by an elastic bow, like a pair of sugar-tongs, the dimensions of the vessel can be enlarged or contracted at pleasure. Any surplus matter is cut away by a pair of scissors. For smoothing the sides of the vessel a piece of wood is used, and for flattening the bottom of tumblers or similar purposes the battledore, a flat square of polished iron with a wooden handle, is used. In these operations the article operated upon may be reheated several times. After it is finished it is detached from the pontil by a sharp blow and carried on a pronged stick to the annealing oven or leer, which is a low arched furnace, generally of considerable length. In this oven small tracks are laid, on which wagons mounted on four wheels are placed, the articles to be annealed being filled into such wagons. These are slowly pushed through the ovens, and are removed at the opposite end.

Flint-glass cutting, engraving, and etching.—The sparkle and brilliancy of flint-glass are developed by the process of grinding and polishing, technically called glass-cutting. Motion is communicated to the glass-cutter's mill, which is of wrought- or cast-iron, by a pulley and band. Over it is suspended a wooden trough or cistern, containing a mixture of sand and water, which, for the operation of grinding, is fed on the wheel as required. Smoothing is done on a wheel of fine sandstone, to which water alone is applied, and for polishing a wooden wheel, supplied with emery, and finally with putty powder (oxide of tin), is employed. The trough under the wheel receives the detritus of the grinding and other operations. The articles are held in the hand, and are applied to the mill while rotating. The punty marks on tumblers, wine-glasses, and the like are ground off by boys holding them on small stone-mills. Ground or obscured glass is made by grinding the surface on a wheel with sand and water. In some works in this country the article is placed on a lathe, and while it is revolving sand and water is applied by a wire brush. Iron tools, fixed on a lathe and moistened with sand and water, are used to rough out the stoppers and necks of bottles, which are completed by hand polishing with emery and water. Engraving is the production of ornamental surfaces by a fine kind of grinding, mostly done with copper disks revolving in a lathe. Etching is variously done by submitting the portions to be etched or bitten to the influence of hydrofluoric acid, the remainder of the glass being stopped off or protected by a coating of wax or some pitchy compound. (*a*)

Blowing in molds.—In blowing bottles or other articles the same method is pursued in gathering the glass as is described above. When sufficient glass has been gathered by the assistant, it is handed to the blower, who rolls it upon a marver, blowing into the metal and forming the rough outline of the article. This is then put into a press or cast-iron mold, which is divided into two or more pieces, and which the workman operates by his foot, opening or shutting at pleasure. As the glass is dropped into this mold, and the mold is shut, the workman blows into the glass to cause it to fill all parts. The glass immediately solidifies, the blowing-iron is broken off, and the article carried to the annealing furnace, the mouth, if it is a bottle, having previously been fashioned.

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a See *Encyclopædia Britannica.*

The great objection to molds is the injurious effect on the surface of the glass. This objection has been overcome by the use of wooden or carbon molds fitted in metal frames, the use of which is quite common in France and Belgium.

FASHIONING ART-GLASS.—To describe the various methods employed for manipulating art-glass, and to enter further into details regarding methods of fashioning the higher grades of glass for table use, hardly fall within the scope of this report. Those interested in these matters, however, are referred to various works on this subject, especially that of Mr. Apsley Pellatt on the *Curiosities of Glass Making*, Mr. Alexander Nesbitt's *Hand-book on Glass*, and the recent publication, *Glass in the Old World*, by M. A. Wallace-Dunlop.

THE PORTLAND VASE.—Though I have not deemed it advisable to enter into any extended description of the different processes employed in the manufacture of what I have termed art-glass, this account would be incomplete without some reference to the Portland vase. This vase was found in a marble sarcophagus of a sepulchral chamber under the Monte del Grano, about 3 miles from Rome, on the road to Laurentium. The inscriptions on the sarcophagus showed it to have been dedicated to the memory of the Emperor Alexander Severus, killed A. D. 325, and his mother, Julia Mammoca. The vase measures 10 inches in height by 7 in width, and is ornamented with white opaque figures in bas-relief upon a dark-blue transparent ground. This blue ground was originally covered with white enamel, out of which the figures have been sculptured in the style of a cameo with astonishing skill and labor. For a long time this vase was supposed to be of stone, but now there is no doubt that it is of glass, and is supposed to date about two centuries before Christ.

Immediately after its discovery this vase was placed in the library of the Barberini family, who sold it to Sir William Hamilton, by whom it was brought to England and disposed of to the Duchess of Portland, from whom it received the name by which it is now known (the Portland vase), having previously been called the Barberini. At the sale of the museum of the Duchess, in 1786, the vase was purchased for £1,029 by her son, who permitted Wedgwood to copy it. Fifty copies were made in jasper ware, which were sold at 50 guineas apiece, but the sum received did not pay for the reproduction. The vase is now in the British museum, where it is carefully guarded. (*a*)

It was for a long time believed that modern skill was inadequate to the reproduction of this vase, or indeed to the production of work similar in character; but the intelligence and remarkable artistic skill of Mr. John Northwood, of Wordsley, near Stourbridge, England, has not only succeeded in reproducing this vase, but in producing similar vases fully equal, if not superior, to the Portland. The reproduction of the Portland vase by Mr. Northwood was undertaken with the assistance of Mr. Philip Pargeter, who manufactured the vase used, and after a large number of trials succeeded in imitating the full rich blue of the original. He coated the copy a sufficient thickness with a layer of white, soft, opal glass, and succeeded in welding them together with the utmost thoroughness. The vase was now ready for Mr. Northwood to operate upon. His mode of proceeding was to cut away the opal by hand with chisels and gravers and carve upon it the entire design of the original in the same manner as the finest cameo engraving. For the entire ground of the design the opal has been literally chiseled away and the surface of the blue glass polished. The figures, trees, etc., composing the design are left in relief in the opal, and are carved with consummate skill and unapproachable delicacy. Mr. Northwood devoted three entire years to the work. In addition to the skill required on the artistic part of the work the artist met with unexpected difficulties in contending with a flaw in the metal. The character of the work was such, also, that the ordinary glass-engravers' tools would not answer, and new ones had to be invented. The result has been, however, that again it has been shown that modern art, in many respects, is equal to ancient. This copy is valued by Mr. Pargeter at £1,000.

Since reproducing the Portland vase, which was finished in 1877, Mr. Northwood has produced others of a similar character that are regarded by some critics as even superior to that work. At the Paris exposition of 1878 a vase was shown in the exhibit of Thomas Webb & Sons, representing the triumph of Galatea and Aurora. This vase at the time was unfinished, but its value was estimated at $15,000. Mr. Northwood has also produced a vase called the Milton vase, which in beauty of conception and in exquisite and delicate execution is believed to surpass the Portland vase.

TEMPERED, HARDENED, OR TOUGHENED GLASS.—In 1875 M. Alfred de la Bastie, a French gentleman, announced that as the result of a series of experiments he had discovered a method of so tempering or hardening glass that the strength of the material would be greatly increased. His experiments were based upon the assumption that the fragility of glass is due to the weakness of the cohesion of its molecules, and that if the molecules could be forced closer together, thus rendering the mass more compact, the strength of the material would be increased. In his first experiments he endeavored to produce this result by mechanical compression while the glass was in a fluid or viscid state. Being unsuccessful in this, he was led to make use of a modification of the method by which the well-known Prince Rupert's drops have so long been produced. In the manufacture of these drops a piece of very fluid glass is dropped into water, assuming, as it falls, the shape of a tear or drop. The outside of the glass cools at once, the inside remaining partly fluid for some time, but ultimately the mass becomes

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[a] After being placed in the British museum it was left uncovered, and was dashed into a thousand pieces by the cane of a madman. The pieces, however, have been so skillfully joined as to leave no trace of the accident.

perfectly solid. This indicates that the outside layer is at once condensed by cooling, while the inside remains fluid, and is consequently more distended. Though the outside of the drop is very hard, and a severe blow may be struck upon the thick part without any perceptible effect, if the tail or thin end is broken the whole mass instantly flies to pieces with a slight detonation. Dumas explains these phenomena by stating that when at last the central and dilated parts of the drop become cooled they must have retained points of adherence to the surface, and consequently occupy a larger volume than that which agrees with the temperature to which they are reduced. The central molecules, therefore, must be much distended and exert a more powerful contracting influence on the surrounding parts; are, in a word, "on a strain," as a workman would term it. At the instant when a part of the envelope or outer portion is broken the molecules held by it briskly contract, draw in with them all the others, and thus determine a multitude of points of rupture; and as this effect is instantaneous, the particles move very rapidly and drive out the air before them, producing a sudden dilation and contraction of the latter.

BASTIE'S TEMPERED GLASS.—In view of these well-known phenomena, M. de la Bastie endeavored to find a method by which the hard surface produced by immersion in water could be retained and thickened while the objectionable tendency to flying in pieces would be lessened or removed. In his experiments he found that two conditions were necessary: first, the glass must be brought to just that degree of heat where softness or malleability begins, the molecules then being capable of closing suddenly together and condensing the material when immersed in a liquid at a considerably lower temperature; second, the liquid employed must be capable of being heated much higher than water without boiling. He therefore adopted an oleaginous mixture, into which he plunged the glass, reheating the latter, which had previously been annealed in a kiln.

DIFFICULTIES OF THE PROCESS.—This process was admittedly a success as far as flat or solid glass was concerned, although the necessity of heating the glass to the point of softening rendered it extremely difficult to handle, and the liability of the bath to catch fire had to be lessened in some manner; but both these difficulties were overcome by M. de la Bastie's apparatus for reheating and plunging the glass. The process, however, was found to be defective as regards any other forms of glass, such as hollow flint vessels, as such glass, while being reheated, is almost certain to collapse before reaching the required temperature. In M. de la Bastie's experiments at Whitefriars glass works, England, therefore, a new plan was adopted, by which the bath was placed as near the mouth of the working pot as possible, and the workmen dropped the finished vessels directly into it. This process was found to answer well in the manufacture of all vessels made in one piece, and the somewhat complicated apparatus for reheating was done away with. As regards the character of the glass obtained by the process, Mr. Powell, of the Whitefriars works, disposes of some popular fallacies in this wise:

> Hardened glass is not unbreakable; it is only harder than ordinary glass, and, though it undoubtedly stands rough usage better, it has the disadvantage of being utterly disintegrated as soon as it receives the slightest fracture, and up to the present, until broken, of being undistinguishable from ordinary glass. This glass is known as "toughened" glass, and we have seen the terms "malleable" and "annealed" applied to it. Nothing can be more misleading than these unfortunate epithets. The glass is hard, and not tough or malleable, and is the very opposite to annealed glass. Annealed glass is that glass the molecules of which have been allowed to settle themselves; the molecules of hardened glass have been tortured into their position, and until the glass is broken are subject to an extreme tension. It is the sudden change of temperature that "hardens"; glass heated up together with the oil may be annealed, but decidedly is not hardened. A piece of hardened glass is only a modified Rupert's drop, *i. e.*, it is case-hardened; the fracture of both is identical; both resist the diamond and both can be annealed. * * * In our experiments we found that while the glass could be marked with the diamond or smoothed and engraved in the ordinary way, still an endeavor to cut it with the diamond, or even the disturbance caused by the smoothing-wheel, when penetrating to any appreciable depth, tended to weaken or even to cause the destruction of the entire mass.

For practical utility the value of glass tempered by M. de la Bastie's process is of course impaired by its inability to be cut, and also its utter destruction by the slightest fracture. It will stand sudden changes of temperature without breaking, but if reheated slowly to a high temperature its temper is destroyed and it becomes as common glass. The great anticipations which were at first formed as to the extended use of the glass have not been realized. M. de la Bastie has made some improvements in his process, and two eminent London firms adopted it and manufactured the glass for a time, but finally gave it up. In this country Messrs. E. de la Chapelle et C^{ie}., of Brooklyn, manufacture on the Bastie system, but the process is not a complete success, the glass not being uniform in temper or producing the best results.

SIEMENS' TEMPERED GLASS.—While M. de la Bastie was introducing his discovery to public notice in Europe Mr. Frederich Siemens, who is owner of the most considerable glass-bottle works in Germany and Bohemia, and perhaps in the world, was studying the question of tempering glass by following a different course from that selected by the former. Instead of plunging hot glass objects into liquids, Mr. Siemens, fearing distortion of the articles to be treated, conceived the idea of subjecting them to tempering by placing them in molds between cooled surfaces, whereby not only would their shape be maintained intact, but force could also be applied, if necessary, to press the molecules of glass firmly together. By these means glass of any shape could be tempered, and the process was considered to be particularly well suited for the production of strong window-glass, which had not previously been attempted. Mr. Siemens, however, soon found that the glass so prepared was liable to the defect of breaking suddenly, and he had to undertake further researches, with a view of perfecting his process, by the removal of that defect. When a cube of tempered glass is considered, it will at once be seen that, all its surfaces having been subjected to the same cooling influence, the edges, and particularly the corners, will be much more cooled than the broad surfaces. At each edge the cooling will take place from two surfaces, and at each corner from three surfaces, from which circumstance Mr. Siemens inferred that glass so treated could not be homogeneous in character, and that sudden breakages were due to that cause. To overcome this defect Mr. Siemens modified his process so as to limit the cooling influence of his apparatus to two surfaces of the glass under treatment. From these surfaces the cooling and tempering action is transmitted to the center of the mass in a uniform manner, whereby homogeneous glass is produced which is found to give entire satisfaction. By Mr. Siemens' process glass may be tempered to various degrees of hardness, according to the use for which it is intended. For the production of window and other flat or molded glass presses, cooled by the circulation of water, are employed, but in dealing with large castings of glass, such as railway sleepers, for example, the castings are packed in rectangular boxes, or trucks, heated internally for their reception, and all interstices between them are filled up with a material having the same conductivity for heat as glass. These boxes or trucks are constructed so as to prevent dispersion of heat at their sides, and as each is filled with glass articles it is withdrawn from the kiln to cool from two parallel surfaces only. By this means ideal plates are formed, which are treated like the solid plates for the production of homogeneous tempered glass in bulk. Glass railway sleepers, tempered on Mr. Siemens' plan, have been introduced in England, and have been put in actual use on one or two railway lines.

TESTS OF THE SIEMENS' GLASS.—A number of tests were made of these sleepers, at one of which it was shown that their average breaking weight, when resting on supports 30 inches apart, was 5 tons. At another time a plate of Mr. Siemens' toughened glass, 9 inches square by 1⅛ inches thick, imbedded in gravel ballast 9 inches deep, and having on its top a wood packing one-eighth of an inch thick and a piece of rail, was subjected to the action of a falling weight, the blows being delivered on the rail. The weight was 9 hundred-weight, and blows were successively delivered by letting this weight fall from heights of 3 feet, 5 feet 6 inches, 7 feet, 10 feet, 12 feet 6 inches, 15 feet, 17 feet 6 inches, and 20 feet. Under the last-mentioned blow the rail broke, the glass, however, being uninjured. A higher fall could not be obtained, and a greater weight was not available. A smaller section of rail was substituted for that previously employed, and the glass was broken by the second blow of the 9 hundred-weight falling 20 feet, the plate being driven through the ballast into the hard ground. A cast-iron plate, 9 inches square and one-half an inch thick, tested in a similar way, broke with a blow from the 9 hundred-weight weight dropped 10 feet.

USES OF SIEMENS' GLASS.—Mr. Siemens writes me, under date of January 29, 1881:

> Extensive works are about to be established in England for carrying out my process and for producing the glass to be tempered. These works will at the start comprise furnaces capable of producing 50 tons of glass per day, and will be arranged in view of being doubled and trebled in a short time, it being confidently expected that a large demand will arise for strong glass as a substitute for wood, brass, cast-iron, stone, and other substances, in the condition of railway and tramway sleepers, gas-, water-, and drain-pipes, eave troughs and gutters, millstones and crushers, tiles for roofing, facing walls and flooring, plates for floors of bridges, tanks, and cisterns, ship lights, telegraph insulators, etc., for which applications tempered glass will offer the advantages of economy in first cost and greater durability over the materials now usually employed.

COST OF SIEMENS' GLASS.—The cost of glass toughened on Mr. Siemens' plan is stated to be about the same per ton as that of cast-iron; but as its specific gravity is only about one-third that of iron, the cost of any article of given dimensions is, of course, materially less. The material has as yet been too recently introduced, and too little is known of its characteristics, to enable any very decided opinion to be formed as to its future capabilities; but the results of the experiments so far made are certainly of a very promising character, and the further development of its application will be watched with much interest.

GLASS FROM BLAST-FURNACE SLAG.—The process of manufacturing glass from the waste cinder or slag of iron blast-furnaces is simply the utilization of a substance which already contains many of the ingredients of glass by adding to it those materials necessary to complete the composition. The idea is not a new one. In England, and also on the continent, a sand prepared by pulverizing slag has long been used as an ingredient in glass-making with much success. It is possible that much of the early glass was metallurgical slags remelted.

RELATIVE COMPOSITION OF GLASS AND SLAG.—Recent comparative investigation into the composition of glass and of slag shows that the use of the latter in this manner is not without reason, the two substances being very similar, as is shown by the following table:

Constituents.	Composition of iron slag (Welsh or South Staffordshire).	Composition of bottle-glass (quantities variable).
	Per cent.	*Per cent.*
Silica	40	45 to 60
Lime	35	18 to 28
Alumina	16	6 to 12
Magnesia	6	0 to 7
Alkali	½ to 2	2 to 7
Oxide of iron	¼ to 2	2 to 6

A trace of sulphur is also found in slag associated with the lime, but this readily passes away with heat, and is insignificant. The iron, which would seem to be the most objectionable element, while present in too great quantity for the manufacture of perfectly clear glass, is still less than is often required by the glass-maker. The chief points of difference between the slag and the glass are in the silica, alkali, and iron, the slag being too deficient in sand to make a hard glass.

ADDITIONS TO SLAG IN THE MANUFACTURE OF GLASS.—To make glass of slag of the composition given the additions indicated in the following table should be made:

Slag.		Additions.	Glass.	
Silica	40	Ferruginous sand	60=100	or 57. 14 per cent.
Lime	35		35	or 20. 00 per cent.
Alumina	16		16	or 9. 14 per cent.
Magnesia	6		6	or 3. 43 per cent.
Alkali	1	Soda	10= 11	or 6. 29 per cent.
Oxide of iron	2	From the sand	5= 7	or 4. 00 per cent.
	100		175	100. 00

Thus by combining with 100 parts of slag 10 parts of soda and 65 of sand the proportions of the lime, alumina, and other constituents are severally altered, and a compound formed of the precise nature required. It is to be noted that the figures come well within the limits of difference found in the analyses of glass given in the previous table. It would seem that the variation in the purity of the slag would interfere with certainty in its use; but daily analyses of slag at a furnace in Great Britain have shown that its composition is measurably regular, enough so for all practical purposes.

USE OF HOT SLAG.—To take slag, however, which has cooled, and remelt it in connection with the additions named, would require so intense a heat as to counterbalance all benefit to be derived from its cheapness. A plan was brought to public notice in England in 1876 by which the slag is taken as it comes from the blast-furnace and converted into glass without cooling. Mr. Bashley Britten, the originator of this plan, has established glass works at Finedon, in Northamptonshire, at which the slag from the Finedon furnaces is used. The molten slag is conveyed (presumably in covered iron vessels mounted on wheels) to the glass furnace in the immediate vicinity, and is poured, after the addition of the necessary ingredients, directly into the melting furnace, where, after proper fusion, it is run into another chamber, from which it is drawn by the workmen and fashioned into shapes. The products of these works comprise chiefly such articles as wine and beer bottles, which do not require a colorless glass. This process might be much improved by locating the glass house immediately adjacent to the blast-furnace, from which the slag could be run directly into the melting furnace. In regard to the great economy of the process, Mr. Britten says, (a) referring to the table given above:

> The above 175 parts or tons of glass would, consequently, be produced with the following economy: One hundred tons of it would cost an iron-master nothing. Instead of the labor of mixing and handling in the usual way the whole quantity of the material, only 75 tons would have to be lifted into the furnace. The only ingredients to be bought are 65 tons of common yellow or red sand, to be had anywhere at a mere nominal price, and 10 tons of common sulphate of soda, which may be bought or made for about 20s. per ton. The necessary fuel would be limited to what is needed beyond the surplus heat of the slag to raise only three-sevenths of the glass to the required heat; and it is a question whether the greater part of even this might not be saved by bringing down some of the spare gases from the blast-furnace and employing them with regenerators; if needed, they could easily be enriched with a little added carbon. Against these items there would be a set-off from the cost of removing the 100 tons of slag, which must otherwise be thrown away. Beside this, another and considerable saving would arise from the wear and tear of the glass furnace being lessened, in consequence of four-sevenths of the materials going into them being already fused. Under such circumstances the total cost of the glass in a melted state ready for working is seen to be so extremely small that it is hardly safe to venture to express it in figures; it scarcely amounts to the value of the commonest bricks per ton.

COLOR OF SLAG GLASS.—The natural tint of the glass thus produced is greenish, but it can be colored to any required tint, and by careful fining and bleaching it can be produced almost as colorless as common window-glass. A cheaper glass can be made by using more slag and less sand, and with some ores the slag is said to be sufficiently siliceous in itself to be converted into a black or dark green or amber glass. With the simple addition of soda and a little arsenic it becomes transparent and perfectly workable, and may be used for many purposes. Acid, however, corrodes this glass, on account of its want of silica. Glass of superior quality to the first mentioned can also be produced. The constituents of slag, as has been seen, are common to all kinds of green glass, and by diluting them with the usual pure materials to a greater or less extent the compound may be brought up to any standard short of the purity of color inconsistent with the iron and sometimes manganese in the slag. Should the manufacture of glass in this manner ever be deemed of sufficient importance to warrant the taking of steps to purify the slag, much more might be accomplished. The working qualities of the glass thus produced are excellent, admitting of its being blown, cast, or pressed with great ease, and Mr. Britten's company propose to enter into the manufacture of other articles beside bottle from a material so cheaply produced.

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[a] See his paper in *Journal of British Iron and Steel Institute*, 1876, pages 453–467.

CHAPTER VIII.—HISTORY OF SOME PROCESSES OF GLASS-MAKING.

For many years the question as to whether window-glass was known to the ancients was a matter of doubt and discussion, and it has only been recently that the evidence of its use prior to the beginning of the Christian era has been conclusive. Winckelman, the author of the remarkable *History of Art*, who was assassinated in 1768, pleaded its antiquity, but by far the greater number of scientific men considered it a modern invention, their view being strengthened by the almost utter absence of any allusion by ancient writers to window-glass and the utter lack of fragments of this glass, though large quantities of pieces of vases and other vessels had been found. This want of allusion and absence of remains shows that at least it was of rare occurrence and use.

The first positive evidence of the antiquity of window-glass was its discovery, in the year 1763, in a small chamber attached to the bathing-room of a private dwelling, the House of the Faun, unearthed at Pompeii, "in a window closed by a movable frame of wood, which, though converted into charcoal, still held when it was found four panes of glass about 6 inches square." In 1824, in a room connected with the public baths, "a window 2 feet 6 inches high and 3 feet wide, in a bronze frame, in which were found set four beautiful panes of glass fastened by small nuts and screws, very ingeniously contrived with a view to being able to remove the glass at pleasure," was discovered. Remains of what is supposed to be window-glass of the Roman period are now occasionally found in the ruins of Roman houses built in England and Italy. Dr. Bruce, in his work on the Roman wall, states that "fragments of window-glass are frequently found at some of the stations", and in 1855 he exhibited at Newcastle samples found in the course of his excavations at Bremenium. It is also certain now that glass was used by the Romans for green-houses and for the frames used over plants. The glass found at Pompeii shows by chemical analysis a very close resemblance to the glass of modern days, containing about 69½ per cent. of silica, 7¼ per cent. of lime, and 17⅓ per cent. of soda, with 3½ per cent. of alumina. This glass also contained 1.15 per cent. of oxide of iron and 0.39 per cent. of oxide of manganese, the latter being used probably to correct the color due to the iron.

It must not, however, be supposed that glass was used to any great extent in the windows of dwelling-houses at this time. The glass was not blown, but probably cast on a stone, as it is very uneven and full of defects.

Before the close of the third century, however, window-glass begins to be mentioned in the writings chiefly of the monks and priests of the time, and mainly in connection with the glazing of churches. About this time reference is made to window-glass by Lactantius, A. D. 290, who says that "our soul sees and distinguishes objects by the eyes of the body as through windows filled with glass". Jerome, A. D. 331, speaks of sheets or plates of glass obtained by casting, the casting-table being a large flat stone, and the ordinance of Constantine II, A. D. 337, mentions *specularii*, who were probably glaziers working in other materials as well as in glass.

From this time the evidences of the use of window-glass multiply. It is reasonably certain that it was employed in the church at Treves early in 420. During the fifth and sixth centuries many large churches were built at Rome and Ravenna which were filled with numerous windows, and in the sixth century the glazed windows in the church of Saint Sophia, at Constantinople, with panes from 7 to 8 inches wide by 9 to 10 inches high, were among the wonders of the East. Indeed, it was the building of churches, or the conversion of pagan temples into houses for Christian worship, that extended the use of window-glass at that time. The Roman priests kept the windows and sometimes the roof of the buildings open to read the auguries, but these the Christian priests closed.

Window-glass was used in France as early as the third century, but became more common in the sixth. Late in the seventh century "Abbot Benedict", so saith the venerable Bede, "sent for artists from beyond the seas to glaze the church and monastery at Wearmouth," and York cathedral was glazed about the same time. In the eleventh and twelfth centuries glass was generally employed in the windows of the religious edifices, and it is reported that somewhere about the end of the first thousand years of the Christian era a window-glass works was established at Newcastle-on-Tyne, which proved a failure. From the close of the twelfth century the use of glass for windows became more and more common.

The earliest glass used for windows was undoubtedly cast, that used at Pompeii having evidently been cast on a stone, on the same principle as plate-glass is made at the present time, only it was not polished. It thus appears that, though rough cast plate-glass was for a long time believed to be a modern invention, it really is the oldest method of making glass for windows. This was, however, probably in the twelfth or thirteenth century, or perhaps earlier, abandoned for blown window-glass, and was revived and virtually rediscovered in France in 1688 by Abram Thevart. He obtained a patent for thirty years for the invention, and erected works in Paris, where plates were cast of the then extraordinary dimensions of 84 inches long by 50 inches wide. This works was transferred to Saint-Gobain, which has since become celebrated for its plate-glass. Disputes arose between Thevart's company and a company of Venetian workmen who were manufacturing blown plates near Cherbourg, and Thevart's company was bound not to cast any plates whose dimensions should be less than 60 inches in length and 40 in breadth. To end the rivalry the two companies were consolidated. Two years, however, from the consolidation the company was in a state of insolvency, and many of its furnaces were abandoned. Blancourt gives a different account of the invention of plate-glass, and ascribes it to the accidental spilling of some liquid glass from a crucible upon the ground. The metal having ran under one of the large flat stones with which the place was paved, upon taking up the stone a piece of plate-glass was found under it. This is stated to have been two hundred years before Blancourt wrote in 1699. The first English establishment of any magnitude for the manufacture of glass was begun in 1772 or 1773 at Ravenshead, at which date "the Governor and Company" "of the British Plate-Glass Manufacturers" were incorporated for the purpose of manufacturing plate-glass in England, and as late as 1832 this was the only establishment in that country. Since that time, however, a number of works have been established. The oldest plate-glass works in Belgium, we believe, dates from near the beginning of the present century, while that of Germany has been in existence but a few years.

As noted, it is very difficult to say when blown window-glass was first made; but one of the earliest notices of it is by the monk Theophilus, in the thirteenth century, who, in his *Essay on Divers Arts*, gives an account of a method then employed of blowing glass, which is a perfect description of that used at the present time. For many years the factories at Venice were renowned for their blown window-glass, and in the seventeenth century workmen from its houses were scattered in various parts of Europe and taught many of the glass-workers of the different countries the method of making cylinder-glass. Nesbitt also states that window-glass was made in Germany at a very early period, and it also seems, from a statement quoted elsewhere regarding the windows of Beauchamp chapel at Warwick, that window-glass was made in England, probably blown, in the fifteenth century. Mr. Chance states that the manufacture of blown window-glass in England existed in the fifteenth century, and perhaps even prior to that period; but the glass then produced was of a very inferior description, and the first works of note established in England were those of Sir Matthew White Ridley & Co., on the river Tyne, at Newcastle, about the middle of the seventeenth century.

VASES, CUPS, AND OTHER HOLLOW WARE.—As has already been noted, the earliest records of glass-making (those on the tombs of Beni-Hassan and at Memphis) show unmistakably that the art of glass-blowing was well known at the early period at which these tombs were built. One of these figures illustrates two glass-blowers, with their blowing irons or rods in their hands, heating the glass, which has evidently been gathered, in a small U-shaped furnace. Another drawing represents two men blowing a vase.

From that day to this the production of various kinds of hollow ware has not ceased. An immense number of articles of this character, including vases and cups of all sizes and almost all shapes, from those of the most common description to others showing the most exquisite art, as instanced in the Portland and the Naples vases, and bottles of all forms and decanters, have been found. Indeed, so common and persistent has been the manufacture of these various articles, that the history of ancient and modern glass is chiefly the history of the manufacture of hollow ware, and, as we have entered so fully into the statement, nothing more need be said here.

LEAD GLASS.—The invention of what was so long known as flint-glass, and now generally termed lead flint, to distinguish it from the lime flint of the glass houses of to-day, is an English invention. Its production was a necessity arising out of the use of coal in the place of wood in the furnace. This substitution of coal for wood affected injuriously the color of the glass, and to overcome the pernicious effects of the smoke the melting-pot was covered with a clay cap, which gave it the shape of a short-necked retort. It was found, however, that though the metal was protected from the action of the smoke, it was also protected from the action of the heat, and it became evident that either the time of melting, as well as the consumption of fuel, must be very much greater, or some flux or alkali must be used which would not deteriorate the glass, but hasten its melting. The flux used was lead, which had to a slight extent been employed on the continent of Europe for some time previous in the manufacture of artificial gems: a use which may probably have suggested its employment for the making of flint-glass. The use of lead, however, in the manufacture of glass was not entirely unknown before, as lead is found in many specimens of ancient glass, and Heraclius gives a recipe for making glass with lead. There was also a glass, known as the Jewish, made with lead in the Middle Ages. M. Peligot, however, reviewing these facts, comes to the conclusion that there is no proof that the true flint-glass was known to the ancients, and that to the English should really be attributed the honor of having created in their flint-glass a new product, which, by the progress made in the quality and selection of the materials used in its fabrication, has become without dispute the most beautiful glassy substance which we know, and which it may be possible to produce.

The date of the introduction of the manufacture of flint-glass with lead is placed by M. Bontemps about 1635; Nesbitt suggests that it may have been 1615.

THE USE OF MOLDS is generally believed to have been a comparatively modern invention; but, as is shown in the chapter on ancient glass, it is evident that some of the vases used in very remote times were not blown, but were cast or molded over a sand or clay core, which was afterward broken up. It also seems that the so-called Roman molded glass, which was supposed to be a modern invention, was well known to the Romans, as specimens exhumed in the city of London prove. At what time, however, the modern method of using molds in the production of various forms of hollow glass was first introduced is not known, though it is evident that the use of these has largely increased within the years since the introduction of the use of the lever-press for molding or pressing glass.

PRESSED GLASS.—One of the most important inventions of recent times, especially in the line of cheapening glassware, has been the production of what is generally known as pressed glass. This is an American invention, and the right of this country to the honor of its production has not been called in question until recently. Lardner, in his *Cabinet Cyclopædia*, published in 1832, which has a very complete *résumé* of the methods of making glass in use at that time, has not even a suggestion of the pressing process. Pellatt, in his *Curiosities of Glass-making*, published in 1849, says:

> The invention of pressing glass by machinery has been introduced into England from the United States of America. It has not, however, realized the anticipations of manufacturers; for, by the contact of the metal-plunger with the glass, the latter loses much of the brilliant transparency so admired in cut-glass; hence it is now chiefly used for common and cheap articles. The process of rewarming or fire-polishing after the pressure has somewhat remedied this defect.

Recently, however, an attempt has been made to deprive the American glass manufacturers of the credit of this invention. The *London Pottery Gazette*, in a recent issue, says:

> There seems to be a general impression that pressed glass was first made in the United States. This is an error. The addition of the ring to give the thickness was undoubtedly an American invention; and this discovery, trifling in itself, opened up the pressed trade in a remarkable way by enabling the lever used in modern pressing to force up the metal sharply, so as to give it the appearance of cut-glass, as well as to closely imitate cut-glass patterns.
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> Many in the English glass trade are living who remember the pressed square-footed ales and goblets. These are as old as the end of the last century, and were very fashionable with our ancestors. At first they were cut over, but they perfected the make so that they were simply cut at the bottom to take off the overplus.

ANCIENT PRESSED GLASS.—It is undoubtedly true that glass was pressed before the invention of the American lever-press, and one of the earliest specimens, bearing an inscription from which its date may be ascertained, is the lion's head, now in the Slade collection in the British museum, which was found many years ago at Thebes. This is evidently a piece of pressed glass, or glass pressed in a mold. In the British museum are also many pieces of glass found at Ialyssos, in Rhodes, chiefly disks, all of which have evidently been produced by pressure with a mold or die. There is no doubt that the Venetians were acquainted with pressed glass; but, notwithstanding this, the invention of what is now known as pressed glass is undoubtedly American. The same line of reasoning that is adopted to prove that this is not an American invention would also prove that lead-flint glass was not an English invention. Lead was used to make glass centuries before the invention of lead-flint in England, but the English are none the less entitled to the credit of the discovery of that beautiful, brilliant ware that we know to-day as lead-flint glass. Glass was no doubt made by pressing many centuries ago, but the invention of pressed glass, as it is understood to-day, the use of a mechanical press with mold, plunger, lever, etc., is due to American ingenuity. Pellatt, when referring to specimens of the embossed and pressed glass of the ancients, says: (*a*) "No machinery was used by them in producing any completely pressed hollow vessel or utensil at one operation." It occurs to me that if Mr. Pellatt, with all of his knowledge and information regarding ancient glass-making and his years of practical connection with the business in England, ascribes the invention of modern pressed glass to Americans, his testimony cannot be impeached.

HISTORY OF THE INVENTION.—The invention of the American press is ascribed to a Massachusetts carpenter in the town of Sandwich, about 1827, who, wanting an article of glassware made for some purpose, went to Mr. Deming Jarves and asked him if he could make the article desired. Mr. Jarves told him that it would be impossible for the glass-blowers to make such an article. The carpenter, who was of a mechanical turn of mind, asked if a machine could not be made to press glass into any shape. This idea was scouted at first, but upon second thought Mr. Jarves and the carpenter fashioned a rude press and made their first experiment. This machine was intended to make tumblers, and when the hot molten glass was poured into the mold, which was to determine whether glass could be pressed, the experiment was witnessed by many glass-makers of that time. They were nearly all of the opinion that the experiment would come to naught, and were greatly amazed when the result demonstrated that it was possible to press glass. From that time the manufacture of articles of glass by the use of pressing machines gradually developed, until to-day the bulk of the glassware produced in this country is made with presses. The first tumbler manufactured in the rough improvised press, alluded to above, remained in Mr. Jarves' possession for many years, and then passed into the hands of John A. Dobson, a well-known glass dealer in Baltimore, and was exhibited at the Centennial Exhibition by Hobbs, Brockunier & Co., when it was accidentally broken by Mr. John H. Hobbs.

The *London Pottery Gazette*, to which we have referred above, in an article claiming the invention of pressed ware for England, says: "The first pressed tumbler was undoubtedly English, and was made about 1836." As Mr. Jarves made his pressed tumbler in 1827, as described above, we think that the evidence is conclusive that the first pressed tumbler was not English, but American.

The result of this American invention in cheapening glass has been most marked. By the use of iron or other metal molds immense quantities of the same article can be produced at a very low rate. This invention has in fact revolutionized the whole system of flint-glass manufacture, and has made it possible for all to possess for common use glass that in gracefulness of form and beauty of design and material was formerly within the reach of only the most wealthy.

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[a] See Pellatt's *Curiosities of Glass-making*, page 122, note.

CHAPTER IX.—ANCIENT GLASS.

DISCOVERY OF GLASS.—But little is known of the early history of glass-making, and absolutely nothing of the method and date of its discovery. The story told by Pliny, (*a*) and repeated substantially by Tacitus (*b*) and by Strabo, (*c*) of its accidental discovery by some storm-driven Phœnician mariners while cooking their food on the banks of the river Belus, (*d*) is not entitled to the least credence. It is impossible that the high temperature necessary to the production of glass could have been obtained in the manner described in these fables. It is true, however, that a small spot at the mouth of this river supplied a most excellent sand, which was used not only by the Phœnicians, but by many other ancient glass-workers, and even by the Venetians in latter times. This fact, coupled with the excellence of the Phœnician glass and the commercial enterprise of the people, which carried the products of their manufactories to all lands, may have given rise to the story related by Pliny, and thus for a time robbed the Egyptians of the credit of a discovery which is undoubtedly theirs.

PROBABLE METHOD OF DISCOVERY.—While nothing positive is known of the method of the discovery of glass, it is not improbable that it was in connection with the older art of metallurgy. (*e*) Many metallurgical operations produce in their vitreous slag a coarse colored glass that may have led to the manufacture of glass as a direct product. All of the oldest specimens of glass are colored, and, so far as these have been analyzed, the coloring matter is metallic. The extreme variability in the composition of this antique colored glass led Klaproth to the conclusion that many of the specimens are merely metallurgical slags remelted. It is also true that much of the ancient glass is "cast." These facts certainly indicate, if its discovery was not due to this older art, that metallurgy had an important influence on early glass-making.

EGYPTIAN GLASS.—The earliest evidences of the existence of the art of glass-making are found in Egypt. It is impossible, however, to surmise even at what time it began to be made in that country, aside from the certainty that the art antedates by many centuries the time of its earliest inscriptions and specimens. Egyptian chronology is so uncertain, that the same events are assigned by different Egyptologists to periods thousands of years apart. Inscriptions, paintings, and the glass itself, however, indicate its manufacture at least from 4,000 to 6,000 years ago. (*f*) Rawlinson, (*g*) a most conservative authority, states that "glass was known in Egypt as early as the Pyramid Period", which he places at 2450 B. C. (*h*) That at this early date the art of glass-making had reached a high degree of perfection and development seems beyond question. The art of blowing glass into bottles, fashioning it into vases and drinking-cups, pressing it into various shapes, especially figures of deities, sacred emblems and coins, forming it into huge masses for pillars, adapting it for mosaic art, coloring it to imitate precious stones, the color being of surpassing brilliancy, working it into beads or necklaces, these and similar processes were well known and practiced with great skill. It would seem impossible that the processes necessary to the production of these forms of glass could have been developed without centuries of practice. The invention of the art of blowing glass, which is unmistakably figured on the tombs of Mastaba of Tih, at Memphis, and on the tombs at Beni-Hassan, (*i*) is as remarkable as the discovery of glass itself, and would indicate an advance in the art that, in that day of slow development, must have required many centuries to evolve. The manufacture thus early begun was continued by Egypt far into the Christian era, and under the various dynasties and rulers, both native and foreign, it continued to flourish. When Egypt passed under the dominion of Rome, its glass houses found in the palaces and villas of the the imperial city a larger and more profitable market for their wares, and even as late as the third century its glass works were still in operation, an ordinance of Aurelian providing that glass should form a part of the

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[a] See Pliny's *History*, book xxxvi, chap. xxvii.

[b] *Histories*, book vi.

[c] *Geography*, book xvi.

[d] This river runs along the base of Mount Carmel, and empties into the Mediterranean near the modern city of Saint Jean d'Acre.

[e] Metallurgy is one of the arts the invention of which is ascribed by the Egyptians to Osiris, and while the first man was living copper and iron were melted and worked (Gen., iv: 22). Some writers incline to the opinion that the discovery of glass was in connection with the art of pottery in making the glassy glaze.

[f] Among the earliest traces of glass are those found in the ruins of Memphis, built by Menes, first king of Egypt, whose reign Manetho places at 5004 B. C. The mummies in the tombs of this city wear necklaces of paste-glass beads. Glass-blowing is unmistakably figured on the walls of the tomb of Mastaba of Tih, belonging to the fifth dynasty, or, say, 3900 B. C. This is the earliest representation of glass yet discovered.

[g] See *Origin of Nations*, p. 56. For further account of glass and glass-making in ancient Egypt, see Wilkinson's *Manners and Customs of the Ancient Egyptians*, vol. iii, p. 58, and Rawlinson's *Herodotus*, 2d ed., vol. ii, p. 292. Pellatt, in his *Curiosities of Glass-making*, gives beautifully colored lithographs of some of the glass found in Theban tombs. See also *Glass in the Old World*, London, 1882.

[h] The enumeration of articles put into the west pyramid mention "glass which might be bended and not broken".

[i] The tomb is supposed to be of the time of Osirtasan I, some 2500 to 3000 B. C. A late number of the *Saturday Review*, discussing the antiquity of glass, says of the Beni-Hassan inscription: "A much older picture, which probably represented the same manufacture, is among the half-obliterated scenes in a chamber of a tomb of Tih, at Sakkara, and dates from the time of the fifth dynasty, a time so remote that it is not possible, in spite of the assiduous researches of many Egyptologists, to give it a date in years."

Egyptian tribute. Coins and tokens of as late a date as the eleventh century are in the Museum of Paris, and a basin of the same century, and lamps of the fourteenth, all the products of Egyptian glass houses, are still in existence. This long-continued practice of the art of glass-making in Egypt was probably due to the possession by the Egyptians of a great abundance of the essential materials, sand and soda, the latter, which was of excellent quality, being found native on the shores of its lakes. In a valley abounding in these lakes extending northwest from Memphis the Egyptian expedition of Napoleon I found remains of ancient glass furnaces. In this locality, at the "very gates of the lakes of Nitre", the priests of P'tah or Vulcan, who were constantly engaged in experimenting, placed their glass factories, and Rawlinson states that their ruins may still be found. These glass works, however, were not confined to this valley, but were situated also in the Delta and along the Nile valley. Those of Alexandria, however, were the most famous, especially for the production of colored hollow glass and mosaics.

PROCESSES OF EGYPTIAN GLASS HOUSES AND CHARACTER OF THE GLASS.—The processes used by these early glass-makers were, in many respects, similar to those of the present day. The "batch" was melted in crucibles, and the glass-blower's tool pictured on the Beni-Hassan tomb might well be taken as a representative of those in use at Pittsburgh to-day. Cast glass appears to have been a common product both of the Egyptian and the Phœnician glass houses, and molds were also used both for blowing and for pressing. Some of the hollow ware gives evidence of having been made on wire molds, and other specimens indicate that the glass was molded around a core or "former" of sand. Pressed glass, however, was not made as American pressed glass is formed, a die being used, into which the glass was pressed, or the die was pressed into a mass of pasty glass. The perfection to which these processes were carried, however, will not compare with that attained to-day. Egypt in the days of its best glass-making could not produce a cast plate approaching in size, purity of the glass, or brilliancy of surface those of Saint-Gobain, nor would her blown and pressed ware approach that of the United States; but it must be conceded, that some of the specimens of ancient glass that have been preserved, (*a*) especially such as are evidently the result of careful, patient manipulation, are unsurpassed by the products of our modern glass-houses, as they not only display a high degree of art, but give such evidence of exquisite skill and a knowledge of the most refined and delicate processes that even now they excite unbounded admiration. Among these products may be mentioned embossed and molded reticulated vases, glass mosaics, imitation pearls, glass pastes in several colors, precious stones, glass eyes, the "ut'a" of mummies, bottles, etc. This perfection, however, is only seen in articles of luxury, and indicates a degree of skill on the part of the workman that justly entitles him to the title of an artist in the highest sense of the word, and the product to be termed a work of art. While all this may be said of the skill displayed in working the glass when made, the "metal", as glass itself is technically termed, was decidedly inferior to that of the present day. White glass, as we understand whiteness, was unknown, and the clear, white, brilliant flint-glass of our works of to-day would have excited astonishment in the Egyptian and Phœnician glass houses. Most of the specimens that have come down to us from these ancient glass works are articles of luxury, and therefore might give rise to the belief that most ancient glass was of this character; but such is not the fact. Glass of an inferior quality, for common use, was largely produced, and it is probable that it was much more extensively employed by the ancients than it is in our time. (*b*) They had no porcelain, and were forced to use metal vessels or those of glass for many of the uses for which porcelain is now employed.

COMPOSITION OF EGYPTIAN GLASS.—The early Egyptian, as well as other early glasses, appears from its analysis to be a soda-lime glass, the Egyptian containing from 70 to 72 per cent. of silica, 17 to 20 per cent. of soda, and 5 to 8½ per cent. of lime, with some iron and alumina. Its composition is very similar to plate-glass made without potash, containing, however, more impurities.

PHŒNICIAN GLASS.—Second to Egypt in the antiquity, extent, and character of its manufactures of glass, if indeed it did not for a time surpass it in the excellence of its products, was Phœnicia, that wonderful country which gave us letters, and whose nautical skill and commercial enterprise made the Mediterranean, even in Homer's time, a "Phœnician lake". The renown of the workmen of Phœnicia at an early date is evidenced in the selection of Hiram of Tyre, the artificer, whom Hiram the king loaned to Solomon for the ornamentation of the Temple. Both Tyre and Sidon were famous for their glass, and the beautiful hollow ware made by them was universally celebrated in the ancient world. As already noted, the river Belus, which was near the northern boundary of Phœnicia, furnished a sand of excellent quality, which added largely to the renown of Phœnician glass. Mr. Nesbitt (*c*) thinks that among the earliest products of Phœnicia in the art of glass-making are the colored beads of opaque glass in great variety of color and pattern, called by the Ashantees "Aggry" beads. These beads have been found in all parts of Europe, in India, and in many parts of Asia and Africa, (*d*) their wide dispersion, as well as the abundance of other forms of glass that are probably of Phœnician origin, bearing evidence to the extent of this industry,

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[a] These are chiefly articles of luxury or personal ornament, and have been largely preserved through the custom of burying with the dead articles which the deceased regarded highly, or which were used constantly.

[b] See Winckleman's *Origin de l'art.*

[c] *South Kensington Museum of Art Hand-books:* Glass, by Alex. Nesbitt, F. S. A., page 13.

[d] These are the "Glain neidr" (adders' eggs) and the "Gleini na Droedh" (Druids' beads) of Wales and Ireland, which are regarded with superstitious veneration by the peasantry.

and there is good reason to think that many of the glass vases found in tombs in the countries washed by the Mediterranean are the products of Phœnician work-shops, rather than of those of the country in which they are found.

Character of Phœnician glass and processes employed.—Speaking of the character of Phœnician glass and the processes known and practiced, Kenrick says:

> They knew the effect of an addition of manganese to the frit of sand and soda in making glass clearer. They used the blow-pipe, the lathe, and the graver, and cast mirrors of glass. They must also have been acquainted with the art of imitating precious stones and coloring glass by means of metallic oxides. The "pillar of emerald" which Herodotus speaks of (ii, 44) in the Temple of Hercules at Tyre, "shining brightly in the night," can hardly have been anything else than a hollow cylinder of green glass, in which, as at Gades, a lamp burnt perpetually. (*a*)

Rawlinson says regarding Phœnician glass-makers:

> What was the amount of excellence which they attained is uncertain; but the fame of the Sidonian glass in early times would seem to imply that they surpassed the artists both of Assyria and Egypt. (*b*)

Late Phœnician glass manufacture.—As in Egypt, the manufacture of glass was continued in Phœnicia, especially at Sidon, far into the Christian era, even as late as the twelfth century, at which time it appears to have retained some of its ancient reputation. The art also seems to have found a place in the industries of the other Syrian cities. In the twelfth century some Jews of Antioch were known as glass-makers. In the fourteenth century Damascus was the chief seat of glass-making in the East, and as late as the seventeenth century glass-making is mentioned among the industries of Smyrna.

Glass-making in the other ancient monarchies.—In following the history of glass-making, there is little to note after leaving the glass houses of Egypt and Phœnicia until we reach those of Rome. The other great monarchies do not appear to have become celebrated in this art, as the specimens found in their buried cities do not furnish sufficient data to enable the formation of any judgment as to the extent to which glass-making was practiced, and but little as to the character of the glass.

Assyrian glass.—Layard found in the ruins of Nineveh, which was destroyed 625 B. C., a number of specimens of glass, among which were a glass lens and a small vase or bowl of a transparent green glass with the name and title of the Assyrian monarch Sargon (719 or 722 B. C.) This was blown in one piece, and was then shaped or hollowed by a turning machine, and is regarded as the earliest specimen of transparent glass. An earlier vase, with the name of a Khorsabad king, which Layard found, was stolen or lost. Many glass vases and bottles of elegant shape were unearthed in the same mound, some of which were colored, some ribbed, and others otherwise ornamented. In the palace of Babylon, at Kars, vases and bottles of gilt glass of Assyrian origin have lately been discovered, and M. Botta found among the ruins of Nineveh a round glass bottle or vial with oblong black spots melted into the glass, the earliest specimen of the tear-sown bottles known, the "*gafres de Venise*". The discoveries at Babylon, while they show the use of glass by its inhabitants, indicate the possession of but little skill, the vessels found being of small size, and the bottles very frequently misshapen. Egypt, however, exported immense quantities of small glass articles to Babylon, and some of the glass found may have been of Egyptian origin.

Greek glass.—But little is known of the history of glass in Greece. Homer does not mention it, Aristophanes being the earliest writer who refers to it, and the excavations by Dr. Schliemann throw but little light on the subject. At Mycenæ and Troy he found but few pieces of glass, and these only beads, disks, and pieces of vitreous paste. General De Cesnola brought to light at Dali, in the island of Cyprus, a remarkable collection of Greek glass, containing 1,700 pieces, some of which show great skill; but these are by no means of the earliest Greek period, and are placed by him at later than 100 B. C. Greek art, however, had considerable influence upon Roman glass. The Portland vase, for example, shows marks of Greek rather than of Roman art, though it is not certain that it is of Grecian workmanship. However, it is certain that some glass was made in Greece, and many of the lovely Greek vases of the tombs of the countries of the Mediterranean are undoubtedly of this kind of glass. The Greeks appear also to have used glass occasionally for purposes of architectural decoration during the best period of Grecian art, but not to the extent that it was afterward used at Rome.

Carthaginian glass.—There is some evidence that Carthage was the seat of glass-making. As is well known, this city was thoroughly Tyrian, and the relations between it and the mother city were very close. It is probable that most of the glass used in the African colony was procured in Phœnicia. At the same time M. Deville, whose contributions to the history of glass have been so valuable, found on a tomb at Lyons the name of "Jules Alexander Africanus, citizen of Carthage, artist in glass". If this artist was from old Carthage, he must have gone to Lyons at least as early as the sack of that city, 146 B. C. Mr. G. Rawlinson attributes to Carthage work-shops many of the glass objects found in the northwest of Africa. The only glass yet found in the ruins of Carthage was in the tomb of Thapsus, but the tomb is probably of the Roman-Carthage period.

Etruscan glass.—But little is known of the state of the glass-makers' art in Italy prior to the Christian era; but there is evidence from Etruscan tombs that this people, who are noted for their massive engineering works, were acquainted with the use of glass, and some very fine specimens have been brought to light. These specimens, however, are believed not to be of Etruscan origin, and as yet no distinct evidence of glass manufacture among this people has been found.

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a Kenrick: *Phœnicia*, p. 249.

b Rawlinson's *Origin of Nations*, p. 57.

INTRODUCTION OF GLASS-MAKING INTO ROME.—It is uncertain when glass-making began to be practiced in Rome. By some it is assigned to 536 B. C., but others place its introduction as late as the time of Cicero, 106 B. C., and state that the first works were near the Flaminian circus. This latter statement is probably not correct. Though Cicero is the first Latin author who refers to glass, it was not, however, until the days of imperial Rome that glass-making in that city attained any importance, either by reason of the character or the extent of its products. It is probable that a cheap glass had been made in Rome before the time of the Cæsars, but the Romans had been dependent upon Egypt for the bulk of their glass, and with the wealth and luxury of the empire came a demand that stimulated its manufacture and use to a degree of development that has, in some respects, never been excelled, and perhaps never equaled. The beginning of the better period of Roman glass dates probably from Augustus. The secrets of the Egyptian glass houses were secured by purchase or by threats, and the long fusion, remelting the frit, and the slow cooling, that had given much of its reputation to Egypt, became the property of Rome. With this knowledge came perfection, and gold and silver cups gave place to those of glass. Strabo says "that in Rome such improvement had been made in the coloring and process of working, especially in making glass of a crystalline appearance, that you might buy there a cup and dish for half an as". The degree of skill in manipulation shown by the Roman glass-makers, as well as the taste exhibited in designing, is evident, not only in the stories of the fabulous sums paid for samples of their work, but in the exquisite specimens of their skill that have been preserved, such as the Portland and the Auldjo vases and the Naples amphora. These are as beautiful objects of the glass-makers' art as have been produced in any age of the world, and though at some of the late expositions our modern glass-makers have shown most elegant work in similar style the work of the Romans has rarely been excelled. (*a*)

AMOUNT AND VARIETY OF THE PRODUCTION OF ROMAN GLASS HOUSES.—If these vases and other similar works show the skill attained and the elegance and variety of the products of the Roman glass houses, the prodigious quantity made is evidenced by the wonderful abundance of the fragments of glass found even now, not only in and around the ancient city, but in all parts of the world where the Roman legions penetrated. Nesbitt states that in the winter of 1858-'59, during a residence of four months at Rome, he saw in the hands of dealers fragments of at least 1,000 to 1,200 vessels of colored glass, for the most part the crop of that season's discoveries. (*b*)

The number of specimens of Roman glass that have been found in Germany, France, Spain, and especially in England, is very great, the museums of those countries abounding in examples, and even now in some of them it is no uncommon occurrence to bring to light glass of the Roman period. The use of glass in Rome was not only very extensive, but entered into use for some purposes to a much greater extent than in modern times. For domestic purposes, for architectural decoration, and for personal ornaments, it was used far more extensively than with us, and so common was its use, and so largely and cheaply was it produced, that, as stated by Strabo in the passage above quoted, a cup and a dish were sold for a coin worth a little less than a cent.

LATER GLASS-MAKING.—As stated, it is uncertain when the art was introduced into Rome. It was probably derived from Egypt, but it did not reach perfection until after the beginning of the Christian era. A company of glass-makers established themselves in the city in the reign of Tiberius, and were assigned a street near the Porta Capena. In the succeeding reigns marked improvement was made, and in A. D. 220 glass-making had become of so much importance that Alexander Severus levied a tax upon its manufacture in common with other industries, which lasted until the time of Aurelian, if not later. Pellatt thinks that this tax was one of the causes of the transfer of the art to Venice, (*c*) but the transfer is more correctly ascribed to the incursions of the barbarians, and the dispersion of glass-makers attendant upon them.

BYZANTINE GLASS.—With the decline and fall of the city of Rome under the torrent of the German and Hunnish hordes the manufactories fell into comparative neglect and were confined to articles of every-day use. When Constantine the Great, about A. D. 330, made Byzantium his capital, he attracted to the city, with other tradesmen, the glass-makers of the world. In the first half of the fifth century the Emperor Theodosius exempted the glass-makers from all taxation. In the commencement of the eighth century Justinian II furnished the Caliph Walid with glass mosaics for a new mosque at Damascus, and in the middle of the tenth century Romanus II sent presents of glass to Cordova; indeed, so extensive was its manufacture at Byzantium that one of the gates leading to the port took its name from the adjacent quarter in which the glass houses were situated. As has been noted, many of the Byzantine artisans came originally from Rome, and brought with them the traditions and customs of the art as it had been practiced there. These, as was customary in this early period, were handed down from father to son. In the new Rome of the East glass-making for a while assumed a front rank among the arts, but from the specimens that have come to us it is evident the skill and splendor of the Roman period was not reached, though for five hundred years at least Byzantium secured and held the markets of the world. This art, with others, however, fell under the adverse influence of the bigoted emperors of the East, and the ancient

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a The reproductions of the Portland vase in jasper ware by Wedgwood are well known, but its reproduction in glass by Mr. John Northwood, of Wordsley, England, is not so noted.

b *South Kensington Museum Art Hand-book:* Glass, by Alex. Nesbitt, F. S. A., page 19. Those interested in the character of Roman glass and its manufacture will find in this work a very complete description.

c See *Curiosities of Glass-making*, page 8, note.

traditions were wholly lost. The glass that belongs probably to the later period shows but little of the elegance of form and the skill in manipulation of the early Byzantine and later Roman, and the weakness of the later days of the empire of the East had impressed itself upon its art, and with its fall its artisans were scattered, many seeking the shores of the Upper Adriatic to renew their art and restore some of its lost glory in the rising city of the refugees, Venice.

EARLY GLASS-MAKING IN OTHER COUNTRIES.—The details of the manufacture of glass in other countries prior to the Middle. Ages are imperfectly known. Pliny states that the glass works of Gaul and Spain were established before those of Rome, and it may be possible that this is true, as in the days of the later republic and early empire Rome was too intent on extending its conquests to give that attention to the arts, other than those connected with war, which it afterward bestowed upon them. Wherever the Romans extended their conquests, however, in the western part of Europe, glass is found to a considerable extent in the ruins of their occupation.

GLASS IN FRANCE.—M. Fillon considers that the manufacture of glass in France began at Poitiers (*a*) in the second century. (*b*) These factories were active in the Roman and Frankish periods, survived the Norman invasion, and were left a legacy to the gentleman workers of the Middle Ages. In many tombs of the Gallo-Roman period in the neighborhood of Poitiers large quantities of vases of varied form, and sometimes of delicate and careful workmanship, are found; but the amount found in these and other tombs of France can only be described as immense. Abbé Cochet states that 20,000 vases were found buried in the cemeteries at Terre-Nigre, Bordeaux, and in many of the tombs glass vials, children's glass toys, beads, twisted sticks, and tiny glass vases, some not exceeding half an inch high, were very common, all indicating the extensive scale upon which the industry was operated. In the Boulogne museum are preserved some curious barrel-shaped jars of a low-grade glass quite green in color, bearing the mark of the imperial factory at Frontincennes, at Forêt Eu, which is supposed to have been started in the second century, and was the school shop of all the Norman factories of later times. It is still a great factory, and must surely be about the oldest in the world.

It is impossible to give a suggestion even of the styles and character of early glass found in France. As Christianity advanced and spread over Gaul the character of the glass changed, and in this way its history can be, in a measure, traced. Its use for church purposes also became established, a pope in the year 197 having ordered that wine should not be consecrated, as heretofore, in a wooden, but in a glass vessel. Glass chalices were used in the fifth century, but at last glass became so common that it was not deemed costly enough to celebrate this mystery, and the church found it best to interdict its use, though glass vessels were still used as late as the tenth century.

M. Fillon says that the written documents connected with glass works begin in the ninth century. Normandy was the first country where special privileges were given to glass-workers, and in the tenth and eleventh centuries the first dukes of Normandy bestowed special glass-making privileges on four families attached to their persons, these families continuing the manufacture of glass and enjoyed their privileges up to the last century; and to this day descendants of one of these families, the Brussards, are to be found as glass-makers.

SPAIN.—If Pliny's statement quoted in connection with France be true, glass was made in Spain before it was in Rome. As to the localities of these early works, Mr. Nesbitt quotes Sinobas as authority that in the Ibero-Roman period " glass was made chiefly in the valleys which run from the Pyrenees to the cost of Catalonia near the Ebro, also in Valencia and Murcia. Ruins of furnaces still met with in these parts are small in diameter". It is believed that the manufacture continued to exist under the Gothic kings, though others are of the opinion that the art did not survive the invasion of the barbarians. There is evidence that in the seventh, tenth, twelfth, thirteenth, and fourteenth centuries glass was made in various parts of Spain. An edict of 1324 banishes all glass ovens from inside the city of Barcelona, and after this date large quantities of glass seem to have been manufactured in Spain, both for home use and exportation.

GERMANY.—In Germany also the influence of Rome on the early glass is marked, and it is probable that glass was made in the vicinity of Cologne, Treves, and other places near the Rhine during the Roman occupation, but many questions in connection therewith are as yet unsolved. As to the glass of later times there is similar uncertainty. The drinking glasses found in the Saxon graves of Germany are similar to those found in France and England, but it is undetermined whether these were made in the countries in which they were found, or are all the product of one of these countries, and if so, which one. It seems probable, however, that the art of glass-making was not wholly allowed to die out after the Roman dominion had passed away. The early glass of Germany was inferior in color and ornamentation to that of its more southern and artistic rivals, but it was superior to them in hardness. The first notice of glass-making in Germany in any document yet published is that to the Bishop of Mainz, elsewhere referred to, in which the Abbot of Wearmouth, England, wrote about the middle of the eighth century, asking him to send him workmen who " can make vessels of glass well ". Window-glass was also made in Germany at a very early period, and mirrors were made as early as the twelfth century. The use of the tin amalgam is claimed as a German invention of the fourteenth century, and German authors claim the invention of painted glass for their workmen.

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[a] See *Glass in the Old World* (page 126), to which I am indebted for much of the information about early French glass.

[b] This can hardly be so if Pliny's statement is true.

British Islands.—Though the evidence seems to indicate that glass was made in England by the Romans, it is not as yet quite fully determined that such was the fact. Beads and glass vessels of various kinds are found in tombs of the Roman period, and fragments of ornamented glass, and even of window-glass, are often met with in the ruins of towns and villas; but the similarity in most instances of these to Roman glass lead to the belief that they were imported. The probabilities are that, if glass was made in England by the Romans, it was of the coarser kind, the finer articles being the product of other countries. The remains of a glass furnace found at Buckholt in 1860, however, if it was of Roman origin, which is doubtful, would prove that colored and ornamented glass was made in England in the days of the Roman occupancy. It is worthy of note that some authors claim that glass was made in Britain in pre-Roman times; but if it was, it must have been of the coarsest and most common kinds. In Kentish graves, dating from about the time of the conversion of the Saxons to Christianity, many vessels of glass, mostly the peculiar elongated tumblers, are found, which Nesbitt thinks there is some reason to believe were made in England, though they resemble greatly French and German drinking vessels. At what time the manufacture of glass became firmly established in Britain is not known. In A. D. 670 an attempt was made to establish a glass factory at Newcastle-on-Tyne, but it was a failure, and eight hundred years passed before the attempt was renewed but in A. D. 675, when Benedict made glass for his monastery at Wearmouth, he imported workmen from France, who were probably skilled in making cast, not blown, glass for the windows, and eighty years later the Abbot of Wearmouth asked the Bishop of Mainz, in Germany, to send him a maker of glass vessels. For some centuries from this glass-making seemed to languish in England.

Little ancient glass is found in Scotland. Rome had but little foothold on its shores, and but few fragments of Roman glass have been found. Even the Druids left but few of their paste beads to be preserved in tombs. No record of glass-making in this country exists until 1620.

In Ireland there are more evidences of early glass-making than in Scotland. The art seems to have been practiced at an early period, and mosaic glass dating as early as 1112 exists. Some chalices are also in the museum of the Irish Academy that are supposed to date from the ninth and tenth centuries.

Persia, that ruled Egypt so long, carried away captive its most skilled workmen and artists and employed them in building and decorating their famous cities, Persepolis and Susa, and among the ruins of these cities to this day are found fragments of mosaics and other glass, evidently the work of these Egyptian captives. At least 400 B. C. the Persians made glass, as the Athenian ambassadors to Ecbatana drank "wine out of glass and golden cups", and the remarkable cup of Chosroes I (A. D. 532) proves that the art was practiced long into the Christian era; and even to the present glass works are in operation.

China.—The same mistiness that surrounds everything in connection with the arts of this mysterious empire attaches to glass-making. There seems some reason to believe that glass was made in this country before the Christian era, though it does not appear to have attained much importance. The ancient books state that mirrors were made from pebbles and materials obtained from the sea and reduced to ashes, which is a fair description of glass-making. A factory still in existence in Shan-tung is believed to date as far back as the third century.

India.—There are few traces of the manufacture of glass in India. The remark of Pliny that Indian glass was the finest, being made from crystal, is now believed to refer to Chinese glass, as no examples of early glass of undoubtedly Indian origin have yet been found.

Chapter X.—MODERN GLASS.

Modern glass-making dates from Venice.—We have dated the history of glass-making from the workshops of Venice and its island of Murano. It was in the glass-houses of that "gentile island", (*a*) as Howell terms it, that the art that produced the beautiful and exquisite forms of Roman glass was revived, and from its "whole street of glass furnaces" came the knowledge and inspiration as well as many of the workmen who carried its manufacture into many of the countries of Europe, and laid in these countries the foundations of the glass industry that has continued until the present time.

Venetian glass did not, however, at once attain the full measure of its reputation. For many years after the establishment of the industry in that city Egyptian, Phœnician, Roman, and Byzantine glass were those of most repute in the markets of the world, while the earlier products of the Venetian glass houses were of a greatly different character from those that in the sixteenth century gave Venice such renown.

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a See *Howell's Familiar Letters.* First letter dated Venice, May 20, 1621.

INFLUENCE OF BARBARIANS UPON GLASS-MAKING.—Glass-making, with all other arts, felt the influence of the barbarian deluge and that strange stupor that marks the centuries from the close of the fifth to the close of the eleventh. The demand for glass for other than the most common uses quite ceased when the barbarians conquered Rome and appropriated its wealth. The glass works of the imperial city were broken up and the workmen, for the most part, slain or scattered, while those that continued the art, from lack of opportunity, soon lost their cunning. Only in one branch did any of the former glory remain: the manufacture of mosaics and painted glass for windows. Here, as in so many of the arts, the church saved glass-making from perishing from the earth.

REVIVAL OF ART INFLUENCED GLASS-MAKING.—Such was the condition of glass manufacture when the works of Venice began to assume importance; but as the eleventh century drew to a close the great cities of Germany and Italy, with their opportunities for commerce and the arts, arose, and among them the republic city of Venice, and the artisans in glass of reputation were attracted to this rising city and shared in the great art revival of the Italian Renaissance. The false and debasing canons of the art of the dark ages were cast aside, and from the study of the pure and simple antique came those great works in modern glass that are regarded as masterpieces in form and color.

EARLY VENETIAN GLASS-MAKING.—It is not known when glass began to be manufactured in Venice. The Venetians place the date as early as the fifth century, but there is no evidence of its existence earlier than the eleventh, with the exception of certain mosaics that may be of Byzantine origin. In the thirteenth century the art had grown to considerable magnitude, and about the middle of this century codes of rules for regulating glass-workers were drawn up. In 1291 the Council of Ten, to guard against fire, ordered that the glass furnaces in the city should be demolished, but that they must be reconstructed in the district of Venice. This led to the establishment of works at Murano. This edict was afterward modified so as to allow the manufactories of small wares to remain, provided there were fifteen paces left between the works. In 1275 the council prohibited the exportation of glass-making material, and in 1295 renewed it; in addition, it levied a heavy fine upon all glass-makers who should leave Venice to practice their art in other cities, and in 1474 death was made the penalty. At this time the fame of Venetian glass had become so great that extraordinary efforts were made to induce workmen to leave Venice and establish its manufacture in other countries, and England, Spain, and Flanders all endeavored to secure workmen to build up their glass works. This was the occasion of the edicts of the great council to which we have referred. (*a*) In the sixteenth and seventeenth centuries glass-making reached its highest development in Venice, from which time it began to decline, and in the eighteenth century England, France, and Bohemia began to compete successfully with Murano, interrupting its trade, and the works became idle, the glory of Venetian glass departed, and only beads and common ware came from the shops that for five centuries had given an incontestable superiority to Murano. This lethargy remained until the art was recently revived through the efforts of Dr. Salviati.

EXTENT OF THE INDUSTRY AT VENICE.—The extent to which this art was practiced in Venice can be inferred from the fact that in the time of its prosperity 8,000 men were regularly employed, and the glass houses extended in an unbroken line for a mile along one of the streets of Murano. The manufacture was not carried on, as now, in large establishments, but by artisans working on a small scale, which may account for the great variety of form. For the most part, the glass, with the aid of the pincette, was shaped before the blow-pipe, and the forms of the product were vessels, window-glass and mosaics, optical glass, mirrors, and beads.

CONDITION AND RESTRICTION OF WORKMEN.—Mr. Jarves, in his admirable paper in *Harper's Magazine* on Venetian glass, in speaking of the causes that produced such a body of workmen and maintained the superiority of its glass through so many centuries, says:

> As early as 1500 there were twenty-four glass houses at work at Murano, each having more or less its specialty. The furnaces in general were small. During the period of its greatest prosperity (the fifteenth, sixteenth, and seventeenth centuries) Murano counted 30,000 inhabitants, now reduced to about 5,000. Each owner of a factory was obliged to contribute annually a certain sum into a common fund for the succor of the unfortunate of their own class, poor and infirm artisans, or those out of employment, and for the maintenance of the schools of inventive design. No apprentice could be admitted as a master-workman before passing a strict examination in his art and proving his skill in the manufacture of certain objects. The candidate was elected into the body of masters by their secret ballots. Each factory was subject to inspection, night or day, by certain officers, whose duty was to see that the work was regular according to the statutes, to note the quantity and quality of the objects, and that no glass in fragments or cullet be exported. Proprietors and master-workmen of ten years' experience, if they honorably failed and had no other means of subsistence, were entitled to pensions of 70 ducats annually. When there were more master-workmen than could be profitably employed, it was forbidden to increase their number from the apprentices until there was a real call for new hands. Whoever became a member of the guild was obliged to take an oath of fidelity. No one who had not a regular discharge from his employer could be received into the service of another, and every proprietor was obliged to seal his cases with his own trade-mark. It was forbidden to employ strangers under any pretense. If there were not enough of the Muranese at times for labor, or to exercise the art, Venetians only might have the privilege, but they must be duly qualified. No employer could hire a master-workman who was in debt to another of the guild. Such were some of the regulations to keep the art in a high state of efficiency, and which for more than five centuries gave it an incontestable superiority in its special aim over other establishments in Europe. In fine, Murano became as artistically famous for its glass as Urbino, Pesaro, Gubbio, or Chaffagiola at the same time for majolica, but with far greater commercial development.

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[a] It is impossible to follow the history of glass-making at Venice. An admirable account will be found in Nesbitt's "Glass" in the *South Kensington Art Hand-book.*

Glass in the Dark Ages.—As has already been stated, the barbarian invasions and the destruction or decadence of the Roman power brought with it a decline in the art of making glass. The conquerors of Rome had but little in common with the taste and refinement that have sought and preserved as precious treasures the dainty and exquisite gems of the glass-maker's art of which so many evidences remain, and under their early dominion it seems probable that only the commoner and more useful forms of glass were produced. Thus it would appear that while glass-making in most of its higher and artistic processes was a lost art for some centuries, it was not wholly forgotten, but in all countries where Roman enterprise had established glass houses the art was preserved. It seems certain that France, Germany, Spain, and possibly England, made glass during the period of its decadence, and thus kept alive the practice of the art that was afterward, under the influence and example of Venice and by the art of its workmen, to grow in most of these countries into the glass works of to-day.

France.—It is reasonably certain that the manufacture of glass has not been wholly lost in France at any time since the days of Pliny and the Romans. The glass works at Poitiers, which were of so much importance, and which, if the evidence of the tombs in its neighborhood is to be taken, produced such enormous amounts of glass during the Roman period, seem to have maintained a continued existence and to have been of no little account even into the eighteenth century, when the industry declined under the competition of the glass houses of La Rochelle and Nantes. There is no doubt, however, that the works of Poitiers felt the same adverse influences as fell upon those of all Europe, and also that the new skill and the advance in its art that marked the close of the sixteenth century came from Venice. In 1572 one Salviati, "gentilhomme de Murano," came to Poitiers to practice his art, and was undoubtedly accompanied or followed by others. Their presence is evidenced in the efforts to produce fine and ornamented wares, and enameled glass, pretty drinking-cups, vases, and bottles, both white and colored, were some of the products of the period that followed the coming of these gentlemen of Murano. Glass-making, however, was by no means confined to the neighborhood of Poitiers, as works were erected at Provence as early as the thirteenth century, and attained considerable skill in the sixteenth. Large quantities of glass were made in Normandy in the twelfth century, and the le Valliant family, upon whose ancestors Charles VIII, in 1490, conferred the "privileges de verrerie", have continued its manufacture up to the present century. In the Boulogne museum are some barrel-shaped jars from the imperial factory of Frontincennes, which is supposed to date to the second century, and is still a great factory. In 1598 Henry IV permitted two "gentilshomme verriers", natives of Mantua, to establish themselves at Rouen, in order to make "verres de cristal, verres dorés, emaulx, et autres ouvrages qui se font à Venise", and in 1603 the same king established works at Paris and Nevers. Colbert, the great finance minister of France, who did so much for French industry, wrote to his ambassador at Venice in 1664 requesting him to procure workmen for a glass house; but the story runs that the ambassador replied if he did so he ran the risk of being thrown into the sea. In 1665, however, eighteen Venetian glass-makers were obtained, and the manufacture of mirrors was begun at Paris. Colbert united this with another existing at Tour-la-ville, near Cherbourg, and in 1693 the united works were transferred to Saint-Gobain, where the manufacture is still carried on upon a very large scale. It was about this date also that Thevart rediscovered the method of casting plate-glass, and succeeded in making plates 84 by 50 inches.

For a time in the eighteenth century France seems to have lost the art of making "vases de verre", as in 1759 the Academy of Sciences offered a prize for the best essay on the means by which the art could be revived. If this was true, France has abundantly recovered its prestige, and Baccarat wares are to-day the rival of any. France seems also for a while to have been behind its neighbors in the manufacture of blown window-glass. Even in the beginning of the eighteenth century the French imported from Germany and Bohemia whatever window-glass of the better sort they used. In 1740 an association for the making of French cylindrical or broad window-glass was formed by Drolinvaux, workmen being drawn from Germany, and a manufactory was established at Lettenbach (Saint-Quirin), which attained good repute, and became later the parent factory of the modern French, Belgian, and some English plate-glass works.

A late German writer, from whom the above statement is derived, states also regarding the influence of Germany on French glass-making:

> By holding closely together, and by steadily and firmly repelling French apprentices, the workmen who had been attracted from Germany kept off the competition of the natives of the country during a long time, and, as a consequence, even at the present day, among the French artisans in glass a very great majority bear German names, while German words and phrases are very numerous among the technical terms of the art.

The first lead-flint glass melted in France was by Lambert, at Saint-Cloud, in 1784. In 1790 the crystal manufactory of Muensthal, or Saint-Louis, was founded. In 1823 d'Artigues bought the glass manufactory of Saint-Anne, and changed it into the world-famous "Crystallerie de Baccarat".

Spain.—In this country, as in France and Germany, glass was made in the Roman period, and it is probable that its manufacture did not wholly cease in the dark ages, though this is not as well settled as in the case of France. Señor Juan F. Riano (I quote from Nesbitt), in the introduction to the catalogue of art objects of Spanish production in the South Kensington museum, has supplied much information with regard to the later history of Spanish glass-making. He commences the modern history of the art in Spain by stating that an Arab author of the thirteenth century says that Mercia was renowned for the fabrication of glass and pottery, of both which materials large vases of the most exquisite and elegant shapes were made by the Moors; and that "Almeria was also famous for the fabrication of all sorts of vases and utensils, whether of iron, copper, or glass". The making of glass at Barcelona was probably of equal, if not of greater antiquity.

In a municipal edict of 1324 is a prohibition that the glass ovens should be inside the city. In 1455 permission was granted to the "vidrieros" to form a corporation under the patronage of Saint-Bernardino, and from this period some of the members figure as holding municipal charges. Jeronimo Paulo, who wrote in 1491 a description in Latin of the most remarkable things at Barcelona, says "they also send to Rome and other places many glass vessels of different sorts and kinds, which may well compete with those of Venice". Marineus Siculus, who writes at the beginning of the sixteenth century, says "that the best glass made in Spain is that of Barcelona"; and Gaspar Baneiros, in his *Chronographia*, published at Coimbra in 1562, mentions that excellent glass was made at Barcelona, almost equal to the Venetian. From the beginning of the seventeenth century there are several allusions to the merit of the Barcelona glass, and to the vast quantity which was exported.

Glass was also made at Cadalso, in the province of Toledo, as early as the beginning of the sixteenth century; other works were at Torre de Esteban, Hambroz, in 1680, which gave the most brilliant results, and at Recuenco, in the province of Cuenca, in the beginning of the sixteenth century, and in 1722; also in the seventeenth century at Valdemaquada, in the province of Avilo. In a royal schedule, dated 1680, stating the prices at which things were to be sold in Madrid, glass made at Barcelona, Valdemaquada, and Villafranca in imitation of the Venetian is mentioned; and the glass of Valdemaquada was sold for a higher price than that made at the other places. There was also an important manufactory at La Granja, famous for fine chandeliers, mirrors, and engraved glass.

What we have of the products of these factories scarcely seems to support the assertion that the glass rivaled Venetian, though several pieces in the collection formed by Señor Riano closely resemble the products of Murano. One reason of the success of so many factories making glass of the same character as Venetian, and of the failures of England, was, no doubt, that the Spanish, in the interior of a country ill provided with the means for the transport of such an article, did not sustain so severe a competition as the English factories.

Spain is not a country very productive of fuel, and doubtless when the glass houses had burned up the wood in their neighborhood the manufacture ceased to be profitable. It would seem that, except near the coast, the glass must have been made with potash obtained from the lees of wine or from burnt wood, as the transport of soda, either from Egypt or from the coast, on which it could be produced from seaweed, would have been extremely costly. At Barcelona and other places on or near the coast soda may, of course, have been used.

GERMANY.—Though the specimens found in the neighborhood of Cologne, Treves, and other places bordering on or near the Rhine indicate that glass was made during the Roman occupation, it is not clear that it continued to be manufactured after this time. From the tenth to the fourteenth century, however, it is certain that window-glass was made in considerable quantities, and the letter of Cuthbert, Abbot of Wearmouth, to Lullo, Bishop of Mainz, about the middle of the eighth century, would indicate that glass vessels were made as early as this. Vessels of the sixteenth century, however, are quite common, among them the "wiederkoms", some of which are twenty inches high, the oldest of which the date can be ascertained being 1553. From the wood-cuts in Agricola's *De Re Metallica*, published in 1556, we may gather some idea as to the products of German glass houses at that time, which seem to be vases, bottles, and retorts, but he does not indicate that any fine glassware was made in Germany. About the year 1600 glass was extensively made in Bohemia and other parts of Germany, and the fine crystal glass of Bohemia may date from this time. In 1609 glass-cutting was practiced, and some of the work in this century was said to be of remarkable fineness and delicacy. The invention of etching with fluoric acid is ascribed to Henry Schwanhard in 1670. The Electoral glass works, on the Isle of Peacocks, near Potsdam, was established in the eighteenth century, and, under Kunckel's management, gained great celebrity for its gold ruby. Then, under the ministry of Danckelmann, French workmen were drawn into the country, and under Moor's management the manufacture for blown plate-glass was established in 1695 at Neustadt-on-the-Dosse, whose workmen, when, after Danckelmann's overthrow, Neustadt for a time fell into stagnation, founded, at the instigation of the elector, Lothar Franz, the mirror manufacture at Lohr-on-the-Mayn, which in course of time attained to great distinction. Similar manufactures were soon afterward established at Schleichach, near Wurtzburg; at Fahrafeld, near Vienna; at Gruenplan, near Hanoverian Minden; at Senftenberg, in the electorate of Saxony; and at Alten-Kronau, in Hesse. Finally, in 1710, through the influence of Count Rechtskron, mirror or plate-glass casting was introduced from France, and a mirror foundery was established after the model of Saint-Gobain at Neuhaus with French workmen, which, though protected in every way and defended by prohibitive regulations, in 1728 passed over to the Austrian state. In fact, plate-glass casting did not prosper in the beginning any better in Germany than in France. As little successful, too, were the attempts in various places made to obtain useful flint-glass for optical purposes, and it was not until 1806 that Utzschneider, at Benedictbeuren, produced such an article of the kind as answered the ends for which it was required.

BOHEMIA.—It was in Bohemia that Venetian glass first found a successful rival, this rivalry being at first manifest in the quality of the glass itself. Venetian glass had never been noted for the purity of the metal, and with their purer materials the Bohemians were able to produce a much whiter glass than the Venetians could with their somewhat impure sand and soda from seaweed. The Bohemian crystal, therefore, soon became noted, and for centuries was held in high estimation, and only lost its pre-eminence with the invention of English flint. But it was not alone in the purity of its glass that Bohemia became the successful rival of Venice, for in the beginning of the seventeenth century the decoration of glass by engraving, probably a Bohemian invention, which soon became the fashion, sadly interfered with the products of the Italian city. The cut-glass was especially noted, and so sharp and injurious did the competition become that one Briati, a glass-maker of Murano, determined to go to Bohemia and learn the secret, and accordingly worked for three years in a Bohemian glass house as a porter, returning to Venice in 1739 to obtain a patent for ten years for the production of glass after the fashion of Bohemia. The excellent character of Bohemian glass is noticeable to this day, and the skill of the workmen who robbed Venice of its glory has not departed from the forests of Bohemia.

THE LOW COUNTRIES.—But little is known of the glass industry in the Low Countries until a very recent period, though it is positive that glass was made in Flanders as early as the fourteenth century. "Crystal of Antwerp" is mentioned in 1509, and in 1563 glass is mentioned as among the articles of export from Antwerp to England. In the first half of the seventeenth century several Muranese glass-workers obtained privileges for making glass, and in 1642 John Savonetti was permitted to establish glass-making at Brussels with an absolute prohibition of all imports. In the sixteenth or beginning of the seventeenth century were produced the glasses on which are to be seen the paintings of John Steen, Zerburg, and others. In comparatively modern times the works of Belgium have been quite noted, at one time the product of vases and such ware surpassing the French. It is stated that the celebrated Baccarat works were established by Belgian workmen.

BRITISH ISLANDS.—As has already been noted, there is considerable doubt as to the continued existence of the English glass works after the period of Roman occupancy, and it was not until the beginning of the fifteenth century that they awoke from their period of actual or comparative idleness. In 1447 John Prudde, of Westminster, covenanted to "use no glasse of England" in executing the windows of the Beauchamp chapel at Warwick, which would indicate that glass was made in England at that time. The vast palace of Henry VIII that formed one of the attractions of the Field of the Cloth of Gold in 1520 was built of wood and glass. The glass-maker's art, however, did not advance rapidly, for, in 1557, according to quaint Thomas Charnock:

> As for glass-makers, they be scant in the land;
> Yet one there is, as I do understand,
> And in Sussex is now his habitation;
> At Chiddingsfold he works of his occupation.

In 1589 George Longe petitioned for a patent, in which he stated that there were fifteen glass houses in England. These he proposed to reduce to two and rebuild the balance in Ireland, whereby the wood of England would be saved and that of Ireland wasted. In the reign of Queen Elizabeth some persecuted Protestants from France came to Newcastle and worked at their trade of glass-making at the Close Gate, and afterward went to Tyne. In 1662, Fuller states that "coarse glass-making was, in this county (Sussex), of great antiquity", and another, writing of the manufacture of glass in that county, says:

> Neither can we match the purity of Venice, and yet many green ones are blown in Sussex profitable to the makers and convenient to the users thereof.

INFLUENCE OF VENICE ON ENGLAND.—As the use of glass began to increase in England adventurers from Venice and other portions of the continent sought to advance their fortunes by bringing schemes for making glass of superior quality before the English government. In 1550 eight Muranese glass-makers, imprisoned in London, who had been induced to go there by offers of no small sums of money, and who had heard of the edicts of the Council of Ten, petitioned the council to be allowed to work out the money received. On June 13, 1550, the council, to gratify the king, decided to allow this. For the next few years evidences of the influence of Venetian workmen multiply, and the art began to assume importance. Early in the seventeenth century sea-coal began to be used. Mansel secured the patents for its use in 1616, and set to work making both window-glass and glass vessels of various kinds, having brought a Venetian to aid him. About this time one of the most important advances or discoveries in modern glass-making, and one of the very few real discoveries of modern time, was achieved (the manufacture of lead flint), and the English workman had this beautiful and brilliant glass to stimulate his exertions. In 1677 the Duke of Buckingham made at Lambeth "huge vases", "clear, ponderous, and thick as crystal," as well as looking-glass plates and windows for coaches. In 1673, at the "Italian glass house at Greenwich", "glass was blown of finer metal than that of Murano at Venice." The revocation of the edict at Nantes in 1685 drew a number of glass-workers to England, and the manufacture continued to improve, until, in 1736, Dr. Pococke considered English glass to be superior to that of Bohemia, and only inferior to that of the royal Prussian glass houses. From this time the manufacture of glass was of growing importance, and the details need not be given.

RUSSIA.—In Russia the glass industry first obtained a firm footing in the course of the seventeenth and eighteenth centuries, having been introduced by German and Bohemian workmen. As regards the details of its introduction and establishment, slight information has ever reached the public. We have historical mention of a glass manufactory at Schabino, near Jamburg, in 1717, and in 1720 an establishment for the making of French mirrors and dishes and plates of crystal was opened at Kiew. In the last year of the last century we find mention of Lund's plate-glass manufactory at Wyborg, in Finland, and of Bolew's similar establishment in the Russian government (province) of Rajasan. At the same time the imperial mirror foundery at Saint Petersburg had already begun work; and the imperial crystal and hollow-glass manufactory, which exists at the present day, had been already established at the same place. In 1792, with the aid of workmen from Gruenenplan, the foundation was laid of the Amelung mirror manufactory at Dorpat, near which place, in 1780, a similar establishment had been set up by Major Lauw, but its existence had been brief.

CHAPTER XI.—THE PRESENT CONDITION OF GLASS-MAKING IN EUROPE.

CHIEF GLASS-MAKING COUNTRIES OF EUROPE.—The countries of Europe most largely engaged in the manufacture of glass at the present time are England, France, Belgium, Germany, and Austria-Hungary. Each of these countries not only manufacture most of the kinds of glass needed for its own use, but the factories supply the non-glass-making countries of the world and supplement the production of each other and of such other states as manufacture to some extent. This is especially true of the finer grades of glassware (table and ornamental glass) and plate-glass.

EACH COUNTRY HAS A SPECIALTY.—While each of the countries named produces most, if not all, of the chief varieties of glass, each one has become especially skillful in the manufacture of some particular variety, and has secured and maintained a pre-eminence in its production that has enabled it to command the markets of the world.

ENGLAND'S SPECIALTIES.—England is especially noted for the beauty, purity, and brilliancy of her flint ware, which is without doubt the purest and most brilliant made. Individual glass houses in other countries may produce flint that may be compared with some English flint, but none, as a commercial product, that can rival it, while in no other country does the bulk of the flint-glass made approach even the bulk of that made in England. These remarks apply to lead-flint only, as the American lime-flint is probably, so far as the metal is concerned, equal, if not superior, to any other. In the blowing, cutting, and engraving of the flint, the regularity and perfection of the work, as well as the beauty and brilliancy of the finished ware, England is unequaled. The exhibit of Thomas Webb & Sons at the Paris exposition of 1878 surpasses in these respects, and in the limpid whiteness, purity, and brilliancy of the metal, all other flint I have ever seen, and was justly entitled to the "grand prix" it received, while the vases engraved by Mr. Northwood in the style of the Portland vase equal in workmanship, if they do not surpass, that product of the glass-makers' and engravers' art. Certainly no modern work equals it.

FRANCE'S SPECIALTIES.—The artistic taste shown in the product of the French glass houses has given French glassware a world-wide reputation. The metal is not as white as that of Bohemia, nor has it the brilliancy and fire of the English flint; but for elegance of shape, lightness of design, and beauty of glass, all combined, it is unsurpassed. The products of the Baccarat works have been regarded for years as models of taste, and have been eagerly sought for and copied in cheaper wares by the glass houses of other countries. France is also unsurpassed in the manufacture of plate-glass, the product of the Saint-Gobain works being taken as the standard of color, quality, and perfection; and to say that the plate-glass of any works equals French plate is generally considered sufficient praise. (*a*) The same artistic taste that has given French glassware so enviable a reputation is displayed in the staining and decorating of window- and plate-glass. The stained-glass windows of French artists show remarkable ability in designing and execution. (*b*) The decoration of fancy ware by various methods, especially by enameling and etching, is also carried to a high state of perfection, both as to color and workmanship.

BELGIUM'S SPECIALTY.—Belgium is pre-eminently the window-glass manufacturer of the world, and though the other countries mentioned above (England, France, Germany, and Austria-Hungary) all make window-glass to a considerable extent, there is not one of them in which Belgian window-glass does not find a market. A large amount, equaling a large proportion of their consumption, is also exported to other countries, and even the United States imported in the fiscal year ending June 30, 1880, 37,927,414 pounds of Belgian window-glass, valued at

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[a] Our American works claim to have succeeded in making plate-glass fully equal to the French; indeed, some works claim to make better.

[b] Most marked advances in the art of staining windows have been made in the last ten years in this country, and the productions of Tiffany and La Farge rival those of the artists of any country.

$1,230,622. The excellent quality of this glass, as well as its remarkably low price, accounts for this import. The average value of the Belgian window-glass imported into this country in 1880 was about 3¼ cents per pound.

GERMANY'S SPECIALTY.—Germany is especially noted in the markets of the world for her silvered plate or looking-glass and for her cheap table ware and colored vases. The production of mirrors of various grades, largely of the cheaper kinds, in Germany is enormous, and their exportation constitute a large part of her foreign trade. Of the $2,897,747 in value of silvered plate imported into the United States in 1880, $2,746,636 was from Germany. The cheap colored-glass vases of this country were the first (about 1830) to supplant the decorated china vases, which until that time had undisputed sway as cheap mantel ornaments, and she still retains much of the trade in these articles, though other nations manufacture them in large quantities. Germany is also noted for a remarkable ruby glass, which was brought to perfection by Kunckel in 1679.

AUSTRIA-HUNGARY'S SPECIALTIES.—Austria, or Bohemia in Austria, rivals France in the graceful forms, the variety of shapes, and the beauty of the engraving and decoration of its glassware, and surpasses it in the color and purity of the glass itself. Bohemian glass has been renowned for many years, its workmen apparently inheriting the skill and some of the peculiar processes of manufacture of the Venetians when the cunning of glass-making left the city of the Doges, and it is this cunning in design and ornamentation that has given it its celebrity. It does not compare with the English flint in brilliancy, and is only equaled by the French in beauty of contour, but in purity, whiteness, and homogeneity of metal it is the best white glass made in Europe, while their success in making glass of intricate design and great difficulty of manipulation makes the Bohemian glass workers second only to those of Venice.

VENETIAN GLASS.—Though not a large producer of glass, Venice deserves most honorable mention in any statement of the specialities in glass manufacture of the different European nations, and the recent very successful revival of the manufacture of Venetian glass at Murano, that "gentile island which attends the cittie of Venice", promises to restore to that city the world-wide celebrity of its former days of glass-making. The wonderful color, intricacy of design, and execution of the mosaics; the pastes, gem-like in color and brilliancy; the murrhine of Pliny; the remarkable enameling of the famous tazze of St. Mark's; the aventurine or imitation gold-stone, with its difficulties in manufacture; vases in millefiori, others with metallic flakes and spun and twisted threads of filigree work; all of these products of the elder Venetian glass houses are reproduced with wonderful fidelity in the modern Venetian glass of the Venice and Murano Glass and Mosaic Company. The glass-bead manufacture of Venice is also a remarkable industry, 6,000,000 pounds a year being produced, the markets of the world being largely supplied from this country.

GLASS IN OTHER EUROPEAN COUNTRIES.—None of the other European countries are especially noted for their glass, nor is it made to any great extent in any of them. Sweden and Norway make glass of the commoner kinds, window, flint, and bottle, but no plate. Russia has largely increased its make of glass in the last ten years, but does not yet supply the demand of its own people even for the commoner kinds. Holland makes large quantities of a square black bottle. Of the glass works of Spain and Portugal but little is known.

PLATE-GLASS FACTORIES IN EUROPE.—The manufactories of plate-glass are located chiefly in England, France, Belgium, and Germany.(*a*) In England there are six or seven works, in France seven, in Belgium five, in Germany five, in Russia one, and in Austria-Hungary (Bohemia) one, possibly two, making a total of twenty-six or twenty-seven. These differ greatly as to production, most of the English, French, and Belgian works being very extensive, while most of those of Germany and of Russia and Bohemia are comparatively small. Some blown plate is made in Bohemia, Bavaria, and England, and patent plate in England.

PRODUCTION OF PLATE-GLASS.—Of these countries France is the largest producer of plate-glass, England the next, Belgium the third, and Germany the fourth. Mr. Charles Colné(*b*) estimated the production of Europe in 1877 at 1,800,000 square yards, or 16,200,000 square feet, valued at $12,000,000. (*c*) This production he distributes as follows:

	Square feet.
France	5,400,000
England	5,400,000
Belgium	2,250,000
Other countries	3,150,000
Total	16,200,000

This production has largely increased since the date named. Mr. Charles Palmer, on behalf of the plate-glass manufacturers of England, made the accompanying statement regarding the weekly production of polished plate-glass in England, France, and Belgium (*d*) to the commissioner to negotiate a new commercial treaty with France.

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[a] Statistics of the European glass houses are exceedingly difficult to obtain, especially in England. The statistics given will therefore be regarded only as an approximation unless otherwise stated.

[b] See Mr. Charles Colné's *Report on Glass and Glassware at the Paris Exposition of* 1878, page 329. Washington, 1881.

[c] Mr. Colné places the production of 1860 at 992,000 square yards, and of 1867 at 1,100,000 square yards.

[d] See *English Blue Book*, Commercial, No. 38, 1881, pp. 121, 122.

PLATE-GLASS.

WORKS IN BELGIUM.		WORKS IN FRANCE.		
Companies.	Weekly production in English feet.	Companies.	Weekly production in English feet.	Total.
Belgian Plate-Glass Syndicate:	*Feet.*		*Feet.*	*Feet.*
Floreffe	25, 000	Floreffe (Belgian company), at Jeumont, department du Nord	32, 000	
Sainte Marie d'Oignies	25, 000	Sainte Marie d'Oignies (Belgian company), at Recquignies, department du Nord.	32, 000	
Roux	15, 000			64, 000
Courcelles	20, 000	Saint-Gobain Company:		
Auvelais	10, 000	Saint-Gobain, at Aisne Chauny, at Aisne	80, 000	
	95, 000	Cirey, at Meurthe	50, 000	
		Montluçon, at Allier	32, 000	
		Aniche, department du Nord	16, 000	
				178, 000
				242, 000
Quantity of polished plate-glass made in England				175, 000

Assuming that these works would average forty weeks' running in a year, and adding to the production of these countries thus found the best estimates obtainable for Germany, Russia, and Austria-Hungary, the production of Europe would be as follows:

	Square feet.
France	9, 680, 000
England	5, 000, 000
Belgium	3, 800, 000
Germany	2, 900, 000
Russia	250, 000
Austria-Hungary	400, 000
Total	22, 030, 000

This estimate agrees substantially with that of Mr. N. T. De Pauw, who estimates the production of Europe at 500,000 square feet a week. (*a*)

Prices of plate-glass in Europe.—Mr. Palmer, in his statement to the French treaty commissioner before referred to, gives the following as the prices of plate-glass at the date of his communication:

LONDON.		PARIS.		
PRICE OF FRENCH POLISHED PLATE.		PRICE OF FRENCH POLISHED GLASS.		
Saint-Gobain, English tariff, less 40, 5, and 2½ per cent.		French tariff, less 50 per cent., discount 3 per cent., and 10 per cent. premium annually, and supplementary discount.		
Size.	Price per foot.	Size.	Supplementary discount.	**Price** per foot, net.
	s. d.			*s. d.*
About 10 feet superficial	1 6	10 feet superficial		1 11½
About 22 feet superficial	1 6½	22 feet superficial	Subject to 5 per cent.	2 0
About 33 feet superficial	1 6¾	33 feet superficial	Subject to 10 per cent.	2 3½
About 45 feet superficial	1 7	45 feet superficial	Subject to 15 per cent.	2 3½
About 65 feet superficial	1 7½	65 feet superficial	Subject to 15 per cent.	2 7½

Window-glass in Europe.—It is impossible from the data at hand to even estimate the production of window-glass in Europe or the number of factories at work. No statistics, not even an estimate, has been obtained from England. In Belgium there are 61 window-glass factories, with 216 furnaces, of which but 138 were in operation recently. These works produce from 3,600,000 to 4,000,000 boxes of glass of 50 feet each annually. In France, there are from 25 to 30 furnaces, producing from 800,000 to 900,000 boxes annually; and in Sweden, 4 factories, with an annual production of 40,000 boxes; in Norway, 1 factory, no product given; in Italy, 12 factories. In Austria-Hungary, 63 factories make window-glass; in Germany, 86, while from Switzerland, Spain, Portugal, and Russia I have no statistics, though window-glass is made in all of those countries.

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[a] *Report of the Tariff Commission*, page 941. Washington, 1882.

FLINT- AND BOTTLE-GLASS.—The statistics of the manufacture of flint- and bottle-glass in Europe are even more meager than those of plate- and window-glass. All the information that has been obtained is included under the notes of the manufacture of each country which follow.

MANUFACTURE OF GLASS IN GREAT BRITAIN.—The glass manufacturers of Great Britain are, as a rule, extremely chary about giving statistical information concerning their works, and it is a question whether any late complete statement as to the number and production of their glass houses exists. A table published in the factory returns of 1871 shows the number, locality, and employés of the glass works of the United Kingdom at that time to be as follows:

Localities.	Number.	Children.	Males up to 18.	Males above 18.	Females.	Total.
Durham	24	10	1, 113	2, 153	401	3, 677
Lancaster	37	6	1, 530	3, 602	927	6, 065
Middlesex	16	4	134	319	30	487
Northumberland	9	7	117	277	23	424
Somerset	1	....	70	243	6	319
Stafford	33	1	808	2, 755	312	3, 876
Surrey	9	....	86	136	5	227
Warwick	47	3	274	874	167	1, 318
Worcester	[illegible]	2	56	131	7	196
York	29	12	877	1, 961	138	2, 988
Scotland	19	1	464	1, 037	91	1, 593
Ireland	8	....	63	192	9	264
Total	240	46	5, 592	13, 680	2, 116	21, 434

CHIEF LOCALITIES.—The chief locality for glass manufacture in Great Britain is in the north of England especially on the Tyne, plate, window, and flint, both blown and pressed, being made in large quantities. Plate is also made at Saint Helen's, in Lancashire, at and near Birmingham, and at London; flint in London, the Birmingham district, Warrington, etc.; window-glass very extensively in the Birmingham district, and bottles and window-glass near Liverpool.

DECLINE OF THE ENGLISH GLASS INDUSTRY.—If the statements that are constantly appearing in the English journals devoted to this industry are true, glass-making in Great Britain is not in a very prosperous condition. A correspondent of the *Pottery Gazette* says:

> It is a very significant fact that nearly every trade in this country has made gigantic strides in advance during the past thirty-five years, during which time the glass trade has been stationary, if it has not even retrograded in its productiveness. (*a*)

This condition of affairs is especially noticeable in the flint-glass business. The same journal gave recently a list of 30 flint-glass furnaces, containing 296 pots, located in various parts of the United Kingdom, that had become extinct. Commenting upon this that paper says:

> It is but just to say that some of these houses have removed to more convenient works, to the extent of about 6 or 8 furnaces and 48 or 60 pots; but still there is a great reduction in the number of works, during which period it must be borne in mind the population has nearly doubled.

The following table shows the value of the British imports and exports of glass for the years 1878, 1879, and 1880:

IMPORTS OF GLASS.

	1878.	1879.	1880.
Window and German sheet, including shades and cylinders	£452, 202	£450, 647	£476, 338
Flint	489, 518	174, 113	179, 503
Plate, silvered or not	233, 602	163, 064	214, 917
Manufactures, unenumerated, and old broken	879, 733	789, 006	906, 991

EXPORTS OF GLASS.

	1878.	1879.	1880.
Plate	£106, 762	£133, 635	£192, 607
Flint	239, 747	230, 537	248, 694
Common bottles	310, 307	305, 606	332, 886
Other manufactures, unenumerated	99, 068	113, 255	147, 321
Glass of all kinds not of English manufacture	149, 275	190, 635	186, 980

It will be noted that the imports of 1878 and 1880 do not differ much except as to flint, which shows a decided decrease, while the exports show in all classes of glass an increase. Part of the decline in flint-glass is no doubt

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a See the *Pottery Gazette*. London, September 1, 1881.

due to the competition of the cheaper lime-glass, which, for ordinary purposes, is fully as good, and is now made of a superior quality. At the same time it is true that for beauty and brilliancy no glass can compare with English lead-flint.

MANUFACTURE OF GLASS IN FRANCE.—For many years France, through the Saint-Gobain works, has virtually controlled the manufacture of plate-glass on the continent of Europe, and, to a large extent, its production and prices throughout the world. The Saint-Gobain Company not only own four of the seven French plate-glass works, producing fully 70 per cent. of the total make of France, but they also own the only two important plate-glass works of Germany. On the other hand, however, it is to be noted that two of the remaining three of the French plate-glass works are owned by a Belgian company. It thus appears that the plate-glass production of Europe is largely controlled by two companies, one French and the other Belgian. It is possible that the number of plate-glass works at present in France should be given as eight, as a factory was erected at Saint-Denis, near Paris, a few years since, though I am not advised whether it is running at present. The Saint-Gobain works have made the largest sheets of plate-glass that have ever been produced. At the exhibition of 1878 at Paris an unsilvered polished plate, measuring 21 feet 2 inches by 13 feet 6 inches, was exhibited. A special table had to be prepared on which to cast this enormous plate. The quality of the French plate is most excellent, and is the standard for comparison in all the countries of the world. A considerable amount of the production of this glass is used in the manufacture of mirrors, some 275,000 square yards being consumed annually in this way. The manufacture of window-glass in France is relatively of the least importance, the production of plate, flint (lime and lead), and of bottles being greater in value than that of window-glass. According to Mr. Colné, there were in France in 1878 (*a*) from 25 to 30 furnaces, with 8 pots each, producing from 40,000,000 to 45,000,000 square feet. These are found almost entirely in the north of France, near the coal-fields. Large quantities of round, oval, and square shades, for protecting clocks, artificial flowers, etc., are made in France, the process of manufacture being similar to that of window-glass, the sheets being blown in cylinders of a very even thickness all through. The coloring, staining, painting, and decorating of window-glass is carried on to a remarkable extent in that country, there being in the neighborhood of five hundred establishments in France for thus manipulating sheet-glass, and the French colored sheet-glass is especially notable both for its colors and for their manipulation. The so-called flashed or doubled glass is very common, both in sheet and flint, flint glassware being in some instances coated with as many as four different layers of different colored glass put on very thin and evenly. Most of the stained or colored glass used comes from the departments of the Nord and Pas-de-Calais. The work at many of the establishments has attained a high degree of perfection, and the French stained glass, by reason of its artistic excellence and cheapness, is in demand in all parts of the world. As has already been stated, the French glass houses are especially noted for the taste displayed in their flint ware, both lime and lead; but the quality is not as good as the English, though a marked improvement has recently been made in this respect, and the gracefulness of the forms and the beauty of the designs have given French crystal glass a reputation that is unrivaled. The decoration of window-glass with enamel colors in imitation of the antique is also quite an industry in France. Most of the work in the French flint houses is hand-work, the result depending largely upon the manual dexterity of the workman. Pressing on the American system is not employed to any great extent, while that which is made is decidedly inferior to the American.

Owing to her wine production, France is naturally a large manufacturer of bottles, producing annually from 125,000,000 to 150,000,000; indeed, the value of bottles made in this country exceeds that of any other form of glass. Some of the bottle works have been established for a long time, one, that of J. Tumbeuf Neveu et Neveu, in the Jura, being founded in 1506. It was at this place in 1630 that the first gentlemen glass-blowers (*gentilhommes verriers*) were made by decree of the king.

The following table published in the *Report on Glass and Glassware of the Paris Exposition* shows approximately the value of the annual production and exportation of glass of French manufacture in 1878:

Description.	Production.	Export.
Crystal	$2,200,000	$800,000
Glassware	2,800,000	1,600,000
Plate-glass	5,000,000	1,600,000
Window-glass	3,000,000	600,000
Bottles	8,000,000	2,400,000

MANUFACTURE OF GLASS IN BELGIUM.—Belgium possesses excellent facilities for the manufacture of glass, and in some lines, especially window-glass, these facilities have enabled her to produce so cheaply as to command a portion of the trade of the most important countries of the world. Fully two-thirds of the glass made in Belgium is exported. As is noted elsewhere, Belgium has five plate-glass factories, producing about 94,000 square feet polished plate a year. While some of the plate in Belgium equals the French, this is not true of all manufactured. The production, however, is increasing, and the quality is improving every year. This

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[a] *Report of Paris Exposition on Glass and Glassware*, Charles Colné, page 345. Washington, 1881.

production is controlled by a syndicate, as is also the production of plate-glass in France. There are in Belgium 61 window-glass factories, with 216 furnaces, containing from 6 to 8 pots each, of which at a recent date 78 were idle, leaving but 138 in operation. These works are mostly situated in Charleroi. Most of the furnaces used are gas furnaces. These works produce from 180,000,000 to 200,000,000 square feet annually, or, say, from 3,600,000 to 4,000,000 boxes of fifty feet each. The Belgian window-glass is, as a rule, of a very good quality, free from bubbles or impurities, of a good color, and even surface. A large quantity of the colored glass is of a superior quality and very clear color. Their flashed glass is very good, and is admirably adapted for etching or engraving. They also make quantities of corrugated, depolished, and painted sheets. Some corrugated cylinders 7½ feet high have been made at Charleroy. Depolishing is done by the Tilghman sand-blast. Considerable glassware, both lead and flint, is made in Belgium, but it is not, as a rule, of a high standard of excellence, though the product of some of the works, especially that of Val Saint Lambert, is fully equal to the English and the French. The cheapness of this ware has made a great demand for it, especially when made into objects of utility. The exportation of this grade of glass amounts to one and a half million to two million dollars annually. The bottle industry of Belgium does not hold the same relative rank as this industry does in either Germany or France, and the production from 1875 to 1880 was only about 12,000,000 annually, not as many as the single works of Siemens at Dresden make. This industry has been much neglected in recent years. In 1872 12 furnaces were at work on bottles; in 1877 but 5. In 1872 Belgium exported 7,568,000 pounds of bottles, and imported only 1,377,000 pounds; in 1877, however, the exports amounted to only 1,775,000 pounds, and the importations had increased to 3,476,000 pounds.

MANUFACTURE OF GLASS IN GERMANY.—In 1882 there were in Germany 317 establishments for the manufacture of glass, (*a*) a reduction from 329 in 1878, (*b*) and 348 in 1873. (*c*) Many of these, however, were of little importance, being either small works for the production of watch crystals, blown pearls, etc., or so-called "refineries" similar to those common in Bohemia, in which crude glass is produced, to be finished in other works. (*d*) These glass works are found in nearly all parts of the empire, being most numerous in Prussia, especially in Silesia. The production of the different kinds of glass, however, is not so widely distributed, certain districts being the centers of production of certain kinds. In Thuringia and the Bavarian forests large quantities of both blown and cast glass are made for the mirror works at Fürth. (*e*) Window-glass is made chiefly in the Rhine provinces, Silesia, and Westphalia; common table ware in the Rhine provinces and Lusatia; fine table ware in the forests of Bavaria and Lorraine; and chemical ware in the forests of Bavaria and Brandenburg. The glass works of Saxony make large quantities of lamp articles; and Saarbrück, Prussia, and Saxony produce bottles very extensively, one establishment, that of Fred. Siemens, at Dresden, producing 16,000,000 annually.

The statistics of the glass houses of Germany other than those given above are not only exceedingly meager, but very difficult of classification. The best information obtainable places the number of establishments at which plate-glass is made at five. Two of these, Stolberg and Mannheim, owned by the French company of Saint-Gobain, had for a long time the monopoly of the manufacture of plate-glass in Germany, but within a few years past at least three other works have been established. In Thuringia and the Bavarian forests, also, according to the *German Catalogue of the Centennial Exhibition*, glass is made by casting, the plates being ground by water-power with very primitive machinery. These plates are chiefly used at Fürth for the manufacture of looking-glass. There are in the neighborhood of 86 establishments, with 125 furnaces, averaging 7 pots each, at which window-glass and blown spiegel-glass are made, and about the same number make bottles, carboys, and demijohns. At the other works, and also at some of those making window-glass and bottles, various kinds of table ware, articles of luxury, chemical apparatus, etc., are made.

FURNACES AND FUEL.—A great deal of attention has been paid in Germany to the construction and method of firing furnaces, and some very important advances have been made. Direct firing has been abandoned in many works and systems of indirect firing adopted. The Siemens furnace, not only with pots, but of the tank variety, has been very successful. Other systems, as the Nehse and the Boetius, are in use. While coal is the chief fuel of the glass houses, the use of wood, peat, and turf is by no means uncommon. When wood is used, the works are located with reference to its supply, and as the wood is exhausted and transportation into certain districts is made easier and cheaper these works are abandoned. The development of the glass industry of Germany is now in the neighborhood of the deposits of mineral coal, the old glass-making districts gradually losing their prominence.

MANUFACTURE OF GLASS IN AUSTRIA-HUNGARY.—The beauty, elegance, and perfection of the Austrian glassware, as well as the skill displayed in its manufacture, have given it a reputation that is second to none other. The Bohemian glassware is a lime glass, containing little or no lead but a large percentage of silica, and is consequently well adapted to decoration. The purity, whiteness, and homogeneity of the metal make it equal to the best white glass produced in Europe. Not only in form and metal does the Bohemian ware rank with the highest, but

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[a] See *Deutschlands Glasindustrie*, Julius Fahdt. Dresden, 1882.

[b] See same for 1878.

[c] *Bulletin of the Society for the Encouragement of National Industry*, page 71. Paris, 1877.

[d] In 1873 it was stated that but 250 of the German glass houses were of much importance. It is true, however, that though, as stated, the number of works has declined, the output of many of them has largely increased.

[e] Very large quantities of little mirrors, called Judenmasspiegel, are made in Germany.

in its manipulation it has deservedly a great reputation, the variety and diversity, as well as the beauty, of its engraved and decorated articles, being beyond question. The conditions of manufacture of this Bohemian glass are also such that it can be very cheaply produced.

One of the specialties of Austrian glass-making is the manufacture of various fabrics for ladies' wear from spun glass. The glass is spun into threads, like ordinary silk or cotton, and woven into different-colored fabrics, sometimes entirely of glass and sometimes with a warp of silk or cotton. Collars, neckties, cords and tassels, fringes, pin-cushions, feathers, belts, etc., are all made of this material. At the Paris exposition in 1878 a bonnet made entirely of spun glass, with feather and ribbons lined with silk, was shown, as well as cloaks and other articles of wear. This spun glass is also used for watch-chains, brushes, etc. Glass flowers are also made to a considerable extent, but it is difficult for these to compete with those made from china. As is stated elsewhere, large quantities of what is known as "raw glass" are made in Bohemia. This glass furnishes the raw material of other establishments, and is in these establishments decorated, polished, and made into looking-glasses, beads, etc.

There is but one plate-glass works in Austria-Hungary, as the manufacture of plate-glass has not been a very successful enterprise in that country. The first works was established in 1700, and, after leading a peripatetic existence, was finally abandoned in 1840. The plate-glass works now in operation is at Stockau, in Bohemia. The glass is chiefly used for the manufacture of mirrors. Considerable window-glass is also made in Austria, much of it for the manufacture of looking-glasses, for which large sizes are blown, the workmen using levers, cranes, props, and other mechanical means in its production. The finishing of this glass is carried on in the Pilsen district, where there is a number of establishments for grinding and silvering. There are in Austria 63 glass factories making cylinder glass, 46 making what is called cast glass, mainly for mirrors, and 56 making both.

The chief seat of the Austrian manufacture is in Bohemia, 169 of the 360 furnaces reported below being in that district. The glass houses, however, are generally very primitive affairs, being in the midst of forests, the furnaces ordinarily very small, containing seven or eight small pots, and burning wood. These furnaces, being so rude and inexpensive, are placed in the midst of the timber. As the fuel around a factory is burned, it is found more economical to move the furnace than to bring the fuel to it. This state of affairs has resulted in the division of glass-making in Bohemia into two distinct branches, the manufacture or the production of the rough unfinished articles and the manipulation—the so-called refining, or the cutting, engraving, and decorating of this raw glass. In a few establishments both operations are carried on, but the larger number simply blow or mold the articles and sell them to the glass refiner. The result of this division has been the training of a body of excellent engravers, and the skill has been still further encouraged by a government museum; and drawing- and art-schools in connection with the glass industry have also been opened at various places. As is stated in the chapter on materials, sand is but seldom used in Bohemia, quartz, which is quite abundant, being substituted for it.

According to the last statistical reports published in 1880 there are in Austria-Hungary 230 firms, operating 255 glass houses, in which there are 360 furnaces. In these furnaces are 2,803 open pots, 37 covered pots, and 5 tanks. Of the 360 furnaces, 15, with 123 pots, are regarded as permanently idle; 7 furnaces, with 50 pots, as temporarily idle; 1 furnace, with 8 pots, and 1 Siemens tank-furnace were in course of construction. The location of these furnaces and the number of workmen engaged are as follows:

Location of furnaces.	Glass houses.	Furnaces.	Workmen.
Bohemia	122	169	18, 012
Moravia	16	27	9, 072
Silesia	3	3	94
Galicia	15	15	358
Buckowina	4	5	111
Lower Austria	8	14	495
Upper Austria	3	4	179
Salzburg	1	2	300
Styria	20	27	1, 142
Kaernten	2	2	60
Krain	2	4	109
Tyrol	4	5	169
Dalmatia	1	1	24
Hungary	40	66	2, 850
Croatia	4	6	170
Slavonia	3	4	155
Transylvania	6	6	200

Helpers are not included in this estimate. If we add to this number 21,500 workmen engaged in glass refineries and other factories of a kindred character, we may put the number of workmen engaged in the glass industry of Austria-Hungary at 60,000.

Of these 360 works, 1 manufactures plate-glass, 1 cathedral glass, 63 window-glass, including blown looking-glass and colored glass, 71 table ware, 131 hollow glass, including crystal and fine glasses, 20 lamps, 50 green glass and bottles, 15 colored raw glass (9 of these are window-glass, and are included in window-glass manufacture), 15 raw glass sticks and pipes for beads, and 2 pressed glass. As stated above, wood is the chief fuel used. Of the 360 furnaces, 244 use wood as fuel, 86 peat, 18 coal, and 12 turf and wood.

One hundred and forty-six glass houses manufacture cut glass and other fine ware. Of these, 47 use foot-power, 57 water-power, and 16 steam-power. The total annual production of Austria reaches in value about $12,000,000. I find a statement in the *Bulletin of the Society for the Encouragement of the National Industry in France* to the effect that, in 1873, 70,000 to 80,000 quintals of blown window-glass were made in Bohemia in that year.

MANUFACTURE OF GLASS IN ITALY.—The recent revival of the manufacture of Venetian glass, while it has not added largely to the amount or value of the production of Italy, has given to its glass a reputation that has been wanting since the fires of Murano went out. In 1866 the Venice and Murano Glass Company was established by a few English gentlemen for the purpose of restoring the manufacture of Venetian glass, and the result has been a degree of excellence in product not unworthy of comparison with that which in former days characterized the productions of the glass works of Venice and Murano. Through the kindness of Signor G. Castellani, to whose skill the modern glass houses of Venice are so much indebted, I have received the following statement regarding the works at Murano:

> Murano, a small island twenty minutes distant from Venice, contains 4,000 inhabitants, 2,000 of whom are employed in glass works. In these works are made beads, sheet window-glass, blown-glass articles, (*a*) vases, table ware, etc., chandeliers, bottles, green druggists' ware, and enamels for mosaics. There are ten or twelve furnaces in these different establishments. The most important of the Murano works, in a commercial point of view, is *Le Fabbriche Unite*, where beads are made, about a thousand workmen being employed. The Venice and Murano Company, which is the principal factory for blown and artistic glass, employs about seventy men, part of whom are called *maestri*. Its production is limited, the number of *maestri* being very small and not easily increased. The production amounts to about 500,000 francs ($96,500) a year. The entire product of the island does not exceed 5,000,000 francs ($965,000) a year. All the materials used on this island are drawn from other countries; the sand from Dalmatia, soda from England, coloring matter chiefly from Germany.

As to the details of the manufacture of glass in other parts of Italy but little information is obtained. The following statement was obtained from the minister of foreign affairs of Italy through the late Mr. Marsh, American minister:

Kinds of glass.	No. of establishments.	Average number of employés.
Plate-glass		
Window-glass	12	1,200
Glassware	49	3,000
Green glass	14	800
Total	75	5,000

MANUFACTURE OF GLASS IN RUSSIA.—The development of the glass industry in Russia in the last fifteen years has been very marked. All kinds of glass are made in this empire: plate, window, glassware, and bottles. As a rule, however, the works are quite primitive. In the Wilna, Minsk, and neighboring districts only wood is used. The furnaces are very primitive, and average but from four to six pots. In the central district, however, where there are fifty-eight works, the establishments are somewhat larger. The plate-glass establishment is in the northeast district. The entire production of Russia can be placed at about 10,000,000 rubles, or $7,779,000. The number of glass factories in Russia in 1879 was 202, the number of persons employed 14,480.

MANUFACTURE OF GLASS IN SWEDEN.—Sweden manufactures glass somewhat more extensively than Norway, supplying not only the larger part of its own demand, but having some surplus to export to Russia. Its quality, however, is not remarkable, and but little attention is paid to the production of anything but the commoner grades, though some painted glass is made. There are in Sweden 33 glass works, producing window-glass, glassware, and bottles, no plate-glass being made. Of these, 4 manufacture window-glass, making 19,602 cases yearly, (*b*) 15 glassware, and 14 are green-glass factories. In these 33 works are 38 furnaces, with 280 pots and 1 tank. Seven furnaces use gas, 3 coal, 2 peat, and 2 wood, and 31 are direct-firing, using wood as a fuel. The statistics of these factories for 1879 are as follows: (*c*)

Kinds of glass.	No. of establishments.	No. of furnaces.	No. of pots.	NUMBER OF EMPLOYÉS.			Value of product.
				Men over 16.	Women over 16.	Males under 16.	
Window-glass	4						$93,955
Glassware	15						295,547
Green glass	14						265,323
Total	33	38	280 pots 1 tank.	1,200	50	800	654,825

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a Known as Soffiati.

b These cases are probably of 100 feet each.

c For these figures I am indebted to the courtesy of Mr. Fredr. Brushewitz, of Limmared, Sweden.

Manufacture of glass in Norway.—But little glass is made in Norway. There is but one window-glass factory which uses wood as a fuel in a direct-firing furnace; two flint works making table ware, one using a Boetius and the other a wood-gas furnace, and three bottle houses using Siemens furnaces, two with pots and one tank. The latest statistics at hand, which are only approximately correct, are as follows:

Kinds of glass.	No. of establishments.	No. of furnaces.	No. of employés.	Value of product.
Window-glass	1	1	35	$27,000
Glassware	2	2	300	86,500
Green glass	3	3	270	86,500
Total	6	6	605	200,000

Of the employés 25 are women and 112 are children.

Manufacture of glass in Spain.—Though Spain was one of the first nations of western Europe to make glass, the present condition of this industry by no means justifies the promise of its beginning. There existed in Catalonia, Spain, in the last century many works famous for their beautiful glass, but these are nearly all closed. In the whole of this kingdom at the present time there are only some 23 or 24 glass houses, making bottles, lamp articles, and window-glass, mostly for local use, though some little is exported. At these factories, also, some rude and strange shaped vessels and drinking-cups are made, and these, compared with the specimens remaining, show that the old forms and the old systems of ornamentation are still in use.

Glass in Holland.—There are in Holland 19 glass works, all but one of which are engaged in the manufacture of the peculiar square glass bottles used for bottling the Dutch spirits. Many of these bottle factories are in connection with the distilleries, and consequently have a steady business, but little affected by foreign competition. The total production is about 19,000,000 a year, all colored. In addition to these bottle factories there is a glassware works at Maastrecht.

The province of Zealand furnishes a substance largely used in the manufacture of plate-glass, "bergasche", supposed to be the remains of a salt-boiling works which once existed in that province. This substance takes the place of soda, but requires especial preparation.

Glass in Portugal.—In Portugal there is one establishment for the manufacture of crystal and fine glass, and some glass of other kinds is made, but not enough for the needs of the country.

Chapter XII.—HISTORY OF GLASS-MAKING IN THE UNITED STATES.

GLASS-MAKING IN VIRGINIA AND WEST VIRGINIA.

One of the first attempts at manufacturing within the limits of the thirteen original colonies was the production of glass. The hopes of sudden wealth from the discovery of gold and silver, or from finding the fabled passage through this continent to the South Sea, were doubtless the chief causes of the formation of the London Company and its early attempts to colonize Virginia. At the same time this was a commercial venture, with the hopes of profit, and with a shrewdness characteristic of the English merchants, not only of that but of subsequent centuries, they did not forget entirely the possibilities near at hand in their search for what they believed would be greater ones in the near future. The vessel which carried Captain Newport to this colony on his second voyage, in 1608, also brought out eight Poles and Germans to make "pitch, tar, glass, mills, and soap-ashes". Stith wisely remarks that "had the country been peopled they would have done well, but they only proved a burden and a hinderance to the rest". (*a*) After the return from the fruitless expedition to the country of the "Manakins", the president of the colony, Captain Smith, dispersed as many as "were able, some to make glass, and others for pitch, tar, and soap-ashes". Between the arrival of Captain Newport and the return of his vessel, in 1608 or 1609, some glass was made, and part of the return cargo, the first that conveyed any exports of manufactures from what is now the United States, was the trials of glass thus made.

Stith states that the glass house in which the glass was manufactured, and which was probably the first manufactory erected in the English colonies in America, being erected late in 1608 or early in 1609, stood in the woods about a mile from Jamestown. This enterprise was one of some daring. Glass-making at this time was by

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a Stith's *History of Virginia*, page 77. Williamsburg, 1747.

no means well established in Europe. Flint-glass was not yet invented, and plate was not cast, while the art of blowing window-glass and bottles and making glassware was imperfectly practiced in England. Wood, however, was becoming scarce, and the alkalies needed for the manufacture of glass high priced, and those of a good quality were brought from a distance. All of these materials were not only abundant in the new colony, but the wood was a burden and potash could be made readily from the wood-ashes. The great bulk of glass bottles made their importation expensive, and it is possible that the first glass house in Virginia made bottles only. What window-glass was used was imported.

The craze for the raising of tobacco, which had such a disastrous effect upon the colony, interfered with glass-making, and in 1617 Captain Argall, on his arrival as governor, found the glass house fallen to decay. (*a*) In 1620 an attempt was made to restore manufactures to the colony, and a large number of artisans was sent to Virginia. In 1621 a roll or subscription was opened to raise funds for the erection of a glass house to make beads for the Indian trade, and Captain Norton and some Italians were sent over for that purpose. The subscribers to these rolls were to participate in the profits. These beads were currency among the Indians.

The London Company, in its letter of July, 1621, sent in the ship George, commended this Captain William Norton to the governor. He was directed to be lodged in the Guest House with his "gange" until he had found a convenient place for his furnace, and in the choice of place care was to be taken that he and his "gange" be as secure as possible from surprise, "so that the commoditie of glass and beads should not be vilified by too common a sale to the Indians". (*b*) At the time of the massacre, in 1622, the glass house at Jamestown was destroyed, but it does not appear that these Italian glass-workers were massacred, as they must have been had their glass works been at this place. They are referred to in June, 1622, and again in February 20, 1623, by the governor and council in a letter to London, in which they state that a gentleman who was returning to London would inform the company what had been done. This would seem to indicate that the manufacture of beads was not carried on at Jamestown, but that the house that was destroyed was the first one.

What was the history of glass for some years after this date is not, so far as I have been able to discover, a matter of record. No doubt the colonists found that the cheapness of fuel and of alkali was more than offset by the scarcity and high price of labor and its tendency to seek other employment, and it is probable that glass-making was abandoned.

The next account of a glass works in Virginia that I have found is of one that was in existence in 1787 at Alexandria. M. De Warville, who visited this state in the fall of 1788, states that this works exported the previous year glass to the amount of 10,000 pounds and employed 500 hands. This is the last notice of a works in eastern Virginia until early in the nineteenth century. Mr. Jarves states that a Dr. Adams, of Richmond, Virginia, "made large offers of increased wages to the workmen of the Essex-street works, who were induced to abandon their places of work and violate their indentures. They succeeded in reaching Richmond to try their fortune under the auspices of the doctor. A few years' experience convinced them of the fallacy of increased pay, for, after very heavy losses, the works were abandoned and the workmen thrown out of employ".

This is the last record I have been able to find of a glass works in eastern Virginia, or what is now Virginia.

In the census of 1810 Virginia does not appear as a glass-making state. In 1815, however, a glass works for making white flint, hollow, and other glassware was established at Wellsburg, in the western part of the state, at which glassware of an excellent quality was produced. In the census of 1820 a glass works is reported in Brooke county, which was no doubt the Wellsburg works. It made that year $20,000 worth of glass, had $12,000 capital, and paid out $8,000 for wages and $12,000 for material and contingent expenses, or exactly the value of product. It employed 14 men and 12 youths. In 1827 it is reported that glass decanters of great beauty and solidity were made at these works, "while white flint and green glass wares made within a few years rivaled the foreign."

At the tariff convention of 1831 there were two flint-glass furnaces, with 12 pots, reported in operation at Wellsburg, Pennsylvania, evidently a misprint for Virginia, and one with 6 pots at Wheeling, Virginia. Two window-glass works are also reported at Wheeling. In 1840 one glass works is reported in Brooke county (the Wellsburg), and three in Ohio county (the Wheeling).

Regarding the history of the Wheeling factories, Mr. W. Leighton, jr., in an article contributed by him to the Wheeling *Sunday Leader* of March 28, 1880, in some reminiscences, states that—

> The first glass factory built in Wheeling was for the manufacture of window-glass, and the business was commenced some time in the year 1821. I find in the *History of the Pan-Handle* that "in 1829 a flint-glass house was erected in Wheeling by John and Craig Ritchie, located on the side of the hill opposite the second ward market-house. This establishment was operated for several years with great activity and success, and had a widespread reputation for the manufacture of fine-cut glassware. This success and the unrivaled advantages for procuring cheap fuel at Wheeling encouraged other firms to embark in the business, and in 1835 the Messrs. Sweeney put a large flint-glass works into operation in the northern part of the town, which was followed in the course of the next few years by the erection of another large establishment at the extreme south end, built by Plunket & Miller, now owned and operated by the firm of J. H. Hobbs, Brockunier & Co.".

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a Captain Smith, under date of 1615, states that for a long time the labor of the colony had been misdirected in the manufacture of various articles, among them glass.

b Neal's *Virginia Company of London*, page 231.

The veteran glass manufacturers of this country, Mr. J. L. Hobbs, and his son Mr. J. H. Hobbs, of the South Wheeling glass works, have been, I believe, for a longer time uninterruptedly running their furnaces than any other glass manufacturers in the United States. These gentlemen came to Wheeling in 1845 and purchased the glass works built by Messrs. Plunket & Miller, since which time there has been no break or interruption to their business.

Whether or not the introduction of glass-making at Wheeling encountered the same difficulties as are described to have met Mr. Bakewell at Pittsburgh I do not find set down in the records, but the probabilities are that a similar experience was had. The factories, however, ultimately surmounted all difficulties, and went on to good success. In 1863 the Central Glass Company was established by a number of workmen from the South Wheeling glass works and successfully operated. At later dates several other factories have been built in this valley, among which are the Belmont Company and Goblet Company at Bellaire, the La Belle Company at Bridgeport, and the Excelsior Company at Martin's Ferry. Beside these, window-glass factories and lamp-chimney houses have been located here, and the amount of glass business in this vicinity is assuming year by year greater proportions.

The obvious reason for the establishment of glass factories in Wheeling has already been mentioned—its cheap fuel. This has always been an important consideration; but the success of glass-making here has not been due to this cause alone; it owes much of its prosperity to the enterprise of those engaged in it. While the first great step of progress in glass-making in modern times, the invention of pressing, is claimed, as before mentioned, to be American, so is the second not only American, but had its origin here in Wheeling. This second step was the improvement in the composition of lime glass, which enabled manufacturers to substitute that material in place of the old flint-glass.

For the manufacture of bottles, window-glass, jars, and shades in England and on the continent of Europe lime glass has always been used, and can boast an antiquity perhaps as great as that of flint-glass. The first factories in this country made window-glass, using, of course, the lime composition; the manufacture of bottles followed, but flint-glass making was commenced, and, as in Europe, only inferior grades of ware were made of lime glass. In Pittsburgh, at an early period, common tumblers and cheap table ware were made of lime glass, and some improvement had been made in 1864; but still the lime goods were so much inferior to flint-glass as not to come in competition with it, their lack of purity and luster being very conspicuous faults.

In the winter of 1864 Mr. William Leighton, sr., of the firm of J. H. Hobbs, Brockunier & Co., made a course of experiments in the composition of lime glass, the result of which was so successful that the manufacture of lime glass was commenced by his firm, and ware was produced equaling in beauty the finest flint-glass. The most important feature in the composition of this new lime batch was the use of bicarbonate of soda in place of soda-ash, until that time universally used in lime glass; and this use of bicarbonate, and better proportion of all the materials, constituted the improvement, and led to the most important results. As the improved lime glass was much cheaper than flint-glass, being less than half its cost, other factories commenced using the same material and learned the new composition. The ware thus manufactured could only be distinguished from flint-glass by its less specific gravity, and by the peculiar tone of its sound when struck, the flint-glass having a full metallic tone or ring, while the lime glass emits a dull, dead sound, destitute of vibratory tone. From the time of this improvement in lime glass the flint-glass factories began to languish. The larger number of them, perceiving that the era of flint-glass was past, gave up the old composition and commenced the manufacture of bicarbonate glass, as it was then called. But a few factories still clung to the old lead-glass composition, fondly hoping, and perhaps believing, that lime glass would run a brief course, and that there would be a return to the time-honored flint-glass. It soon became evident, however, that lime glass had gained the ascendant by merits that would stand the test of time, and those who still persevered in the manufacture of lead glass found their ware could no longer be profitably made, and gained the experience that, in an age of progress, whoever clings to the methods of the past will soon be neglected and forgotten.

Beside advantage of cheaper material, lime glass has the property of chilling and becoming rigid more quickly than flint-glass, thus enabling, and even compelling, the workmen to finish the ware more rapidly, and hence making a greater production; and as the specific gravity of lime glass is less than that of flint-glass, articles made of the former have the advantage of this lightness of weight. The result of all these advantages, together with improvements in furnaces, tools, and methods of manufacture, has been to reduce the cost of glassware to about one-fourth part of what it was when the invention and introduction of bicarbonate glass took place in 1864. With this reduced cost, and consequent reduced price, the use of glassware has been extended correspondingly. New factories have been built; old factories have increased their capacity; and a sufficient supply of glassware has been produced to meet the demand which the reduced prices created.

No kind of ware, even if composed of the most common materials, can now compete in cheapness with lime glass for drinking-vessels and table ware; while for beauty of material, finish, shape, and ornamentation glassware is more than equal to, and for cleanliness far beyond, any other.

Speaking of gas furnaces, Mr. Leighton says:

> Although Wheeling took no part in experimental gas furnaces, yet as soon as it became evident that a safe form of construction had been reached, that form was at once adopted here. The largest gas furnace for melting glass in this country, and probably in the world, was built and put into operation last year by Messrs. J. H. Hobbs, Brockunier & Co., at their South Wheeling glass works, and after six months' trial they were so well satisfied with its results that they put up another of the same form of construction, which has just been completed.

GLASS-MAKING IN PENNSYLVANIA.

The first mention of a glass works in Pennsylvania is found in a letter written in August, 1683, by Penn to the Free Society of Traders. In this letter he alludes to their tannery, saw-mill, and glass-house, "the last two conveniently posted for water carriage." Where this glass house was located, or for what kind of glass it was intended, is not known; indeed, it is doubtful whether the works were ever used for the purpose for which they were erected. If they were, they proved unsuccessful, as did most of the early glass works in the colonies, and were soon abandoned. (*a*)

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a Budd, who wrote in 1685, does not mention them. Dr. More's letter, printed in 1687, mentions a number of industries, but not glass-making, and the same is true of the pamphlet printed some time in 1691, entitled *Letters and an Abstract of Letters from Pennsylvania*. In this pamphlet all the trades which flourished in Pennsylvania are mentioned, but glass is not one of them. Holme, who wrote in 1689, and who refers to a number of trades that were carried on in Pennsylvania, speaks of the scarcity of window-glass. He writes:

The window-glass is often here
Exceeding scarce and very dear,
So that some in this way do take
Isinglass windows for to make.

There is a statement in Bishop's *History of American Manufactures* to the effect that a glass works was built shortly after this one at Frankfort, near Philadelphia, by the English Friends who settled there, but this is probably a mistake, as there were no English Friends in Philadelphia at so early a date. (*a*)

From this time until just before the Revolution the record of glass-making in Pennsylvania is a blank. Governor John Penn, in a letter to the Lords of Trade and Plantations, dated Philadelphia, January 21, 1767, wrote:

> The other is a glass manufactory, which was erected about four years ago in Lancaster county, seventy miles from this city, by a private person. It is still carried on, tho' to a very inconsiderable extent, there being no other vent for their ware, which is of a very ordinary quality, but to supply the small demands of the villages and farmers in the adjacent inland country. (*b*)

This was probably Baron Steigel's establishment, referred to below, who established himself at Manheim in 1762; but however this may have been, there is evidence that Steigel soon after this built a glass house. In June of the same year that Penn's letter was written (1767) Townsend's scheme for raising revenue from the colonies passed the British parliament and was met in this country by a storm of denunciation and agreements of non-importation. At public meetings it was determined to stimulate by all prudent ways and means the manufactures of the colonies, and glass and paper were particularly mentioned as articles deserving of domestic encouragement. Townsend's revenue act was repealed in 1770. At that time a flint-glass manufactory on a much larger scale than any before attempted in the country had been built at the village of Manheim, near Lancaster, by a German baron, Henry William Steigel, and Mr. David Rittenhouse, in a letter to Mr. Barton, dated the 4th of February, 1770, speaks of his intention when he next visited Lancaster to have some pulse-glasses, then just introduced by Dr. Franklin from Germany, and other things he wanted, made there. In another letter, written in the following summer, acknowledging the receipt of a barometer tube made at this factory, he says:

> I am obliged to you for the glass tube; it will make a pretty barometer, though the bore is somewhat too small. I have compared it with an English tube, and do not think the preference can with any reason be given to the latter. (*c*)

This enterprise did not prove remunerative, as the war interfered with remittances from Europe and embarrassment ensued, and the glass works were abandoned. (*d*)

About the time that Steigel built his factory at Lancaster the first glass works in Philadelphia of which we have any details was established at Kensington. The repeal of Townsend's act did not remove the determination of the people of the colonies to establish domestic manufactures in their limits, and though workmen skilled in the manufacture of glass were by no means common, some gentlemen engaged in trades quite foreign to glass-making were found who were willing to risk their capital in this undertaking. In October, 1771, Robert Towars, skinner or leather-dresser, and Joseph Leacock, watchmaker, purchased a piece of land on the east side of Bank street (now Richmond street) and built upon it a glass house, furnace, and other improvements. (*e*)

This works must have begun the manufacture of glass late in 1771 or early in 1772, and it certainly made green bottles, and perhaps flint ware. In Franklin & Hall's *Pennsylvania Gazette* of January, 1772, appears the following advertisement:

> The glass facture, Northern Liberties, next door to the sign of the Marquis of Granby, in Market street, where the highest price is given for broken flint-glass and alkaline salts.

This would indicate the manufacture of flint-glass. The place designated was the store of Robert Towars, which was in Market street, between Second and Third streets. In November, 1772, Towars and Leacock sold the premises to John Elliott and Samuel Elliott, druggists, who took into partnership and interest Isaac Gray. These partners built an additional furnace and continued the manufacture of bottles, carrying on the business for eight years, and as the Elliotts were apothecaries and Gray was a wine merchant, it may be supposed that in this venture the manufacture of bottles for use in their business was an object. The property was sold in May, 1780, to Thomas Leiper, a tobacconist, who must have needed many bottles for the reception of snuff. The latter was owner for twenty years, and sold the glass house on March 6, 1800, to Joseph Roberts, jr., James Butland, and James Rowland for $2,333, subject to £15 ground-rent, who carried on the works under the firm name of James Butland & Co., and in 1801 had their store at No. 80 North Fourth street. Roberts soon sold out his one-third interest to Butland and Rowland for $2,548, who dissolved partnership in 1804, Butland disposing of his interest to Rowland for $2,548, and the latter advertised in 1808 that his store for the sale of bottles made at the Kensington glass works was at No. 93 North Second street. He was also in business as an iron merchant. James Rowland died before the year 1833, and on July 10 of that year James Rowland, jr., who had purchased the interest of his brother, Joseph W. Rowland, sold the works to Dr. Thomas W. Dyott.

Though the records are very meager, there are evidences that several other glass works were built in eastern Pennsylvania between the breaking out of the revolutionary war and the close of the century, and no doubt the

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a Mr. F. D. Stone, the librarian of the Historical Society of Pennsylvania, writes me that Pastorious was the agent of the Frankfort Land Company, and Bishop probably confounds this name with the little town of Frankford, now a part of Philadelphia.

b *Pennsylvania Colonial Records*, ix, 354.

c Barton's *Memoirs of Rittenhouse*, page 206.

d In Franklin & Hall's *Pennsylvania Gazette* for January, 1772, in addition to the advertisement for broken flint-glass, elsewhere referred to, is one from the Southwark china factory for flint stones and broken glass. This may have been for "cullett" for the Lancaster works, or for some other factory of which we have found no record.

e For most of the earlier details of this works I am indebted to Thompson Westcott's history of Philadelphia, published in the *Philadelphia Sunday Dispatch*.

scarcity of glass during the war led to the erection of works in this and other states. That there were glass works of some importance in Pennsylvania at its close appears from Lord Sheffield's letter, written shortly after peace was declared. (*a*) In November, 1787, the Society for the Encouragement of Manufactures offered a gold medal for the best specimens of flint glassware and bottles. It is hardly to be supposed that a $20 gold medal was offered as an inducement to parties to undertake the manufacture of flint-glass, but rather as a premium to works already in existence for the best samples of their products, and the fact that window-glass is not mentioned would indicate either that window-glass was not made, or that its manufacture was so well established as not to need encouragement. Some time between 1780 and 1786 Robert Morris and John Nicholson erected works at the falls of the Schuylkill for the manufacture of some kind of glass, probably window-glass. The glass house was about opposite the dwelling of Governor Mifflin, and a row of stone houses a little lower down the river was built to accommodate the hands working in this establishment. John Thoburn, about 1808, altered the glass house for the purpose of a calico-printing establishment, and the building was still standing in 1856. (*b*) Mr. Eichbaum, who had charge of the erection of the Craig & O'Hara window-glass works at Pittsburgh in 1797, was "superintendent of glass works at Falls of Schuylkill, near Philadelphia". (*c*)

Thomas Harrison, Philip Jones, and Robert C. Martin, who were interested in other business (which, however, they did not abandon), invested a portion of their capital in the manufacture of green and flint glass, which they made at the glass house, South street, near the Schuylkill, in 1806–'07, and manufactured largely in 1808 green and white half-gallon, quart, and pocket bottles. This establishment consisted of a brick glass house, forty-three feet square, a brick warehouse, fifty by forty-three feet, and a small house and stable. Philip Jones & Co. were proprietors in 1810. (*d*) It is doubtful if this "white" glass could have been what is known as white to-day; for if it was, it must have been made in the same furnace as the green glass—a difficult operation.

The Schuylkill glass works, "two miles from Philadelphia," which were in operation in 1819, were the same South street works, and Edward Lowber, drug and color merchant, at No. 144 North Third street, had for sale in September, 1819, window-glass from those works. Caleb Foulke was agent for these works at No. 19 Minor street; but in 1820 George and Jacob Peterman, flour merchants, were agents, at No. 366 High street, for the Schuylkill window-glass manufactory, in South street, near the Schuylkill river. In May, 1822, H. & W. Lawrence advertised that the Schuylkill glass works were to let; and in February, 1823, George and Jacob Peterman gave notice that they had again undertaken the "agency of the Schuylkill glass works at South street wharf, recently called the Philadelphia works", and that they had for sale window-glass of all sizes. (*d*) Thum & Bitters, of North Third street, made, in 1808, pint and half-pint pocket bottles and vials. (*d*)

Regarding the attempts to manufacture certain kinds of glass at this time and later and the causes of failure, Dr. T. W. Dyott (*e*) states that "the manufacture of ordinary descriptions of glassware, such as apothecaries' vials and bottles and the common varieties so extensively used for domestic and other purposes, was not successfully prosecuted in this country until long after the period of the late war (1812)".

Owing to the extravagantly high prices of imported vials, many efforts had been made previous to this time in the county of Philadelphia and in the state of New Jersey to establish this business, but in all instances they were unproductive, and were finally abandoned, with a heavy loss to those who projected or were concerned in them.

> A number of causes interposed to prevent success in this branch of industry, and the failure of those who had first attempted its introduction among us afterward operated to discourage capitalists from engaging in it. Our knowledge of the business at this period was theoretical, without practice; and our workmen were equally deficient, having but an imperfect acquaintance with the mechanical part of their profession. The metal of our factories was inferior in quality and strength, yet produced from the finest materials and by the most expensive process; the articles we manufactured were also limited in quantity to one-half of what ought to have been produced out of the same amount of materials, yet so rude and shapeless in their appearance that purchasers seldom could be found if a foreign article could be obtained. During the war (1812) I became interested in a factory in New Jersey, which was the first establishment that continued in operation for any number of years, and which afterward became the principal school of instruction to the workmen who were subsequently employed in the business. At a later period two other factories were established, and were in successful operation until after the conclusion of the treaty of peace, when they were compelled to suspend business, owing to the importation of the foreign article, which was designedly sacrificed at auction by the British agents, who publicly acknowledged at the time that they were instructed to sell at any prices for the purpose of breaking up our factories. (*f*)

The furnaces at this time were rude affairs, designed to run only about six months in the year. In 1831, at the date of the tariff convention, several times referred to in this report, the Dyottville factory was the most extensive glass works in the United States, consisting of four furnaces, melting about 8,000 pounds of batch a day, and producing about 1,200 tons of glass per year, which was blown into apothecaries' vials, bottles, shop furniture, etc.

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a His statement is: "There are glass works in Pennsylvania;" but he gives no further particulars. Had not the works been of some importance he would hardly have known of its existence.

b *Early History of the Falls of the Schuylkill*, etc., pp. 33 and 34. By Charles V. Hagner. Philadelphia, 1869.

c These works were managed in 1796 by Mr. Nicholson, as appears from a manuscript letter now in my possession from Mr. Eichbaum to Major Craig.

d Westcott's history of Philadelphia in *Philadelphia Sunday Dispatch*.

e See *An Exposition of the System of Moral and Mental Labor Established at the Glass Factory of Dyottville*. By T. W. Dyott, M. D. Philadelphia, 1833.

f See Dr. Dyott's *Exposition*.

It was stated that this glass was composed of "materials altogether the production of American soil, about 15,000 barrels of rosin from North Carolina being annually consumed as fuel in preference to wood or coal". From 250 to 300 men and boys were constantly employed. In 1833 this works had five furnaces, wood and coal, as well as rosin, being used for fuel. It may be well to follow out the history of these works in this place. They were operated for several years after this until the disastrous failure and conviction of Dr. Dyott in 1838 for fraudulent insolvency, when the works passed into other hands, and after being idle for some years were leased in 1842 by Henry Seybert, who became interested in the glass business principally for the purpose of assisting Eugene Roussel in obtaining a supply of bottles for the manufacture of mineral or aerated water, then just being introduced into the United States. He also made flint in one furnace. In 1843 they were leased by a partnership, of which Mr. Henry B. Benners, the present proprietor, was a member. This works is still in operation, the oldest glass works in Philadelphia, and probably in the United States, with a record of one hundred and eleven years of work.

Returning to 1810, the date of the first census of manufactures, we find reported in Pennsylvania, outside of Allegheny county, five glass houses—one in Philadelphia city, two in Philadelphia county, and one each in Lycoming and Wayne counties. The value of the product of the Wayne county works is given at $36,000, while that of the three Philadelphia works was only $26,000. The Lycoming county works, which was probably at Williamsport, had a product of $20,000. This would indicate that glass-making in Philadelphia was not a prosperous business. At the census of 1820 but one works is reported in Philadelphia county, "a flint-glass works, that had been out of operation for some years", while in Wayne county a window-glass works, with one furnace and six pots, is reported, which had been "in operation for five years with good success". Jarves also states that in 1820 a number of workmen left the New England Glass Company at East Cambridge, Massachusetts, and established a co-operative flint-glass works at Kensington under the title of the Union Flint Glass Company; but after a few years this works passed into other hands, and the first recorded attempt at co-operative glass-making in this country failed.

In 1831, as already stated, the Dyottville works were the most extensive in the country. There was also in Philadelphia a flint-glass works with six pots. No mention is made of the Wayne county works at this time, though it appears at the census of 1840. There were, however, two works in Lycoming county, at Williamsport, one for the manufacture of window glass and the other for hollow ware (green glass, etc.). In 1840, according to the census, there were but two glass works in the eastern district of Pennsylvania: one in Philadelphia and one in Wayne county. But it is not necessary to follow the history of glass in this section further. While there has been glass made in increasing quantities in eastern Pennsylvania since 1840, the industry has not attained the importance it has reached west of the mountains. It may be interesting to state, however, that though window-glass was at one time made in Philadelphia, none has been made in that city for seven years.

Of early glass-making in western Pennsylvania quite full accounts remain, and at least four of those connected with the earliest works, Albert Gallatin, Colonel James O'Hara, Major Isaac Craig, and Major Ebenezer Denny, were prominent in the affairs of the nation. Their journals and papers have been saved from the destruction or oblivion that usually overtakes such documents, and from these very satisfactory statements of these early undertakings can be obtained.

The generally received opinion for some years has been that the first glass works west of the Allegheny mountains was built by Albert Gallatin at his settlement of New Geneva, on the Monongahela river, some 90 miles south of Pittsburgh. Here Mr. Gallatin established a number of industries, and among them that of glass-making. Various dates have been assigned to his glass works, the most common one being 1787; but the evidence is quite conclusive that this is an error, and that the works was not started until 1797. (*a*)

Not only is the date usually assigned to this works incorrect, but it is very probable that it is not entitled to the credit of being the first west of the Alleghenies, Craig & O'Hara making glass about a month earlier. (*b*) As the Gallatin works was isolated and so remained, not forming, as did Craig & O'Hara's, the nucleus of a great industry, it may be well, though it was not the earliest, to give its history first, that the account of the works at Pittsburgh may be a connected one.

The Gallatin works was used for the manufacture of window-glass. The furnace was a small one, with eight pots, using wood as a fuel and "ashes for alkali". The glass house was 40 by 40 feet, three sides frame and one side stone. The most credible story regarding its erection is that a number of glass-workers, mostly Germans, left Amelung's factory (*c*) at Fredericktown, Maryland, and crossed the mountains for the purpose of building a glass works at the point that is now Louisville, Kentucky. Gallatin accidentally met them at Wheeling and persuaded

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a In Adams' *Life of Gallatin*, Philadelphia, 1879, it is stated that the business of "glass-making" at New Geneva began "during Mr. Gallatin's absence in the spring of 1797". This is confirmed by Mr. Isaac Craig. (See note below.)

b I am informed by Mr. Isaac Craig, of Pittsburgh, the grandson of Major Craig, who has in his possession many of the letters that passed between Major Craig and Colonel O'Hara on the subject of the glass works, and who is one of the best authorities on the history of western Pennsylvania living, that as the result of a correspondence between himself, Mr. Henry Adams, the author of the *Life of Gallatin*, before referred to, and a son of Mr. Gallatin, he is convinced that the Craig & O'Hara works began to make glass a month earlier than Gallatin's. The Pittsburgh works began in 1797 without doubt, and this would fix the date of Gallatin's as 1797 also. Mr. Craig has kindly allowed me free access to his grandfather's letter-books.

c See account of this works under "Glass-making in Maryland". It is probable that Mr. Amelung was at one time a glass-worker at Pittsburgh. In *Cuming's Journal*, about 1807, mention is made of A. F. Amelung, a glass-worker in Pittsburgh.

them to turn back to New Geneva and establish the works there, Mr. Gallatin agreeing to furnish capital and they to do the blowing. (*a*) The title of the firm at first was Gallatin & Co., but it was afterward changed to the New Geneva glass works.

For a time the business was exceedingly profitable, more so, Mr. Adams tells us, than any other of Mr. Gallatin's enterprises. (*b*) There were but two, possibly three, other window-glass factories in the country, most of the window-glass used coming from England. These works, as well as Craig & O'Hara's, were on or near the route of travel between the East and the rapidly developing West, and the glass commanded a ready market. There seems to have been considerable discussion between Mr. Gallatin and his partners, among whom were a Mr. Nicholson and two brothers by the name of Kramer, who were skilled workmen and had charge of the manufacturing of the glass, as to the price at which it should be sold, and it was fixed at $14 a box of 100 feet, (*c*) though Mr. Gallatin, fearing ruinous competition by reason of the profit at this price, favored a lower rate. The glass, however, by reason of the character of the materials used, was probably of an inferior quality. The works was removed in 1807 to the other side of the Monongahela river, and in 1814 it was operated by Nicholson & Co. (*d*) As late as 1832 a glass house was reported at New Geneva, and glass was made some years later than this. When the works was finally abandoned I have not been able to learn.

In 1796 preliminary steps were taken by Major Isaac Craig and Colonel James O'Hara toward the erection of the first glass house at Pittsburgh. (*e*) This was also the first works west of the mountains to make glass, Mr. Peter William Eichbaum, a German glass-worker, who was superintendent of glass works at the Falls of the Schuylkill, near Philadelphia, being engaged to direct their erection. (*f*) Various causes delayed the work, and it was not until 1797 that the active work of building the furnace was begun, when, as appears from a letter written June 12 of that year by Major Craig to Colonel O'Hara, (*g*) search for coal in the upper part of what is now Allegheny City not showing a vein of workable thickness, a location on Coal Hill, on the south side of the Monongahela river, just above where it unites with the Allegheny to form the Ohio, was purchased, and the erection of the furnace was begun. This site, or part of it, has ever since been continuously occupied by a glass house, the Point Bridge works of Thomas Wightman & Co. occupying it at present.

This was one of the first, if not the first works in the United States to use coal as a fuel; (*h*) indeed, as late as 1810 coal was not used in any glass works in this country but the Pittsburgh houses. (*i*) It was not the force of circumstances or lack of wood that led to the use of coal, but it was the deliberate design of the promoters of this enterprise to melt their glass with coal, and it was the character of the coal in Coal hill that determined the location of the works. (*j*) The use of coal in the state of the art at this time required considerable determination and risk, and it is to the credit of these gentlemen that they dared use it.

The generally received belief that this was the first glass works in Pittsburgh was called in question a few years since by the statement that in 1795 there was a window-glass works, known as "Scott's", at Glass House riffle, on the west bank of the Monongahela. (*k*) This is without doubt an error. Mr. Neville B. Craig, in his *History of Pittsburgh*, speaks of the O'Hara works as "the first glass house here", and as his memory went back distinctly to 1796, if not earlier, it is hardly possible he would not have known of this "Scott's" works if it existed in 1795. It is probable that the works referred to was the "Ohio" works, built about 1800 by Denny & Beelen, which was on the north side of the Ohio, and which gave the name to Glass House riffle, as it appears from a letter of Major Craig's, in connection with the experiment of Mr. Price, that Dr. Hugh Scott, from whom it got its name,

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a *History of Fayette County, Pennsylvania.* Philadelphia, 1882.

b *Life of Gallatin*, p. 176. Mr. Adams writes me, however, that the glass works were "a constant matter of anxiety" to Mr. Gallatin.

c This does not seem so extravagant a price when it is known that at the census of 1810, when there were at least fifteen works in the country making about 5,000,000 square feet of window-glass a year, the marshals estimated the value of the glass at 16 cents a square foot.

d Cramer's *Navigator*, 8th ed., p. 40. Pittsburgh, 1814.

e *History of Pittsburgh*, p. 276. By Neville B. Craig. Pittsburgh, 1851.

f I have before me a letter from Mr. Eichbaum to Major Craig, dated Falls of the Schuylkill, August 18, 1796, from which it appears that negotiations had been in progress for some time between these gentlemen looking to the building of the glass house, and "four different sorts of clay" from near Pittsburgh had been sent Mr. Eichbaum for his judgment as to their adaptability for pot-making. He writes they "do not look amiss" with the exception of some roots, and gives directions for the digging and ripening of 20 or 25 tons weight. This letter is in answer to one from Major Craig, of June 6, 1796, in which he had evidently made a proposition to Mr. Eichbaum to go to Pittsburgh, which the latter accepts conditionally if Messrs. Craig & O'Hara's resolve to build glass works is "absolutely fixed".

g Craig's *History of Pittsburgh*, pp. 276, 277.

h Gallatin's works used wood, as did Denny & Beelen's, the third west of the mountains.

i See Gallatin's *Report on Manufactures in* 1810.

j The Glass House riffle works referred to below used wood, its location on the north bank of the Ohio rendering this necessary.

k See *Pittsburgh as It Is*, by George H. Thurston, Pittsburgh, 1857; also Bishop's *History of American Manufactures*, which probably follows Thurston. Mr. Thurston's authority is a statement of the late Mr. William McCully, a well-known Pittsburgh glass manufacturer, who learned the trade of window-glass blowing in the Craig & O'Hara glass house. I think there can be no doubt but that Mr. Thurston either misunderstood Mr. McCully, or that Mr. McCully was mistaken. Mr. Mark Watson, Mr. McCully's son-in-law and his successor in business, authorizes the statement that in their many conversations on the subject Mr. McCully always spoke of the Craig-O'Hara house as the first. Mr. Isaac Craig also states that, as early as 1845, Mr. McCully told him that the Craig & O'Hara works was the first.

was in 1800 connected with this works. There seems to be no doubt that the Craig & O'Hara works was the first glass works not only in Pittsburgh, but west of the mountains, and was the pioneer of Pittsburgh's glass industry.

The building erected was frame, and contained an eight-pot window-glass furnace using coal as fuel, three boxes being made at a blowing, the box at that time containing 100 square feet. What is now known as a box, 50 square feet, was formerly, even as late as 1860, termed "half box (H. B.)", and the rates of wages for blowing are still based on the box of 100 feet. Some idea of the pots in this pioneer factory can be obtained from the output. A box of 100 feet did not probably exceed 125 pounds in weight, which would give 375 pounds as the finished product of the blowing or of one blower at each melting, and allowing that the weight of product was four-fifths of the weight of batch, the amount of material charged into each pot would be but 500 pounds. Now the weight of batch in each pot will average 1,500 pounds, and the average of a blower is nine to ten boxes of 100 feet. An old glass manufacturer expresses this difference in the size of the pots very graphically in saying: "One man could easily lift an old-style pot, now it takes four men."

As was generally the custom in the window-glass houses of that day, one or more pots in the furnace were used for the manufacture of bottles—"hollow ware," as they were termed. Among Colonel O'Hara's papers, found after his death, was a memorandum in his handwriting stating, "To-day we made the first bottle, at a cost of $30,000." (*a*) This remark has led to the belief that the works was a bottle house, but it was a window-glass factory, making some bottles. The partnership between Craig and O'Hara lasted for seven years, when Major Craig was persuaded by his relatives, who feared financial loss, to withdraw. (*b*) The works were continued by Colonel O'Hara.

The difficulty and expense connected with this first attempt at glass-making west of the mountains were such as must have discouraged a less determined man than Major Craig, who seems to have had the immediate management of the works, he being in Pittsburgh most of the time, while Colonel O'Hara's other interests called him frequently from Pittsburgh. The men employed as superintendent and blowers did not always prove to be as highly skilled as their own assertions would have indicated, and many of the workmen seem to have been petulant, easily angered, and constantly threatened to leave the works. For some such reason as this, in December, 1798, the works were leased to Eichbaum, Wendt & Co., a firm composed of workmen who do not seem to have been very successful financially. Great trouble was experienced also in obtaining the proper materials. The clay which was found in the neighborhood, and which, as appears from a letter previously quoted, was supposed to be of the proper quality to make pots, proved unfit for use, and clay had to be brought from New Jersey in barrels over the mountains at great expense, and frequently the delays were so great that the furnace had to go out of blast for want of pots. When the clay came the whole force would be put to work making pots, which would be dried hurriedly, and the furnace would be put in blast again with the result that every glass-maker of to day would have anticipated—the pots were lost. In one case, in an 8-pot furnace, three pots were lost at the first melting, and the next day four more, leaving but one in the furnace. Great trouble was also experienced in getting sand, and Major Craig's letters constantly refer to the different localities from which specimens were procured and the success in their use.

The trials and the results obtained at this works are set forth in the following letter, dated August 5, 1803, written by Major Craig to Samuel Hodgson, of Philadelphia:

> With respect to our glass manufacturing, the establishment has been attended with greater expense than we had estimated. This has been occasioned partly by very extensive buildings necessarily erected to accommodate a number of people employed in the manufacture, together with their families, and partly by the ignorance of some people in whose skill of that business we reposed too much confidence. Scarcity of some of the materials at the commencement of the manufacturing was also attended with considerable expense. We have, however, by perseverance and attention, brought the manufacture to comparative perfection. During the last blast, which commenced at the beginning of January and continued six months, we made on an average thirty boxes a week of excellent window-glass, beside bottles and other hollow ware to the amount of one-third of the value of the window-glass, 8 by 10 selling at $13 50, 10 by 12 at $15, and other sizes in proportion.

In the fall of 1800 the "commissioner of the city of Washington", then just made the seat of government, applied to Craig & O'Hara to make for the public buildings some glass of larger sizes than had ever been produced in this country, but the attempt was unsuccessful. Glass of the size required, to the extent of some 400 square feet, was made "of a transparency tolerably good", but it was too uneven for the purpose, or was spoiled in flattening, and the glass required was obtained from England.

The second glass house built in the vicinity of Pittsburgh, and the third west of the mountains, was that of Denny & Beelen. This factory was situated on the north side of the Ohio river, in that part of Allegheny now known as Manchester, and gave the name to Glass-House riffle on the Ohio. (*c*) It used wood as fuel, its location being such that coal could not be procured without boating it across the river from the south side of the Monongahela, while wood was easily procurable. The exact date of the erection of this works has not been ascertained, though

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a *Military Journal of Major Ebenezer Denny*, p. 487. *b* Craig's *History of Pittsburgh*, p. 278. *c* Major Denny's *Journal*, p. 228.

it was probably built in 1800. (*a*) Window-glass was made, whether crown or blown is not certain, though there is a legend that an attempt was made to manufacture the former. A Frenchman by the name of La Fleur, commonly known as "Falure", was brought to this country to have charge of the works; but they were unsuccessful from the first, and being compelled to cease operations after a short run, the furnace was abandoned, La Fleur entered the employ of Craig & O'Hara, and Beelen (*b*) gave up the glass business.

As has already been stated, the manufacture of green-glass bottles, or "hollow ware", was carried on in these early glass houses in connection with that of window-glass, the "corner pots" in the window-glass furnaces being used for the manufacture of bottles and flasks. The history of the manufacture of bottles in the West is, therefore, for many years the history of the window-glass works. It was nearly forty years before furnaces for making bottles exclusively were built, and the records of the make of glass at Pittsburgh and of the works in that city as late as 1837 combine window-glass and green glass or bottles as one branch of manufacture. In 1837 there is a record of a "vial works" and a "black-bottle factory", (*c*) the latter "the only one of the kind in the western country". This factory made wine, porter, and other black or amber bottles, as well as demijohns and carboys. The custom of using the "corner pot" for bottles is now entirely discontinued in this section, bottle manufacture being a distinct branch of the glass industry.

The first attempt to manufacture flint-glass west of the Alleghenies was made in Craig & O'Hara's window-glass furnace in September or October, 1800, by Mr. William Price, of London, who had then lately arrived in this country, and who "had been employed altogether in flint-glass" September 5, 1800, Major Craig wrote Colonel O'Hara that Mr. Price had arrived, and had "offered to show us a specimen of his abilities without charge", and arrangements were made with Eichbaum, Wendt & Co., who were operating the works under lease, to allow him the use of a pot in the furnace and such assistance as he needed to make the experiment. On September 11, 1800, "one hundred pounds of pearlash, refined in the best manner, so that it may be perfectly pure, as it is to be applied in the composition of crystal glass by a man just from London", was ordered from Aaron Aimés, at Funk's tavern, on Franklin road. October 29, 1800, Major Craig sent a specimen of glass made by Mr. Price to Colonel O'Hara, and on November 17, 1800, in a letter to Colonel O'Hara, which he sent by Price, he wrote: "He [Price] has satisfied me, as well as others, that his ability in white-glass manufacturing is equal to his professions."

These extracts from Major Craig's letters leave no doubt but that at this early date an attempt was made to produce flint-glass in Pittsburgh, and, further, that the advisability of building a furnace for its manufacture was seriously considered. Mr. Craig writes that he had hopes that some part of the window-glass house could have been used for the manufacture of flint-glass, but Price told him it could not be done. Major Craig seems to have had some doubt as to obtaining workmen and materials, and also as to whether the business would pay; but Mr. Price was instructed to make an estimate of the articles needed and drafts of buildings, and submit them to Colonel O'Hara. Nothing seems to have come from this attempt at the time. A careful examination of Mr. Craig's letter-books gives no evidence of the prosecution of flint-glass manufacture, and as late as 1803, as will be seen by the letter previously quoted, flint-glass was not made at these works.

There is, however, a statement that should be quoted in this connection, to the effect that in 1802 Colonel O'Hara built an additional furnace at his works and attempted to establish the manufacture of white and flint glass, sending an agent to England to procure the necessary workmen; but this agent is reported to have failed in his mission. (*d*) I have not been able to verify this statement, and a careful examination of Major Craig's letter-books of 1802 and 1803 gives no evidence of the existence of such a house, though they refer quite at length to Mr. Price's attempt at flint-glass making and to Mr. Edward Ensell, who afterward built a flint-glass works. Nor is any evidence of the existence of such a works found in Cramer's *Almanacks*. In the *Almanack* for 1807 O'Hara's "glass factory" is mentioned, not his factories, as would have been the case were he making both flint- and window-glass, these requiring separate furnaces. (*e*) In the *Almanack* for 1808, which would give the establishments for 1807, the only glass works mentioned is "1 green-glass works". In the *Almanack* for 1809 Robinson & Ensell's works appears for the first time, and is the only "white-glass" works, and the first one, mentioned.

In Cramer's *Almanack* for 1804, among the amounts for each article made from raw material in Pittsburgh in 1803 are mentioned "jars, decanters, tumblers, blue glass". It has been argued that this proved the existence of a flint-glass house at Pittsburgh, as tumblers and decanters would hardly be made out of green glass; but this supposition

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a The memoir prefixed to Major Denny's *Journal*, page 228, states that they were built "about the beginning of the present century". In a letter from Major Craig to Colonel O'Hara, dated March 20, 1801, he writes, referring to this factory: "The Ohio glass works have stopped." These two statements would fix the date at least as early as 1800, and it seems from a number of letters that they were built in that year.

b Beelen was a Belgian, son of the Austrian minister "Baron de Belen Bartholf".—Denny's *Journal*, p. 228. It thus appears that in the early glass works of Pittsburgh were represented the chief glass-making countries of Europe.

c Lyford's *Western Directory*. These houses were on the south side, and have been known in recent years as "Ihmsen's".

d Thurston's *Pittsburgh and Allegheny in the Centennial Year*, p. 128; also, Bishop's *History of American Manufactures*, vol. ii, p. 96.

e A flint-pot could not have been used successfully in the window-glass furnace, as pots for bottle-making were, the method of working precluding this.

is not borne out by the facts, as green-glass tumblers and decanters were quite common at that time. (*a*) In the *Almanack* for 1804 also appears the oft-quoted statement about glass-cutting "equal to any cut in the states of Europe" which was carried on at Pittsburgh, and it has been claimed that this indicated the presence of a flint-glass house. The amount reported cut, $500 a year, and the fact that the specimens of Mr. Eichbaum's skill at this early date seem to have been chandeliers, the beautiful clear glass of the prisms of which could hardly have been made in Pittsburgh, indicate that the glass came from east of the mountains, if not from Europe. The evidence I have found is against the existence of such a works. (*b*)

If such a factory as is mentioned ever existed, it must have been short-lived and of but little note, and cannot be regarded as marking the beginning of the flint-glass industry in Pittsburgh, which dates from 1808. In the fall of 1807 (*c*) Mr. George Robinson, a carpenter by trade, and Mr. Edward Ensell, an English glass-worker, who had been a manufacturer of both window- and flint-glass at Birmingham, England, and had sold his works and come to this country to better his condition, commenced the erection of a flint-glass works at Pittsburgh, on the bank of the Monongahela, at the foot of Grant street, under the firm name of Robinson & Ensell; but the partners appear to have lacked capital and were unable to finish the works, and the establishment, in an incomplete state, was offered for sale, probably without having made any glass.

In August, 1808, Mr. Thomas Bakewell and his friend, Mr. Page, who were visiting Pittsburgh at the time, were induced to purchase the works on the representation of Mr. Ensell that he thoroughly understood the business. This was the beginning of the firm of Bakewell & Page, that by itself and successors has continued the manufacture of flint-glass to the present, Bakewell, Pears & Co., their direct successors, reporting to the present census. (*d*)

Mr. Bakewell soon found that the representations made to him as to the skill of the workmen he relied upon were not borne out, and he was forced to rely upon his own good judgment and his diligence in obtaining information about the business. The difficulties he met with would have disheartened a less determined man, and the lack of skill on the part of his workmen and the inferiority of the material interfered at first with his success. His furnace was badly constructed; his workmen were not highly skilled, and would not permit the introduction of apprentices, and his materials were procured from a distance at a time when transportation was difficult and expensive, pearlash and red lead coming from Philadelphia, and pot-clay from Burlington, New Jersey, all being transported over the mountains in wagons. The sand was obtained near Pittsburgh, but was yellowish, and up to this time had only been used for window- and bottle-glass; the saltpeter from the caves of Kentucky until 1825, when the supply was obtained from Calcutta. These difficulties were in time overcome. Good clay was procured from Holland, and purer materials were discovered; and he rebuilt his furnaces on a better plan, competent workmen being either instructed or brought from Europe, and through his energy and perseverance the works became eminently successful. There can be no doubt that Mr. Bakewell is entitled to the honor of erecting and operating the first successful flint-glass house in the United States.

The furnace built or completed in 1808 held six 20-inch pots. This was replaced in 1810 by a 10-pot furnace, (*e*) and in 1814 another furnace of the same capacity was added to the works. The establishment was burned down in the great fire of 1845, but was immediately rebuilt. The site is now occupied in part by the Baltimore and Ohio railroad depot, the brick part of the depot being a part of the old warehouse.

The success of Messrs. Bakewell & Page induced others to embark in the business. In 1809 another flint-glass house was built, which produced glass on a limited scale, and in 1810 another company was formed, but failed in a short time. In 1812 another works, making the fourth in four years, was built. (*f*) It would thus appear that the manufacture of flint-glass increased much more rapidly than that of window-glass, as at that time there was in Pittsburgh only the O'Hara window-glass works, started in 1797.

In 1810 the manufactures of the United States began to attract considerable attention, and for the first time the census returns include a statement of manufactured articles. In this year Mr. Albert Gallatin, then

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a These decanters were known as "big-bellied bottles", and were made out of the "corner pots" of the window-glass houses even later than 1837. Mr. Isaac Craig writes me: "I recollect distinctly seeing both tumblers and decanters made of green glass. In old times decanters were used in every house, most commonly by the poorer families, who could not afford cut glass. Whisky was set out to every visitor in these decanters, and before and after every meal. Although of green glass, they were not cut, but ornamented by beads around the neck." These beads were probably pinched on while the glass was still plastic.

b The only evidence I have been able to find that this works ever existed is that contained in Thurston and Bishop. Mr. Thomas Bakewell, who came to Pittsburgh and entered into the glass business in 1808, and who was authority on the early history of glass-making in that city, seems to have had no knowledge of such a works, and speaks of Robinson & Ensell's attempt as the first.

c Jarves, in his *Reminiscences*, who got his information from Mr. Thomas Bakewell, says 1808; but in Cuming's *Tour*, published in Pittsburgh in 1810, is a statement, p. 222, in regard to Pittsburgh, that "an account of the manufacturers and tradesmen was taken in the fall of 1807, the result of which was * * * a glass works for green glass on the opposite side of the Monongahela, another just erected for white glass on the town side of the same river". This latter undoubtedly was the Robinson & Ensell works.

d Since the census year the firm has gone out of existence, after nearly three-quarters of a century of business life.

e See Jarves' *Reminiscences of Glass-making*, to which I am indebted for many of the facts about Mr. Bakewell and his works.

f Jarves' *Reminiscences of Glass-making*, p. 72.

Secretary of the Treasury, made a report to the House of Representatives on our industries, in the course of which he mentioned that "two works, employing together six glass-blowers, had lately been erected at Pittsburgh, and made decanters, tumblers, and every other description of flint-glass of a superior quality".

The Pittsburgh window-glass works is also mentioned, and it is stated that all of this kind of works in the country, with the exception of "that of Pittsburgh", used wood as fuel, the latter using coal. According to the census returns for 1810, there were three glass works in Pittsburgh that year which produced $62,000 in value. If Gallatin's statement is correct, two of these were flint works, and one manufactured window-glass and green bottles. (*a*)

Concerning the condition of glass-making in Pittsburgh in 1813 and 1814 Cramer's *Navigator* (*b*) states:

> The manufacture of glass has succeeded as well as the most sanguine had expected. The situation of this place is particularly favorable, notwithstanding some disadvantages in procuring some of the materials. The first was established by Colonel O'Hara about the year 1798. (*c*) There are two glass works on the opposite side of the Monongahela, erected by Trevor & Ensell, and one in the new town of Birmingham, under the firm of Beltzhoover, Wendt & Co. These, with the three before erected, to wit, O'Hara's, Robinson's, and Bakewell's, will be able to manufacture to the amount of $160,000 annually. Both flint and green glass are now made here to great perfection. Messrs. Bakewell, Page & Bakewell have lately built another flint-glass works in addition to their former one. There are now in the town and opposite two white and three green glass houses. Glass-cutting is likewise executed in this place not inferior to the best cut-glass in Europe. The furniture of the apothecaries' shops is altogether of home manufacture.

This extract would indicate that some of the flint houses had gone out of existence and capital invested in glass-making was wisely turned to the branches that promised profit.

The number of glass houses after this increased so rapidly that it is impossible to enter into the details of the history of each. In 1819, according to the memorial adopted at a town meeting and sent to Congress, the manufacture of glass in Pittsburgh had rapidly declined since 1815. At the latter date 169 workmen were employed, producing $235,000 in value of glass annually, while in 1819 the number had fallen to 40, producing but $35,100, and the statement is made that in flint-glass alone the reduction was $75,000. (*d*) In 1820 the census reports the product of "glassware and colored flint" as $20,000, and of "glass, window and hollow", as $24,000. In Fayette county, at the same time, there were three establishments making window-glass and hollow ware. In 1826 there were eight window-glass works in western Pennsylvania, producing 27,000 boxes (100 feet) of glass per annum, valued at $135,000, and, in addition, $30,000 worth of flint ware was made. In 1831 (*e*) there were four flint houses, with thirty-two pots, and four window-glass houses at Pittsburgh, four or five at Brownsville, one each at New Geneva, Bridgeport, New Albany, Perrypolis, and Williamsport, making window-glass, and one at the latter place making hollow ware. Mr. Bakewell at this time estimated that the value of glass produced in western Pennsylvania was more than $500,000 annually. In 1837 there were thirteen factories in Pittsburgh and its immediate vicinity, six flint and the balance window-glass or green hollow ware, making about $700,000 worth. Among these were the Sligo works of William McCully, established in 1828, and continued at the present day by W. McCully & Co.; the flint-glass works of Curling & Price, known as the Fort Pitt glass works, established in 1830, now carried on by their successors, E. D. Dithridge & Co.; and the window-glass factory of F. Lorenz, now continued by Thomas Wightman & Co. Twenty years afterward, in 1857, there were thirty-three factories at Pittsburgh, of which nine produced flint-glass and twenty-four window, green, and black glass to the value of $2,631,990, employing 1,982 hands, whose wages were $910,116, consuming material to the amount of $2,078,734 40. In 1865 there were fifteen bottle and vial factories, fifteen window-glass factories, and fifteen flint-glass works in Pittsburgh, being forty-five glass houses in all; an increase of 36 per cent. in eight years. These fifteen window-glass works, located immediately at Pittsburgh, had a capacity to make 520,000 boxes of glass in a year, but their average yield was about 400,000 boxes, whose entire value at that time was $2,600,000. The fifteen green or vial works produced annually about 420,000 gross of vials and bottles, worth, at the then rate, $2,100,000. The pressure upon these works at that time is best shown by the fact that, although only customary to run them for ten months in the year, yet many of them had run twenty-one months without stopping. The fifteen flint-glass works then in operation at Pittsburgh produced about 4,200 tons of glassware, worth then, in round numbers, $2,000,000. Their capacity was, however, double the amount produced, or about 8,000 tons. (*f*)

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a Cramer's *Navigator*, published in 1814, states that in 1810 there were two white and one green glass works in Pittsburgh.

b The copy of Cramer's *Navigator* from which this statement is taken bears the date 1814, though the preface was written in 1811. The statement probably refers to 1813 or 1814, as the work was revised and published in several editions.

c This should, of course, be 1797.

d *Address of the Philadelphia Society for the Promotion of National Industry*, p. 257.

e *Report of the New York Tariff Convention*, 1831, p. 121.

f *Pittsburgh and Allegheny in the Centennial Year*. By G. H. Thurston.

Below, I give in a tabulated form such statistical information as I have been able to gain as to the glass works of Pittsburgh from 1797:

Date.	WINDOW AND BOTTLE.		WINDOW.		FLINT.		GREEN BOTTLE.		ALL KINDS.	
	Works.	Value.	Works.	Value.	Works.	Value.	Works.	Value.	Works.	Value.
1797			1	$10,000					1	*$10,000
1800			1	10,000					1	*10,000
1803	1	$12,500							1	12,500
1810	1	40,000			2	$30,000			3	70,000
1812									3	62,000
1813									5	170,000
1815									5	235,000
1817	3	130,000			2	110,000			5	240,000
1819									5	35,100
1826		†135,000				100,000			7	235,000
1831	4				[illegible]				8	500,000
1837			5		6		2		13	728,000
1840									10	
1850			11		8		7		26	
1857			7		9		9		25	2,631,990
1860			5	$875,520					18	‡2,075,143
1865			15	2,600,000	15	2,000,000	15	$2,100,000	45	§6,700,000
1870									32	‡5,832,429
1876			24		41		11		‖76	
1880			12	1,632,687	30	3,215,038	9	820,487	51	5,668,212

* Estimated.

† 27,000 boxes made.

‡ From the census, and evidently incorrect.

§ Evidently estimated.

‖ Number of furnaces, not of works.

At the present census, as will be seen by an examination of the tables, Allegheny county stands first as a glass-making center. Its statistics are as follows:

Kinds of glass.	No. of establishments.	Capital.	No. of furnaces.	No. of pots.	NUMBER OF EMPLOYÉS.				Total wages paid.	Value of materials used.	Total value of product.
					Total.	Males over 16.	Females over 15.	Children and youths.			
Window-glass	12	$1,880,000	23	216	1,133	1,101		32	$809,842	$576,638	$1,632,687
Glassware	30	2,744,500	51	496	4,069	2,691	129	1,249	1,500,833	1,180,851	3,215,038
Green glass	9	856,500	11	85	851	650	12	189	375,750	382,169	820,487
Total	51	5,481,000	85	797	6,053	4,442	141	1,470	2,686,425	2,139,658	5,668,212

It will thus be seen that this county had 24.17 per cent. of the total number of glass establishments of all kinds in the country, 27.62 per cent. of all the capital invested, and produced 26.79 per cent. in value of the products. It had 20.69 per cent. of the number of window-glass establishments, but 37.96 per cent. of the capital invested in window glass, and produced 31⅔ per cent. of the boxes of glass made, and 32 per cent. of value of product. In flint-glass and glassware Allegheny county had 32.97 per cent. of the number of establishments, 37.04 per cent. of the capital invested, and produced 33.60 per cent. of the value of this kind of glass made. In green glass this county had 16 per cent. of the establishments, 17.50 per cent. of the capital invested, and made 14⅗ per cent. of the green glass produced. Of the total of the entire country in the three classes named—window, flint, and green—Allegheny county had 24.88 or 25 per cent. of the establishments, 31.76 or 32 per cent. of the capital, and made in value 28 per cent. of all the product.

It should be noted that these calculations do not include plate-glass, of which none is made in this county, nor do they include the works in Fayette and Beaver counties, which have their offices in Pittsburgh.

While the figures show that the proportion of the glass of the United States made in this county is not so great as has been supposed, it indicates that of all the great industries of the country it is the one that produces at Pittsburgh the largest proportion.

GLASS-MAKING IN MASSACHUSETTS.

The history of the beginning of the manufacture of glass in Massachusetts is involved in some doubt. Bishop, in his *History of American Manufactures*, states that the earliest works was built in a part of what is now the town of Quincy, but in this he is probably mistaken, as the Salem works were undoubtedly the first. He assigns no date to this Quincy works, but Appleton's *Cyclopœdia* gives it as about 1750. This works was, like most of the other early ones in this country, built by Germans, (*a*) and its site is known to this day as Germantown. Only black bottles were made, some specimens of which still exist, which are of very poor metal and of rude make. The proprietors failed some years before the Revolution, and the house having burned down, it was never rebuilt. (*b*)

The first glass house in Massachusetts, and the first to which a date can be assigned, was erected in Salem about 1639. In this year Ananias Concklin, Obadiah Holmes, and Lawrence Southwick received two acres of land each "adjoining to their houses", which was granted to them as "glass men", for the purpose of promoting the manufacture of glass. The next year John Concklin, another "glass man", was allotted five acres more bordering the previous grants.

In December, 1641, the general court, for the encouragement of the enterprise, authorized the town of Salem to lend the proprietors £30, which was to be deducted from the next town rate, and the glass men were to repay it, "if the work succeeded, when they were able."(*c*) The works having been neglected for three years, the Concklins, in 1645, received permission from the court to form a new company to carry on the business.(*d*) Glass was for a considerable time afterward manufactured at that place, which is mentioned in the *Colonial Records*, in 1661, as the Glass House field. In this, and those which for many years succeeded, it is probable that nothing more was attempted than the manufacture of bottles and other coarse descriptions of glass.(*e*)

Assuming the date assigned to this works to be correct, it certainly displayed a great deal of enterprise in the infant colony to thus early undertake the manufacture of glass, and, though the products were coarse, they answered the purposes of the colonists. Window-glass could be imported from England of a much better quality than could be made, but bottles were so bulky and so liable to breakage that they could be made to advantage in competition with the works of the mother country.

The history of the glass works of New England is involved in doubt for some years after this, but it is probable that a works was built at Boston just prior to the Revolution, as Lord Sheffield, writing at the close of the war, says: "A considerable glass manufacture at Boston failed there several years ago." In December, 1752, the general court passed an act granting Isaac C. Winslow and others the sole privilege of making glass in the province. It is probable that this works was established at Boston, and that it was this failure to which Lord Sheffield refers. However this may be, Boston again began the manufacture of glass shortly after the Revolution, and this time with great and long-continued success. This new enterprise, the Boston Crown Glass Company, which was the first really successful glass works in the country, was greatly encouraged by the very liberal action of the state. In July, 1787, Messrs. Whalley, Hunnewell, and others received from the legislature a charter conferring upon them the exclusive right to manufacture glass in Massachusetts for fifteen years, and a fine of £500 was attached to any infringement of this right. The capital stock was exempted from all taxes, and the workmen from all military duties. Jarves also states that to counteract the effect of the bounty paid by England on the exportation of glass from that kingdom the state paid the proprietors of this works a bounty on every table of glass made. A pyramidal factory of brick was erected on a large scale at the foot of Essex street; but being found ill-adapted to the purpose, it was afterward taken down and a wooden one, lined with brick, differently constructed, was put up in its place, its dimensions being 100 feet in length by 60 in width. On account of difficulties in procuring workmen and other embarrassments operations were not fully commenced until November, 1792.(*f*) The corporation commenced with the manufacture of crown window-glass, which was of a quality equal or superior to any imported. Materials were found to be abundant, and some six years later they produced about 900 sheets per week, worth $1 75 per sheet, or $82,000 per annum. (*g*)

This works was incorporated as the Boston Crown Glass Company in 1809. Regarding the success of this company Mr. Jarves says:

> The state bounty had the effect to encourage the proprietors and sustain their efforts, so that by perseverance many difficulties were overcome and a well-earned reputation supported for the strength and clearness of their glass; a glass superior to the imported, and well known throughout the United States as "Boston window-glass". This reputation they steadily sustained, until they made glass in their new works at South Boston in the year 1822.

The early success of this works led to the establishment of others in various parts of the country, and many of the workmen of the Essex-street house were enticed away by flattering offers. In 1811 the proprietors of the Essex-street works erected large and improved works on the shore at South Boston, and to supply the workmen enticed away, as also to meet the wants of their factory, an agent was sent to England to procure a set of glass-workers. By the time they reached this country the war with England broke out, and the enterprise was defeated;

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[a] It is an interesting fact that some or all of the workers in the first glass houses of Virginia, Maryland, Pennsylvania, and New Hampshire were Germans.

[b] See Jarves' *Reminiscences of Glass Making*, p. 53. Also *Mass. History Col.*, vol. iii, p. 276.

[c] Felt's *Annals of Salem*.

[d] *Colonial Records*, vol. i, 344; ii, 137.

[e] See Bishop's *History of American Manufactures*, vol. i, pp. 233, 234.

[f] Mr. Jarves says in 1803, upon the arrival of a German by the name of Lint (probably Lindt).

[g] See Bishop's *History of American Manufactures*, vol. i, p. 241.

for it became difficult to procure fuel and the various means for carrying on the Essex-street works. After the war operations were resumed and continued until 1826, when from bad management the company failed.

In 1802 glass works were established at Middlesex village, then in the town of Chelmsford, but now a part of Lowell, by Hunnewell & Gore, of Boston. Window-glass was the chief product, though some other glass was made. Allen's *History of Chelmsford*, published in 1820, states:

> On the east bank of Middlesex canal, a distance of 200 rods from Merrimack river, a large building, 124 feet long and 62 feet wide, with necessary appendages for manufacture of window-glass, was erected in 1802.
>
> Near it is a two-storied house, handsomely finished, designed for the residence of the overseer, and around it, at convenient distances, a number of smaller houses for the accommodation of the workmen and their families.
>
> There are appertaining to this manufactory about 20 families, consisting of 40 men, 20 women, and 40 children—100 in all. It is now in a flourishing state. About 330,000 feet of window-glass are annually made, or 3,300 boxes of 100 feet each, which, at $13 per box, will amount to $42,900.
>
> The situation is very favorable for transportation to Boston, and those raw materials from thence which it would be expensive to convey by land. A ready and cheap supply of wood is also easily obtained, of which it is estimated that about 2,000 cords are annually consumed in the manufactory and houses attached to it.
>
> The manufactory consists of two furnaces, three flattening ovens, two tempering ovens, six ovens for drying wood, cutting, mixing, and pot rooms, a kiln for burning brick, a mill-house, and sand-house.

The proprietors failed about 1827 or 1828; the works were also burned about this time. In 1828 a corporation was formed and the works rebuilt, but it is uncertain if glass was made before 1829. In 1839 the works were abandoned and moved to Suncook village, Pembroke, New Hampshire. The process of manufacture at this works is thus described: (*a*)

> The process was to mix Morris river (New Jersey) or Massabesic lake (New Hampshire) sand with lime, sal-soda, black and white salts, etc.; no sand was ever procured for the purpose in this region. Ten large pots were heated from one furnace, each pot making about 500 surface feet of glass per "melt", and there were on an average about twenty-five "melts" per month, running nine months of the year. The glass was first blown in cylindrical shape, like a long piece of stove-pipe, then cut along one side lengthwise and flattened.

Various other attempts have been made in eastern Massachusetts to establish the manufacture of window-glass, the details of which I have not been able to ascertain. In 1860 a large establishment, the Boston crystal glass works, was erected at South Boston for the manufacture of sheet window-glass. This was followed by several smaller ones, but they all failed to make glass at a profit, and were abandoned. As an illustration of the losses frequently met with in these manufacturing experiments, it may be stated that the plant of this Boston crystal glass works, which cost about $186,000, after lying idle for fifteen years, was sold in 1881 for $60,000 to the Walworth Tube Manufacturing Company. All the window-glass works in this section have been abandoned, and in the census year the only one in operation in the state was in the western part, in Berkshire county.

Through the kindness of Mr. A. T. Servin, of Lenox Furnace, who has been closely identified with the glass industry of that section, I am enabled to give some details of the attempts to establish its manufacture in western Massachusetts. In 1812 a window-glass factory was started at Cheshire, probably the first attempt at the manufacture of glass away from the seaboard, and about the same time another was built in the near town of Chester Factory. These were brought into existence by the war of 1812, and owing to the superior quality of the sand were located at this place. Both of these ran but a short time. In 1850–'51 a window-glass factory was started at Cheshire, ran about two years, and was changed to a plate-glass factory. It has since been used for window-glass, but is now abandoned. In 1853 a factory was started at Berkshire. This is still in successful operation, and is the only works that made window-glass in New England in the census year. In 1853 another factory was started at Lenox Furnace, but this was changed to plate-glass; and in 1869 still another works was built at this place, which ran for about two years, but is now abandoned.

The beginning of the manufacture of flint-glass in Massachusetts was an outgrowth of the Essex-street factory. Among the workmen brought to this country to operate this works were a number who were not only skilled window-glass blowers, but were flint-glass workers as well. When the window-glass works were compelled to suspend operations in part, owing to the difficulty of procuring materials during the war of 1812, a number of blowers were thrown out of occupation. Among these was Mr. Thomas Caines, who was still living when Mr. Jarves wrote his *Reminiscences*. Mr. Caines, who was not only a skilled blower, but an admirable manager, and was also well acquainted with the art of mixing glass and the proportions employed, prevailed upon the proprietors of the window-glass works to build a small six-pot flint furnace in a part of their unoccupied works at South Boston. This establishment found full employment during the war of 1812. It, however, was compelled to cease operations, and though several attempts were made to operate it between 1820 and 1840 they were unsuccessful. About the same time that this South Boston factory was built the Porcelain and Glass Manufacturing Company was incorporated and built a flint-glass house at East Cambridge. The furnace was a small six-pot one, and workmen were brought from abroad to work it; but it proved a failure. In 1815 some workmen left the South Boston factory, leased this furnace at East Cambridge, and commenced the manufacture of flint-glass under the firm name of Emmet, Fisher & Flowers; but want of harmony among the members of the firm led to a dissolution, and in 1817 the Porcelain Company disposed of their works at auction. These were bought by the New

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[a] See *Vox Populi*, Lowell, Massachusetts.

England Glass Company, which was incorporated in 1817, and from these works has been produced glass the equal of that made in the best English flint houses. This works, when it first started, had a small six-pot furnace, each pot holding about 600 pounds of batch. Some forty hands were employed, and the yearly product was about $40,000. Bishop, in speaking of these works in 1818, which he calls "one of the most extensive flint-glass manufactories in the country", says:

> Two flint-glass furnaces and twenty-four glass-cutting mills, operated by steam, and a red-lead furnace, capable of making two tons of red lead per week, enabled them to produce every variety of fine, plain, mold, and the richest cut glass, as Grecian lamps, chandeliers for churches, vases, antique and transparent lamps, etc., for domestic supply and exportation to the West Indies and South America. Virginia coal, New Orleans lead, Delaware sand, and other native materials were used. The capital was about $80,000, and the annual product $65,000.

In 1823 it is stated that 22,400 pounds of glass vessels per week were made, many of which are beautifully cut, and were sent into Boston and other places for sale. Writing of these works in 1865, Mr. Jarves states that five furnaces were run, averaging ten pots each, with a capacity of 2,000 pounds to each pot. Five hundred hands were employed, and the yearly product was $500,000. This works is still in existence, but is leased to Mr. W. L. Libby, who runs only a portion of it. Its reputation for the excellent quality of its glass is still very high.

In 1825 ground was broken for a flint-glass works at Sandwich, and in three months they commenced blowing glass. These works also commenced in a small way with an eight-pot furnace, the weekly melts being some 7,000 pounds; but at the time Mr. Jarves wrote his *Reminiscences* the weekly melts had been increased to about 100,000 pounds, and the one furnace, with eight pots, to four with forty pots.

In 1865 Mr. Jarves states that two flint-glass establishments were in operation in East Cambridge, three in South Boston, and one in Sandwich. At the present time there are six glassware establishments in Massachusetts, of which one was entirely idle and virtually out of existence and another idle in part.

Some of the most interesting chapters in the history of glass in Massachusetts are those recording the successes and defeats connected with the manufacture of plate-glass. These are given in detail in that part of this chapter treating of plate-glass. Here it is only needful to say that these attempts began at Cheshire in 1852–1853. The works was changed from window-glass to plate-glass, run for about two months, and was then moved to Brooklyn, New York. The second effort was at Lenox Furnace. These works, after passing the vicissitudes narrated elsewhere, are still in existence.

Though at one time Massachusetts was in the foremost rank of glass-producing states, the lack of fuel has caused it to fall in the rear as to amount of product. In some lines as to quality, however, it is still unsurpassed.

GLASS-MAKING IN NEW HAMPSHIRE.

Glass-making in New Hampshire dates from near the close of the revolutionary war. In May, 1780, Mr. Robert Hewes, of Boston, began the erection of a glass works in the town of Temple, and in the autumn or early winter he started his fires. At this time glass was in good demand in the rebellious colonies. England, of course, prohibited all exportation from her ports, and the severity of the blockade prevented the glass of other countries from reaching this in any quantities. Indeed, the holds of the blockade runners would scarcely find space for glass, when powder and shot were more in demand.

Mr. Hewes, who had been left by his father quite a fortune, determined to undertake the manufacture of glass. Having secured a number of German Hessians and Waldeckers, who were skilled glass-workers in their own country and had formed part of the mercenaries sent to this country with the British army, and who had deserted from it, he started this Temple works; but the building was hardly completed when it was burned down. This was a serious blow, but to prevent the abandonment of the enterprise the people of Temple came to Mr. Hewes' assistance, and the works were reconstructed. Then frost shattered the furnaces so that they would not stand the fire, and they gave way at the first melt. (*a*)

To add to his difficulties as a result of these delays and loss his capital was seriously impaired and money was needed to continue the enterprise; but the people of Temple had no money to lend, and did not choose to invest it if they had. Mr. Hewes petitioned aid from the state, asking "freedom from taxation on his buildings", exemption of taxes for his men, and the granting of a bounty upon the glass produced. January 2, 1781, the house of representatives of New Hampshire voted to receive and accept Mr. Hewes' petition, but postponed the paying of bounty till good window-glass could be successfully produced.

The persistence of Mr. Hewes is best illustrated by the following petition made to the selectmen of Temple in the winter of 1781, written from Boston:

> GENTLEMEN: After due respects, hoping these will find yourselves and families *well*, they are to inform, that, being almost discouraged by the misfortunes I have met with & the little spirit of the People to encourage me, I am almost determined to drop all thoughts of prosecuting the Glass-Manufactory in Temple, for why should I strive to introduce a Manufactory to benefit a people that has not spirit enough to subscribe a trifle to encourage it, when I have met with a misfortune—for if the Business ever comes to perfection it will be a greater service to the *country* than it possibly can be to *me*, even if I make my fortune? But, Gentlemen, *it was not money only*, that

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a These facts concerning Mr. Hewes' enterprise are condensed from a paper on "Glass-making in the Merrimack Basin", published in *Contributions of Old Residents' Historical Association*, Lowell, Massachusetts, vol. ii, No. 2.

induced me, but it was because I was satisfied I could do it, & in so doing serve my country most essentially—more especially your Town. You will do well, Gentlemen, to consider this is not a thing for a moment, but it is laying a foundation for the good of Posterity; for certain *I am* if my Glass-works are brought to perfection, they will soon be as universal as the Iron works, or many others; as I said to Esquire Blood the other day, "that the Glass-makers should be employed, if it were only to steal their art."

I think the Town of Temple, as a Town, will be highly culpable if they let this matter slip without a struggle. But it is not for me to point out the advantage you are all sensible of.

What I have to say is what will your Town do to encourage the matter? I shall have to send 60 miles for stones to build my melting furnace, which will take eight teams, & then all the other furnaces are *to be rebuilt;* but all this while, the Glass-makers and families are to be supported, which will be a costly affair.

Your court will make a Lottery, I suppose, but that will be a thing of Time. Can I be credited for one or two Carcasses of Beef, till the Lottery is drawn, or what way can you think of to help me till the works are set a going?

I should be glad to know your opinion of the matter as soon as possible, so that I may know what to determine.

From Your Friend and Humble Servant,

ROBERT HEWES.

P. S.—Mr. Ashley will wait upon you with this and receive your answer, and transmit it to me as soon as possible.

R. H.

P. S.—If I could be properly encouraged, I would come up in the *Spring* and work at it myself till it comes to perfection.

MARCH 5, 1871.—The Town voted to advance upon a loan to Mr. Hewes £3000, with good security, to be assessed in two months, and collected as soon as may be.

On the same day, March 5. Mr. Hewes' agent at the glass house wrote to the selectmen "requesting provisions".

March 11, Mr. Hewes writes to the selectmen from Boston, declining the loan of £3,000, if security is required; states he will not assume any further risk or responsibility; that ten times that sum could be secured in Boston if he wanted it, but that he had determined to recede immediately, and proposed to sell his interest in the works at a low price; had resolved to do nothing further except bring down the workmen, if nobody appears to purchase the houses and tools.

March 24, in a letter from Boston, Mr. Hewes proposes to the selectmen that he be supplied money on a loan, on the strength of the lottery, for which he seems to have petitioned the general court of New Hampshire, and requests that his glass-blowers be furnished with supplies for subsistence.

It was not till March 30, 1781, that the lottery act was passed, giving leave to raise £2,000, new emission, for the Temple glass works, and appointing three men to conduct the lottery and report their proceedings and account to the general court within one year. A fac-simile of the lottery tickets may be found on page 171 of the *History of Temple.*

The tickets would not sell, and I have no statement what their prize was to be. I infer the great obstacle to the success of the lottery to have been want of faith in the glass works, and as a result Mr. Hewes abandoned the enterprise. The works made both window-glass and glassware, and some of its products, among them a glass plate, are preserved in Harvard University.

There is no record of any further attempt to make glass in New Hampshire until 1814, when by an act of the legislature, passed on June 24 of that year, the New Hampshire glass factory was incorporated at Keene. This works made only cylinder window-glass, and the census of 1820 reports it as having a capital of $25,000, paying out $11,400 for materials, $10,000 for wages, $500 for contingent expenses, employing twenty men and five youths, and producing $30,000 worth of window-glass from 1,825 bushels of sand, 200 barrels of lime, 547 bushels of salt, and 36 tons of potash. In the hands of its original owner the enterprise was not successful, and passed under the control of other parties, who, in turn, disposed of it to others. From 1847 to 1851 the works were operated by J. D. Collony, when they were finally abandoned, no part of them remaining.

In 1817 a factory was started in the same town (*a*) for the manufacture of "black and flint bottles" by Justin Perry. This was operated until 1848, when it ceased work, for the same reason that the window factory was abandoned—the high price of fuel.

In 1840 Mr. William Parker, who had been operating a window-glass works at Middlesex village, Massachusetts, then a part of Chelmsford, but since annexed to Lowell, removed it to Pembroke, New Hampshire, where he built a brick glass house for window-glass. The motive for moving the works from Chelmsford to Pembroke was the reduced cost of supporting the workmen, ease of obtaining cheap fuel, and close proximity to an abundant supply of sand at Massabesic pond, in Chester, now Manchester. These works were carried on from 1839 to 1850, but were by no means a success in their new location, the expected supply of suitable sand proving a delusion, that from Massabesic producing glass of so dark a color, by reason of iron, that it was unsalable, and sand from the Maurice river, New Jersey, was the only resort, with increased cost for transportation. The revision of the tariff in 1845 brought another disaster, the duty on imported glass being made so low that the country was supplied with European glass at less price than the cost of production here. In 1848 the manufacture of sheet window-glass was abandoned and that of crown glass undertaken, but with no success, and in 1850 its manufacture was abandoned.

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[a] This is the account I have received from Mr. William S. Briggs, of Keene. Bishop, in his *History of American Manufactures,* published in 1868, vol. ii, p. 206, speaking of the year 1814, says: "A glass manufactory was this year incorporated in Keene, New Hampshire, where it is still (1868) a principal business." This is probably an error.

In March, 1866, a glass house for the manufacture of bottles was built at South Lyndeborough, New Hampshire. This works is still in existence. Its characteristics and product will be found in the tables of this report.

GLASS-MAKING IN NEW YORK.

According to Bishop's *History of American Manufactures*, among the early settlers on Manhattan Island was a glass-maker, Jan Smeedes, who is supposed to have been among the first to receive an allotment of land on the present South William street, between Wall and Pearl. He probably carried on the business of glass-making on the east side of the street, just north of Hanover square. This street formerly bore within the above limits the name of "the Glass-maker's street", and afterward Smee street, from its original occupant. Of the history of his works no account has been found. In addition to this early works at the southern end of the island there seems to have been a glass house located between Eighth and Eleventh avenues and north of Thirty-fourth street, as on De Witt's farm map of New York about 1732 there is an estate called "the glass-house farm". The first of these works must have been built early in the seventeenth century, at least during the Dutch occupation of the island, which ended in 1664. It would thus appear that New York, equally with Virginia, Pennsylvania, and Massachusetts, counted glass-making among its very earliest industries, dating not much after the first colonization.

From this time for nearly a hundred years no records of the existence of any glass works have been found; but no doubt there were some factories in operation at various points and at various times in this state, as well as in other states, though glass-making flourished but poorly in these early times. In 1754 a glass works was erected by a Dutch gentleman by the name of Bamber in Brooklyn, probably the first in Kings county, which now ranks second as a glass-producing center in the United States. The Historical Society of that city have in their cabinet a glass bottle having blown on it the name of Mr. Bamber and the date 1754, (*a*) "the first one," so the record reads, "manufactured at the glass works started in 1754 on the site of the present glass works on State street. This enterprise, we are informed, was brought to an untimely end for want of sand; that is, the right kind of sand." From this statement regarding the sand Mr. Jarves is led to believe that the bottle must have been of flint-glass, and the works a flint-glass works, as sand suitable for green or black glass abounds on the shore near its location. This, however, would not be conclusive evidence of the fact that they were flint works, as we have no doubt that in those days, as at the present time, reasons which are not at all the correct ones were frequently given for the failure of manufacturing establishments.

Governor Moore, in a letter to the Lords of Trade and Plantations, dated Fort George, New York, January 12, 1767, says:

> The Master of a Glass House, which was set up here a few years ago, now Bankrupt, assured me that his ruin was owing to no other cause than being deserted in this manner by his servants, which he had imported at great expence; and that many others had suffered and been reduced as he was by the same kind of misfortune. (*b*)

To what works Governor Moore referred does not appear.

From this time until 1785 I have not been able to find any other record, when, as the evils of large importations began to be seen and felt, and the advantage of establishing domestic industry became impressed upon the minds of the inhabitants of this country, efforts were made in New York, as in the other colonies, to re-establish the manufacture of glass. In April, 1786, specimens of white glass made at the glass house that had lately been erected in Albany were presented to the American Philosophical Society. Mr. Elkanah Watson, in his *Reminiscences of Albany*, published in 1788, mentions a visit to the new glass house, erected by John De Neufville at a place about eight miles from Albany. Mr. De Neufville, who was a Dutch gentleman, and had been active on behalf of the American colonies during the revolutionary war, having sacrificed in their behalf nearly the whole of a fortune of a half-million sterling, invested the small amount remaining in what Mr. Watson terms the "hopeless enterprise" of a glass house. (*c*) In January, 1785, Leonard De Neufville and his associates, the proprietors of a glass factory situated at Dowesborough, in the midst of a well-wooded pine forest, described as 10 miles from Albany, and which was probably the same works as that referred to by Mr. Watson in his memoirs, applied to the legislature for aid in their undertaking, urging as a reason for this assistance that £30,000 were sent abroad annually for glass. (*d*) They also stated that they were able to manufacture any size superior to English glass. This expression would lead to the belief that the works was a window-glass works. In 1793 the legislature of New York voted a loan of £3,000 for eight years to the proprietors, three years without interest and five years at 5 per cent; but by this time the works had passed out of the possession of the De Neufville family. In *The Appolo*, published at Boston, under date of September 28, 1792, appears the following regarding this works:

> We learn from Albany that the glass works erected several years ago within a few miles of that city, and which has been deserted ever since for want of *cash*, is now owned by Messrs. McCallen, McGregor & Co., who have completely repaired it, supplied it with every material, and are now manufacturing and advertising for sale *window-glass* of every dimension. They want a good *flint-glass maker*. As this manufactory must be of great public utility, it is to be presumed they will receive the greatest encouragement from all (American) glass dealers. (*e*)

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a Stiles *History of Brooklyn*, vol. i, page 309.

b New York *Colonial Documents*, vii, page 889.

c See Munsell's *Annals of Albany*, vol. x, pp. 219, 220.

d See Munsell's *Annals of Albany*, vol. ii, p. 205.

e Quoted from *The Appolo*, p. 416, by *The Historical Magazine*, 2d S., vii, p. 16.

The new proprietors, McCallen, McGregor & Co., offered in 1793 a reward of $50 for the discovery of a bank of sand suitable for their use situated within ten miles of their works. In 1796, for the purpose of consolidating and extending the operations, a village ten miles west of Albany was laid out and named Hamilton, in compliment to Alexander Hamilton, and in the spring of 1797 the Hamilton Manufacturing Company was chartered by the state, and the company and its workmen exempted from taxes for five years. This works was one of the most extensive glass works at that time in the United States. Beside other enterprises in other lines of industry, they had two glass houses, with three large furnaces, employing about thirteen glass-blowers, and making an average of 20,000 feet of window-glass per month, beside bottles and flint-glass. It is stated that they substituted kelp for pearlash in the manufacture of glass. Their glass, however, was in good repute, and the business was actively carried on for some years. Munsell states that this works suspended in 1815 for want of fuel. (*a*)

The next factory of which I have been able to find any record is the Rensselaer glass factory, which was incorporated by the legislature of the state March 21, 1806. In 1809 two more glass works—the Madison and the Woodstock Glass Manufacturing Associations—were also chartered, but I have not been able to find any details of either. In the census for 1810, however, four glass works are reported: one in Albany county, two in Rensselaer, and one in Ontario. These works made that year 3,805,000 square feet of glass, which was valued by the marshals at 16 cents per square foot. In 1810 or 1811, according to Mr. Jarves, a company was formed in Utica for the manufacture of window-glass, and quite a number of workmen from the Essex-street works (Boston, Massachusetts) were induced to leave their employment and break their indentures by the offer of increased wages, but while they were on their way to the New York house, and just before they reached the state line, they, with the agent of the Utica works, were arrested, brought back, and an expensive lawsuit resulted. Mr. Jarves states that the latter works were abandoned and never revived. In the private journal of De Witt Clinton for the year 1810, when, as one of the commissioners of the state of New York, he examined the country between the lakes and the waters of the Hudson, appear several references to the glass works of the state, and under date of Geneva, August 9, 1810, he writes:

> A glass manufactory is erecting about two miles from the village. It was incorporated last winter, and a little village is already rising up around it.

One week later he writes:

> We entered the town of Vernon, in which three glass houses are in contemplation; one has been in operation some time. It is rather to be regretted that this business is overdone. Beside the glass introduced from Pittsburgh, and from a glass house in Pennsylvania, on the borders of Orange county, and the glass imported from Europe, there are ten manufactories in the state already, or about to be established; one in Guilderland, Albany county, one in Rensselaer county, three in Vernon, Oneida county, one in Utica, Oneida county, one in Rome, Oneida county, one in Petersborough, Madison county, and one in Woodstock, Ulster county.

In 1818 the manufacture of window-glass was begun at Sand Lake, in Rensselaer county, by Messrs. Crandall & Fox. This locality was selected on account of its abounding both in sand and in fuel, but a few years' trial convinced the proprietors that the place was ill-chosen, and the location was abandoned. (*b*) In 1845 Mr. Samuel H. Fox, a son of one of the proprietors of the Sand Lake works, built a factory at Durhamville, which was in existence in the census year. The Utica *Observer*, in an article published some months since, claimed for Mr. S. H. Fox, one of the proprietors of this works, and one of the oldest living glass-makers in the country, that he was the first in the country to introduce soda-ash into the manufacture of glass, as he was the first in the state to utilize coal in the furnaces and to introduce wheel ovens.

From the census of 1820 it appears that there were two window-glass factories in Madison county of this state, each containing two furnaces, with ten pots each. In Oneida county there was one cylinder window-glass factory in operation, and one crown-glass factory idle. In Ulster county there were two window-glass factories, manufacturing 800,000 square feet a year; but of these works I have not been able to find any further details. In 1820 some workmen left the New England glass works at Cambridgeport, Massachusetts, and built a factory in New York city, the business being conducted under the firm name of Fisher & Gillerland; but in 1823 the partnership was dissolved, and Mr. Gillerland built a works in Brooklyn. In 1823 there was a manufactory of glass globes at Albany "on a scale which promised to supply the United States with the article". At the tariff convention which was held in New York in 1831 three flint-glass factories, with twenty-two pots, were reported in existence in New York and vicinity, and two cylinder window-glass factories: one at Geneva, and the other at Hamilton; but of these, except the fact of their existence, no details were given. In 1832 the Redford Crown Glass Company was incorporated and began the manufacture of crown glass in Clinton county, making a very good quality until 1841, when it failed. In 1846 crown glass was again made at these works. Of the establishment and history of the later glass works no record at all has been procured.

GLASS-MAKING IN CONNECTICUT.

Information regarding the early history of glass-making in Connecticut is exceedingly meager. It appears, however, that in 1747 a patent was granted by the legislature to Thomas Darling for the exclusive privilege of making glass for twenty years. This act appears to have become void because of the patentee's failing to fulfill its

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a See Munsell's *Annals of Albany*.

b This is Mr. Jarves' statement of the close of the works. It would appear, however, from a newspaper paragraph regarding the Durhamville works, that the Sand Lake factory was in existence until 1852, when it was burned down.

conditions, and at various times after this special grants were made to others to introduce its manufacture; but how successful these were I have not been able to find out. It seems that a few years after the organization of the Essex-street factory in Boston, which was built in 1787, a glass house was in operation in Hartford, Connecticut, and from a reference in Washington's diary (1789) it would appear that glass was made in New Haven. In the census of 1820 two glass works are reported in existence in Hartford county, Connecticut, producing $27,360 worth of glass annually. Bottle-glass is also reported as made in Hartford county at the census of 1820 to the extent of $3,350 annually. At the tariff convention held in New York in 1831 a window-glass works is reported as in operation at Wellington. In the census of 1840 two establishments are reported in Tolland county, making $32,000 worth annually; one of these was probably the Wellington works. In 1850 but one establishment is reported; in 1860 two establishments in Windham county; and in 1870 three establishments. Of these works I have been able to get no information other than the fact of their existence. At the census of 1880 but one establishment was in existence in the state, the flint-glass works at Meriden.

GLASS-MAKING IN MARYLAND.

On May 26, 1790, Mr. John Frederick Amelung presented a petition to the national House of Representatives, asking that the patronage of the government be extended to his glass manufactory at New Bremen, in Maryland. This is no doubt the works to which Mr. Carroll, of that state, alluded in his speech of April 17, 1789, when he moved that a duty be placed on window and other glass, with the exception of black quart bottles. Mr. Carroll's reason for his motion was that the manufacture of window-glass had been begun in Maryland, and had been attended with considerable success, and he believed that with small encouragement it would be permanently established. Mr. Carroll's motion was successful, and in the first tariff law passed under the present Constitution a duty of 10 per cent. *ad valorem* was levied on the kinds of glass mentioned. The patronage that Mr. Amelung desired was a loan from Congress. The investigation and discussion that followed is memorable as raising, and for the time being deciding, the policy of Congress relative to bounties and protection. The committee to which was referred Mr. Amelung's petition for "patronage" reported June 30, 1790, authorizing the Secretary of the Treasury of the United States to make him a loan, not exceeding $8,000, Mr. Amelung giving satisfactory security for the reimbursement of the same within a certain number of years. In the debate which followed the presentation of this resolution a history of this gentleman's exertions in endeavoring to establish an American glass manufactory was given by Mr. Carroll. He commenced in 1775, brought into the country upward of 200 persons, mostly glass-workers, and had expended at that time over £20,000 in the undertaking. Owing to a variety of accidents, and particularly to the extraordinary rise in the price of grain, he now found himself "greatly embarrassed in prosecuting the business; but stated if he could be so far patronized by the government as to be favored with a loan of $15,000 or $20,000 it would afford him such relief as would enable him to surmount every difficulty".

Congress, however, did not look upon this appeal favorably. Some of the members doubted the constitutional power of Congress to loan money in this way; others objected to it on account of the precedent it would establish, while others urged that the encouragement and assistance could be asked for with more propriety from the state government. Mr. Boudinot gave an account of the manufactory, and said: "I have seen the glass made in it, which is superior to any ever produced in America." He contended that Congress had a right by the Constitution to loan the money, and cited several instances in point. He enlarged on the merits of the petitioner "in embarking such large property to prosecute a business of so general utility", and pointed out the consequences which would result from a "failure of this application, which would be greatly injurious to the petitioner and to the public". The report, however, was negatived, and the question between bounties and protection was virtually decided by this debate. In 1794 Mr. Amelung presented a petition for an increase of duties, and in this he was joined by others, among them Thomas Whalley and his associates, of Boston, Massachusetts. Mr. Amelung's works appears to have been originally built on Tuscarora creek, four miles above Fredericktown, and were known as the Etna glass works. Window-glass and wine-bottles were made, and it is probable that some of the workmen from this factory were among those that crossed the mountain to New Geneva and aided Albert Gallatin to establish their manufacture on the Monongahela. The works of Amelung were moved to Baltimore "in 1788, and located on the south side of the basin", and an account of Baltimore, published some years since, declares "they still continue". In Lossing's *Home of Washington* (pages 204–205) is an extract from a letter of a gentleman of Cincinnati describing the presentation to Washington by Mr. Amelung of two flint goblets bearing the general's coat-of-arms. Amelung's ventures did not succeed, and it is possible that he crossed the mountains to Pittsburgh with some of his glass-workers. (*a*)

In 1790, according to Howard, a factory known as the "Baltimore glass works" was established on Federal Hill. Colonel Scharf, in his *Chronicles of Baltimore*, page 236, makes the date 1799. This was the window-glass works at present operated by Baker Brothers & Co., and still known by the same name. This firm also have flint and green glass houses. Concerning the latter, they write me that it was originally established in 1790, though the present works date only from 1852; the flint works date from 1873.

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a Cuming's *Journal*, page 66, speaks of a Mr. Amelung, a glass-worker, at Pittsburgh.

The census of 1810 gives statements of three glass works in this state, two in Frederick county, at which 40,000 square feet of window-glass and 7,000 bottles were made, and one in Baltimore county, at which 500,000 square feet of window-glass were produced.

The census of 1820 reports a glass works in Alleghany county, at which both window-glass and hollow ware were made, and gives the date of the establishment of the works as 1817. The value of the products is given as $30,000, thirty men and eight children and youths being employed. The same census gives statistics of a window-glass works in Baltimore county that had been in operation twenty years, and was producing 3,400 boxes annually, valued at from $8 to $10 a box.

At the tariff convention held in New York in October, 1831, two flint-glass furnaces, with twelve pots, were reported in operation in Baltimore; also one cylinder window-glass factory in Baltimore and one in Cumberland; but no details are given of the same.

The works other than the above at present in existence in Maryland are of comparatively recent date, and are all situated in Baltimore, with the exception of a glassware factory building at Cumberland.

GLASS-MAKING IN NEW JERSEY. (a)

The first glass factory in New Jersey was located about 2½ miles from Allowaystown, Salem county, and was built some time from 1760 to 1765 by a German named Wistar, who brought a company of workmen with him from Germany. He carried on the works a few years, and failed about the outbreak of the revolutionary war, and upon his failure, in 1775, the workmen went to what is now known as Glassborough, Gloucester county. Two objects led to the selection of this place as a site for works: it was so far inland that the operations were not interfered with by the armies, and it was a yellow-pine country, which wood was better for melting glass than the oak of Allowaystown. Mr. Bodine is of the opinion that "the principal kind of glass made was hollow ware or bottles; but from some recollections of an old man that descended from and knew some of the old Glassborough settlers and heard them talk when he was a boy, I think part of them, if not all, could make both bottles and window-glass, such as was used in those days".

The blowers at these works also made the pots, cut the glass into lights, and packed the same. In the scheme of division of labor in more modern works each of these operations is a separate branch of work. At this works the bottles were made without molds, and crown-glass was made. Mr. Bodine says:

> I knew some blowers, when I was a small boy, that were then old men, and could make both bottles and window-glass. I have been unable to fix a time when window-glass commenced to be made in cylinder form. I find that about 1812 or 1813 a crown-glass (window-lights) factory was started up the Delaware river, 10 miles from Belvidere, at a place called Columbia, in what was then Sussex county, now being Warren county. This factory run until 1833, when it ceased operations. I personally know of cylinder window-glass being made in 1827 or 1828 at Millville. About the time of starting the Columbia works a factory was started at a place called Clemonton, now in Camden county, where bottles were made part of the time and window-glass the balance. My informant worked at Clemonton in 1814 as an apprentice, learning to blow.

About the years 1814 and 1815 there were factories started at Port Elizabeth, Cumberland county, and at Malaga, Gloucester county. Both of these were run as window-glass factories, and in 1816 to 1819 Tuckahoe and Hammonton were started and manufactured principally window-glass.

The next works was Millville, started in about 1822. For some years after this no new works were started, until 1827, when between that date and 1832 Waterford, Jackson, old Brooklyn, and Winston were built. These last-mentioned places were in what was Gloucester, now Camden county. The next location was Squankum, now Williamstown, built in 1835, making bottles; then Estilville, Bridgeton, and Temperanceville (now part of Glassborough), built in 1836 and 1837; then Jersey City flint-glass works, built in 1840 or 1845. Somewhere about this date there was a flint-glass works built at Kaign's Point, now part of Camden. Then Greenbank, 1840 to 1845; New Columbia, 1845 to 1848; Jansboro', 1848; Balsto, about 1850; Crowleytown, 1850 to 1851; Clayton and New Brooklyn, about 1851 to 1852; Medford, Milford, and Lebanon, 1855; Bulltown, 1858; Quinton, 1858 to 1860; Salem, 1863; Westville, 1868; Riverside and Herman City, about 1870.

There was a glass works started at Elizabethport some twenty-five years ago and run for a short time; also, one started in Camden about 1868, and run for a short time.

This makes in all thirty-seven locations in New Jersey. Of these the following have gone out of existence entirely: Allowaystown, Columbia, Clementon, Tuckahoe, Hammonton, Jackson, Old Brooklyn, Estilville, Greenbank, New Columbia, Balsto, Crowleytown, Kaign's Point, Milltown, Bulltown, Lebanon, Westville, Jersey City, and Elizabethport—nineteen in all; two run two years, one three years, two five years, two ten years, four fifteen years, four twenty years, two thirty years, one thirty-five years, one forty-five years, while Waterford, Medford, Camden, New Brooklyn, Riverside, Herman City, and Port Elizabeth, seven in all, have not run for several years.

The balance of the locations, eleven in all, have forty-five furnaces, of which thirty-nine furnaces have run the past year, to wit: twelve window-glass, twenty-one green hollow ware, and six lime or white glass. Four of the green hollow ware and the six lime or white glass furnaces are situated at Millville, and are run by one firm, Messrs. Whitall, Tatum & Co.

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a For most of the data contained in the very interesting account of glass-making in New Jersey I am indebted to Hon. John T

About four miles below Millville are located the largest beds of glass-house sand in the state, sand being dug for the Millville and the Philadelphia, New York, and Boston factories. The pits have been opened for more than fifty years. There are also large sand-beds near Williamstown that supply twelve factories a thousand tons each per year. There is sand in very many other localities in south Jersey, but there is none better than the Maurice river, Millville, or Williamstown sand.

Up to 1855 care was taken to locate glass works upon or near to large tracts of woodland. About the year 1856 the factories in New Jersey commenced to use anthracite coal, and since that time the pots have been enlarged at various times until they are more than three times the size they were when wood was used for melting. Mr. Bodine says:

> The use of coal has made locations of glass factories at places other than upon water navigation in New Jersey very expensive, even with railroads. The cost of freight in getting coal and materials to and manufactured products from the marketable points of Philadelphia and New York is about 9 to 10 per cent. of the gross receipts of manufactured goods, while the only offset thereto is about 2 per cent. in the cost of sand and wood for annealing the ware. Many of the New Jersey works have been located where wood could be used. If the locations were abandoned, and the works removed to the large consuming points, the whole plant, so far as the building is concerned, would be lost. I find twenty-six of the factories among the forty-five contained in the eleven locations upon water navigation, and but for the advantage of water transportation we should not have as many glass factories as we now have.

GLASS-MAKING IN OHIO.

The information regarding glass-making in this state is exceedingly meager. It does not appear among the manufactures of the state at the census of 1810. In 1811 John Mellish, in his *Travels*, suggests that a well-organized manufactory of glass bottles would succeed, intimating that no such works existed. An account of Cincinnati, of date of June, 1815, states that a manufactory of green and window-glass and hollow ware was about to go into operation, to be followed the ensuing summer by another for white flint. Palmer's *Travels* in 1817 speaks of two glass houses in operation. The census of 1820 enumerates "glass, window, and hollow ware, chemical and philosophical apparatus", as among the manufactures of Hamilton county, the value of the product being $19,000, and the statement is made that the works are languishing, owing to the supply overrunning the demand. Glass, both cut, flint, and window, was also reported as made at this census in Muskingum county. (*a*) At the tariff convention held in New York in 1831 a window-glass works is reported at Zanesville and another at Moscow, while at the census of 1840 none are reported. In 1850 Ohio is credited with six works; in 1860 with four, and in 1870 with nine, three of which are reported as plate, probably window-glass, and six as glassware. Of the history of these several establishments I have no details.

GLASS-MAKING IN MISSOURI. (*b*)

As early as 1842 efforts were made to establish the manufacture of glass at Saint Louis. In that year a company of gentlemen, with Mr. James B. Eads, who has since become known in connection with the magnificent Saint Louis bridge and the jetties at the mouth of the Mississippi river, established the works now known as the Saint Louis glass works. This works at first made flint-glass tumblers, etc., and it is stated that Mr. Eads, finding it impossible to get the proper workmen, himself made the pots used in this factory. Five years of toil and vexation was the only result, and he and his associates, finding success impossible, were forced to suspend payment and abandoned further effort. To the credit of Colonel Eads, it should be stated that in after years he paid up every dollar of indebtedness incurred. Thus the first glass-making venture west of the Mississippi river passed into history as a failure. The factory was changed to a green-bottle works by Mr. Eads' successors, and then in 1854 back to a flint works. In 1855–'56 a green-bottle house was added, and in 1861 Bayot & Cummings took the works, since which it has been a flint house, now manufacturing only flint bottles.

The second works, those of the Missouri Glass Company, began operations in 1851, making window-glass, but ceased after running two years, remaining idle until 1856, when they were purchased and changed to flint-glass; but after sinking considerable sums in fruitless efforts the parties owning them sold out and abandoned the field. These works, then, like the Saint Louis glass works, became the property of various persons, who at different times encountered unvarying failures, until at last, in 1865, operations were wholly abandoned and the building taken for the manufacture of agricultural machinery. The other Saint Louis glass works have all been established since 1870.

GLASS-MAKING IN OTHER STATES.

As to the history of glass in other states but little has been learned. Glass has been made in Vermont, but there is none made at present. Two glass-houses are reported in that state at the census of 1840, one in Addison and one in Chittenden county, but none are reported in 1850, 1860, or 1870, nor at the present census. In Rhode Island no glass, as far as I have been able to learn, was ever made, and the same is true of Maine and Delaware. In the southern states, with the exception of Virginia, Kentucky, and possibly Tennessee, I can find no record of glass-making.

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a I have seen a statement that this Zanesville works was the first in Ohio, but I have been unable to verify it.

b For the facts in this sketch I am indebted chiefly to an article in the Saint Louis *Trade Review* and to Mr. J. K. Cummings, of Saint Louis.

It has already been stated that the glass-blowers that Albert Gallatin induced to aid him in starting the New Geneva works were on their way to establish a glass house near Louisville, Kentucky; but it seems to have been many years before any other glass-makers sought this state to practice their art. Cramer's *Navigator* for 1814 states that a glass house had lately been built at Louisville, but neither the census of 1820 nor that of 1830 gives any evidence of the existence of this factory. At that of 1840 one glass-cutting establishment is reported in Kentucky, but no glass works. In 1850 no glass works is reported, though the Covington flint-glass works was established in 1848. In 1860 statistics of one glassware establishment are given in Jefferson county, in which Louisville is situated, but no facts are given regarding Kenton county, in which Covington is located, though the Covington glass works inform me that their flint-house was established in 1848, and their green-glass house in 1860. In 1870 three works are reported.

The statement is frequently made that the first glass works west of Cincinnati was built at Alton, Illinois, and in the returns received from the Alton factory the date of establishment of this works is given as 1867. No glass is reported as made in this state in any of the censuses until that of 1870. A similar statement can be made of Indiana. Michigan has no place in the several censuses as a manufacturer of glass. No glass is reported as made in Wisconsin at any census, though an establishment was started shortly after the close of the census year 1880. Mississippi was building a works during the census year. Glass-making was established in California in 1863, or at least a works was in operation, but of the details of its history I have no record.

HISTORY OF THE MANUFACTURE OF PLATE-GLASS IN THE UNITED STATES.(a)

It is probable that the first attempt to manufacture in this country what is now known as plate-glass was made at Cheshire, Massachusetts, though some rough cast plate may have been made earlier at some of the window-glass works. The extensive deposits at this place of exceedingly good sand, which was at one time supposed to be the only sand in the country from which good glass could be made, no doubt had much to do with this early attempt to make plate-glass and determined the location of the works. In 1850 a window-glass factory was erected at Cheshire, which was run for two years on blown glass. In 1852–'53 this was changed to a rough cast-plate factory. A large amount of money was expended in fitting up the works and putting in the necessary machinery and tools, but it was operated only for about six months, when the tables, tools, fixtures, etc., were removed to Brooklyn, New York, and a factory was there fitted up and operated through 1854 and 1855. Very little glass of a merchantable quality was made, and in 1856 the works were abandoned, (b) one of the chief causes of the failure, no doubt, being the small scale on which the works were projected and operated and the inexperience of the promoters. The manufacture of plate-glass requires large capital and experience, and it was not until these were brought together that the plate-glass industry was firmly established in this country and the product could compete with the foreign.

The second effort was made at Lenox Furnace, Massachusetts. In 1853 a glass works was erected at this place at a cost of $30,000 for making window-glass by the Lenox iron works, a corporation owned by William A. Phelps, Oliver Peck, and James Collins, who ran the works for about two years on window-glass at a loss. In the fall of 1855 the window-glass business was abandoned. This property was leased with contract to sell to James N. Richmond, who organized a company called the National Plate Glass Company, and was converted into a plate-glass factory. The company spent a large amount of money in reorganizing the establishment and experimenting, having bought the tables and tools of the Brooklyn company. In 1856, after a heavy loss, the company failed, and in 1857 the property came back to the original owners, who started up the works and continued to run them with success till the spring of 1865. In 1862 the factory buildings, with a large amount of glass, were destroyed by fire. There was no insurance, and the loss was over $25,000. In 1865 a company was organized, called the Lenox Plate Glass Company, consisting of the old parties with Messrs. Theodore and James Roosevelt, of New York city. Up to this time only rough plate was made, but it was the intention of this company to commence polishing as soon as suitable machinery could be obtained. It is worthy of notice that, although for a number of years plate-glass had been produced in England and in France, there had been scarcely any improvements in the machinery used. Some few years previous to this parties in the western part of the state of New York had invented and patented a machine for grinding and polishing marble slabs, and this was found to work admirably in polishing glass; but through the influence of Mr. John R. Platte, then agent for the British Plate Glass Company of England, the owners of the patent were induced to put up one of these machines for the company, on condition that if the working was satisfactory they were to buy the patent. The machine worked with satisfaction, doing its work in much less time than the old system. Mr. Servin states that the company paid about $50,000 for the patent. The principle of this machine is now generally used, though with improvements, in

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[a] The statements of fact contained in this history are derived chiefly from letters from Mr. A. T. Servin, of Lenox, Massachusetts, Mr. E. Ford, of Jeffersonville, Indiana, and Mr. E. A. Hitchcock, of Saint Louis, and from Mr. W. C. De Pauw's testimony before the tariff commission.

[b] This is Mr. Servin's statement. Mr. Ford, however, states that the first attempt was made at Williamsburg, New York, in 1850, on a small scale, for the manufacture of rough plate-glass only, but was abandoned. The next effort, he states, was by the same party at Green Point, New York, but this was also a failure. This, Mr. Ford states, was the parent of the Lenox works.

polishing plate. About this time the Lenox Plate Glass Company was organized. The inventor having patented another machine in 1866 and 1867, this company bought the patents and put up some costly machinery, which was not completed till 1868 and 1869. About this time, and for two or three years previous, a company in Philadelphia held patents for making cryolite, a mineral from Greenland, into a material called cryolite or hot-cast porcelain, resembling white marble when worked, but having all the qualities of glass. This material was worked in the same way as glass. Through statements of great profits in this manufacture the Lenox company were induced to allow a new company to be formed January 1, 1870, called the Lenox Glass Company, which took all the property of the old company and gave the Philadelphia company $200,000 for their patents, also purchasing a large amount of cryolite from them. This new company expended a large amount in preparing for the cryolite manufacture, but after six or eight months working it was found to be a perfect failure, resulting in a total loss to the company of the cryolite and patents purchased, and in 1871 the company failed. The furnace has since been run on rough plate for a part of the time. In 1879 a large proportion of the glass property was sold at about one-thirtieth of its cost, and a new company has been formed, called the Lenox glass works.

The next works built in the United States were at New Albany, Indiana, and it was here that polished plate-glass was first successfully and continuously manufactured. In the year 1869 Mr. J. B. Ford conceived the idea of erecting works for manufacturing polished plate-glass, and with this in view he visited Lenox, gathered what information he could on the subject from the workmen there who had been employed abroad, and returned to New Albany with a determination to make polished plate. He immediately entered into negotiations with manufacturers of plate-glass machinery in Europe, and purchased one each of the best machines for grinding, smoothing, and polishing, and while waiting for their arrival, in company with his associates, built a works for rough plate. About the time the machinery arrived the works was burned, but a new one was built on a more extended scale. This new plant was measurably successful, but had to undergo the reverses that seems the fate of all plate-glass houses in this country. In 1872 Mr. Ford withdrew, since which time it has been run by Mr. W. C. De Pauw, who stated before the tariff commission that until 1879 the works made no money, though the quality of the glass for some time had equaled the imported.

In the same year that he withdrew Mr. Ford organized and built another works at Louisville. These he managed until 1875, when he left there and organized a works at Jeffersonville, Indiana, the city having offered him some ground valued at $20,000. These works have been largely increased, make excellent plate, and were, with New Albany and Crystal City, Missouri, the works that made polished plate in the census year.

Shortly after the organization of the New Albany plate-glass works Mr. E. B. Ward, of Detroit, and others, induced by the very extensive deposit of sand of an excellent quality at Crystal City, Missouri, organized the American Plate Glass Company, with a capital stock of $250,000, and began in 1872 the erection of works at the point named, this sum being increased in January, 1874, to $500,000. In 1875 the manufacture of plate-glass was begun, though with appliances much inferior to those now in use, and a considerable quantity of glass of good quality was produced. The usual difficulties, however, which attend new industries, by reason of lack of the requisite experience, were encountered. The production was irregular and uncertain as to quality, and in 1876 the work was suspended for several months, with a view to its resumption under more favorable conditions. In October, 1876, the enterprise was reorganized by the formation of a new corporation (the present Crystal Plate Glass Company), composed of most of the stockholders in the old company, in which additional capital was invested, and which acquired the entire premises, plant, and a large stock of materials on hand. Mr. E. A. Hitchcock, of Saint Louis, president of the old company, continued in charge as president. During the winter of 1876–'77 preparations were made for resuming work under such conditions as to profit by the experience already gained. Convinced by thorough examination of its superior advantages, a Siemens furnace was erected. These works have since been largely increased, and are producing plate-glass the equal of any made in the world.

An extensive works for the manufacture of plate-glass is also being built at Hite's station, on the West Pennsylvania railroad, near Pittsburgh, by Mr. Ford, who built the works near Louisville. (*a*)

Regarding the manufacture of plate-glass in this country, Mr. W. C. De Pauw, in his paper before the tariff commission, made some statements which he summarizes as follows:

> First. That all money put into plate-glass works in America prior to 1879 had been a total loss.
>
> Second. That some of the shrewdest, most energetic, and successful business men in Boston, New York, Philadelphia, Detroit, Chicago, Saint Louis, and Louisville had in the aggregate invested millions in plate-glass enterprises and lost the whole of it.
>
> Third. That no plate-glass had been made in America without loss to the maker prior to 1879.
>
> Fourth. That I, instead of having made a large fortune in a few years, as represented, have actually lost more than half a million dollars over and above all (very small) profit made since 1878.
>
> Fifth. That after a long, earnest struggle, I have succeeded in making good glazing glass at a small profit.
>
> Sixth. That Americans are paying about half as much for plate-glass to-day as they paid prior to the time plate-glass was made in the United States at my works.

IMPORTS OF GLASS INTO THE UNITED STATES.

In order to show the amount of glass received into this country, I append a table giving the imports of glass into this country in the years 1876 to 1880, showing quantities and values so far as they are given in the reports of the bureau of statistics, and also the value of each unit of quantity.

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[a] It is now (April, 1883) in successful operation.

TABLE SHOWING IMPORTS OF GLASS INTO THE

	Articles.	1876.			1877.		
		Quantities.	Value.	Value per unit of quantity.	Quantities.	Value.	Value per unit of quantity.
	Total glass, and manufactures of		$4,803,091 25			$3,952,703 22	
	Bottles:						
1	Empty		25,306 44			22,125 84	
2	Containing liquors .... number	3,740,473.74			3,313,957.73		
3	Or jars filled with articles not otherwise provided for						
4	Crystals for watches		6,970 00			10,078 00	
5	Disks, or plates unwrought, for optical instruments		1,748 00			1,119 00	
	Glassware:						
6	Porcelain, Bohemian, cut, engraved, painted, colored, printed, stained, silvered or gilded, not including plate-glass silvered, or looking-glass plates.		567,269 17			496,705 62	
7	Plain, mold, and press, not cut, engraved, or painted		60,833 97			54,319 15	
	Plate-glass, cast, polished, not silvered:						
8	Not above 10 by 15 inches .... square feet	15,500.00	2,822 00	0.182	17,365.00	2,836 00	0.163
9	Above 10 by 15 inches, and not above 16 by 24 .... do	8,117.75	3,615 00	0.445	12,643.00	5,113 00	0.404
10	Above 16 by 24 inches, and not above 24 by 30 .... do	101,949.00	67,008 00	0.657	88,802.75	55,781 00	0.628
11	Above 24 by 30 inches, and not above 24 by 60 .... do	442,705.50	340,998 00	0.770	458,704.00	326,150 00	0.711
12	Above 24 by 60 inches .... do	1,024,318.33	943,958 00	0.922	1,017,317.55	871,744 00	0.857
	Plate-glass, cast, polished, silvered, or looking-glass plate:						
13	Not above 10 by 15 inches .... square feet	250,895.50	52,791 00	0.210	219,531.00	40,437 00	0.184
14	Above 10 by 15 inches and not above 16 by 24 .... do	812,671.33	223,407 00	0.275	755,919.00	175,798 00	0.233
15	Above 16 by 24 inches and not above 24 by 30 .... do	838,597.00	319,964 00	0.382	821,439.00	268,274 00	0.327
16	Above 24 by 30 inches and not above 24 by 60 .... do	168,753.19	117,096 00	0.694	102,556.00	55,456 00	0.541
17	Above 24 by 60 inches .... do	65,778.75	76,467 00	1.162	12,149.25	17,064 00	1.405
	Plate-glass, rough, fluted, or rolled (excess of 1 pound per square foot in proportion):						
18	Not above 10 by 15 inches .... square feet	2,265.00	120 00	0.053	4,077.00	395 00	0.097
19	Above 10 by 15 inches and not above 16 by 24 .... do	2,668.00	75 00	0.028	2,787.00	96 00	0.034
20	Above 16 by 24 inches and not above 24 by 30 .... do	23,838.00	1,800 00	0.076	20,832.00	1,616 00	0.078
21	Above 24 by 30 inches .... do	870,783.50	33,741 00	0.039	258,708.00	13,261 00	0.051
	Window-glass, cylinder, crown, or common, unpolished:						
22	Not above 10 by 15 inches .... pounds	6,330,449.00	215,619 88	0.034	4,677,124.00	154,815 00	0.033
23	Above 10 by 15 inches, and not above 16 by 24 .... do	7,542,537.50	304,205 46	0.040	5,662,851.00	202,878 00	0.036
24	Above 16 by 24 inches, and not above 24 by 30 .... do	8,085,927.00	376,706 34	0.047	7,220,534.80	288,382 47	0.040
25	Above 24 by 30 inches .... do	6,879,206.00	425,486 00	0.062	7,378,928.00	381,517 00	0.052
	Window-glass, cylinder, and crown, polished:						
26	Not above 10 by 15 inches .... square feet	539.00	117 00	0.217	5,438.00	1,144 00	0.210
27	Above 10 by 15 inches, and not above 16 by 24 .... do	1,244.00	477 00	0.383	6,208.00	1,704 00	0.274
28	Above 16 by 24 inches, and not above 24 by 30 .... do	72,084.75	8,391 00	0.116	15,662.00	5,288 00	0.338
29	Above 24 by 30 inches, and not above 24 by 60 .... do	2,316.00	1,221 00	0.527	2,404.00	1,078 00	0.448
30	Above 24 by 60 inches .... do						
31	Manufactures of, not otherwise provided for		624,877 99			497,528 14	

UNITED STATES IN THE YEARS 1876 TO 1880.

1878.			1879.			1880.			
Quantities.	Value.	Value per unit of quantity.	Quantities.	Value.	Value per unit of quantity.	Quantities.	Value.	Value per unit of quantity.	
....	$3,331,857 25	....	....	$3,281,420 09	....	....	$5,133,272 42	....	
....	23,710 40	....	....	20,676 00	....	....	43,760 56	....	1
3,200,087.00	....	....	3,360,793.00	....	....	4,276,410.00	....	....	2
....	....	....	....	56,412 00	....	....	199,459 00	....	3
....	7,271 00	....	....	11,049 00	....	....	7,391 00	....	4
....	428 00	....	....	1,607 00	....	....	2,668 00	....	5
....	458,447 93	....	....	501,541 38	....	....	722,637 41	....	6
....	29,965 00	....	....	41,958 80	....	....	38,381 36	....	7
10,252.00	1,858 00	0.181	14,338.00	2,711 00	0.189	108,732.00	16,200 00	0.149	8
12,601.16	4,413 00	0.350	27,317.60	8,724 00	0.319	46,185.80	14,721 00	0.319	9
58,340.50	33,106 00	0.567	90,434.91	32,888 00	0.364	157,804.92	50,326 00	0.319	10
392,594.16	286,537 00	0.729	562,071.08	240,480 00	0.428	719,373.06	285,419 00	0.397	11
756,779.29	658,560 00	0.870	869,635.12	421,401 00	0.485	874,521.64	390,741 00	0.447	12
121,213.00	18,607 75	0.154	128,904.75	23,992 00	0.186	230,728.42	50,823 00	0.220	13
619,379.50	133,430 00	0.215	697,652.50	165,437 00	0.237	1,000,349.42	269,421 00	0.269	14
912,375.50	277,113 00	0.304	1,081,357.00	342,750 00	0.317	1,648,187.31	557,998 00	0.339	15
85,545.00	41,865 00	0.489	102,961.00	45,460 00	0.442	153,637.00	75,218 00	0.490	16
1,284.50	1,251 00	0.974	1,034.66	1,245 81	1.204	6,020.66	4,274 73	0.710	17
80.00	5 00	0.063	....	....	....	....	....	....	18
2,441.00	163 00	0.067	405.00	29 00	0.072	10,785.00	196 00	0.018	19
3,585.00	153 00	0.043	7,202.00	365 00	0.051	1,957.00	89 00	0.045	20
78,588.00	5,432 00	0.069	173,384.00	7,693 00	0.044	757,908.00	25,426 00	0.034	21
4,330,949.00	124,033 91	0.029	3,582,364.00	90,356 62	0.025	12,041,215.00	308,978 11	0.026	22
5,903,795.00	176,184 84	0.030	5,045,243.00	140,367 05	0.028	11,077,758.00	333,063 23	0.030	23
6,576,448.00	226,396 85	0.034	5,836,463.00	184,885 64	0.032	10,693,808.25	351,463 90	0.033	24
6,242,560.50	274,624 61	0.044	6,225,791.83	237,232 87	0.038	10,137,070.00	412,472 44	0.041	25
3,563.00	828 00	0.232	1,675.00	325 00	0.194	11,900.66	2,110 00	0.177	26
8,724.00	2,601 00	0.298	15,460.50	3,256 00	0.211	26,575.58	4,153 00	0.156	27
10,779.00	4,185 00	0.388	21,031.00	6,023 00	0.286	36,938.75	10,605 00	0.287	28
1,661.00	690 00	0.415	4,039.00	1,690 00	0.418	12,651.66	4,229 00	0.334	29
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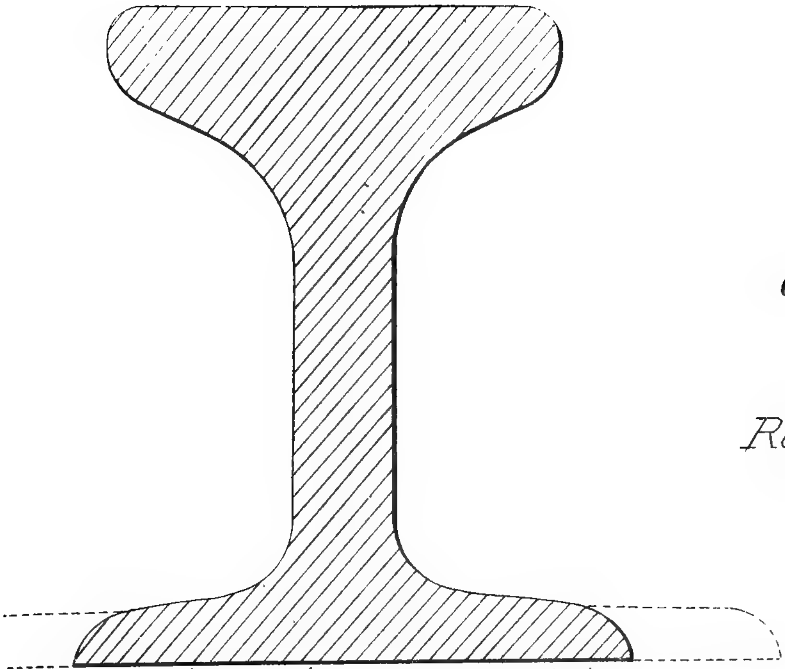
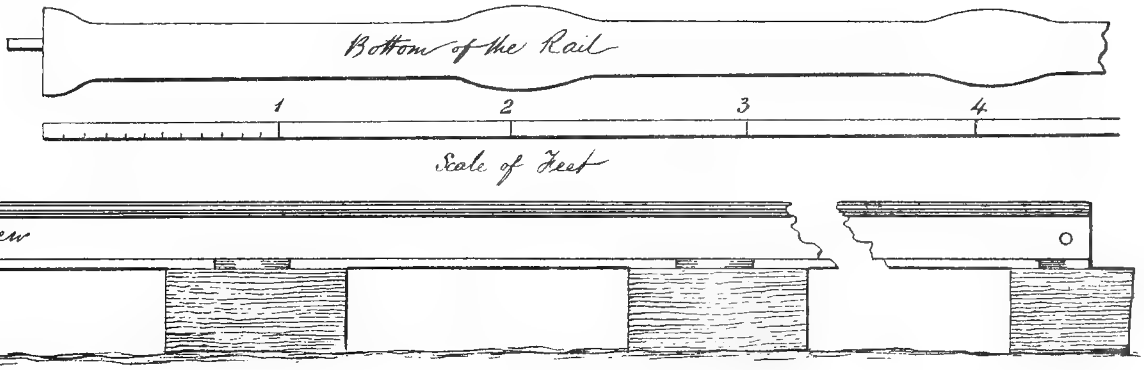
Copy of the Call for Bids for T-rails issued by Robert L. Stevens in 1830.



Full size with projections at every two feet on the bottom flange, 3/4 f an inch by 4 inches.



Liverpool 1830.

Gentlemen

At what rate will you contract to deliver at Liverpool, say from five r six hundred tons of Railway, of the best quality Iron rolled to the above pattern in twelve or sixteen feet lengths, to lap as shewn in the drawing, with one hole at each nd, and the projections on the lower flange at every two feet. Cash on delivery. How soon could you make the first delivery, and at what rate pr month until the whole is complete – Should the terms suit and the work give satisfaction a more xtended order is likely to follow, as this is but about one-sixth part of the quantity equired – Please to address your answer (as soon as convenient) to the care of Francis B. Ogden, Consul of the United States at Liverpool –

I am

Your obedient Servant

President & Engineer of the Camden & South Amboy Rail road & transportation Company

The T rail is not much used in Great Britain. The pattern most in use in that country is the double-headed, or H, rail, which is set in a cast-iron chair. The bridge, or U, rail is in use on the Great Western railway and on some other railroads. The Clarence rail is still used on the Great Eastern railway, and perhaps on some other British railroads. In the United States the T rail is now almost exclusively used.

The first locomotive to run upon an American railroad was the *Stourbridge Lion.* It was first used on the coal railroad of the Delaware and Hudson Canal Company at Honesdale, in Susquehanna county, Pennsylvania, on Saturday, August 8, 1829. The *Stourbridge Lion* was built in England, and weighed about six tons. Its use was not long continued, because it was too heavy for the superstructure of a large part of the road. The first locomotive built in the United States and used on a railroad was the *Tom Thumb*, which was built by Peter Cooper at Baltimore, and successfully experimented with on the Baltimore and Ohio railroad in August, 1830. The fuel used for this pioneer American locomotive was anthracite coal. The boiler was tubular, and for want of specially-constructed tubes Mr. Cooper used gun barrels. The locomotive, which was also its own tender, did not weigh a ton. Strictly speaking, it was a working model, but it worked well and led the way to the construction of more powerful locomotives. Mr. Cooper was his own engineer. The first American locomotive that was built for actual service was the *Best Friend of Charleston*, which was built at the West Point foundry, in New York city, for the Charleston and Hamburg railroad, and was successfully put in use on that road in December, 1830. The Mohawk and Hudson railroad and a few other railroads used horse-power exclusively for some time after they were opened.

Mr. Brown informs us that "the first charter for what are termed city passenger or horse railroads was obtained in the city of New York and known as the New York and Harlem, and this was the first road of the kind ever constructed, and was opened in 1832. No other road of the kind was completed till 1852, when the Sixth Avenue was opened to the public."

The first elevated city passenger railway ever built was the Greenwich-street railway in New York, which was commenced in 1866 and has been in successful operation since 1872. The next project of this character was the Gilbert elevated railway, in New York, for the construction of which a charter was granted in 1872. The first elevated railroad constructed in this country in connection with a regular freight and passenger railroad was undertaken by the Pennsylvania Railroad Company in 1880 and finished in 1881. It constitutes an extension of the main line of the Pennsylvania railroad from West Philadelphia to the heart of the old city of Philadelphia, and is over a mile in length.

DIFFICULTIES ENCOUNTERED IN THE EARLY DEVELOPMENT OF THE AMERICAN IRON AND STEEL INDUSTRIES.

Many of the difficulties encountered in the early development of our iron and steel industries were inseparable from the conditions which attend the settlement of a new country, but others were of a political character, and grew out of the dependent relation of the colonies to Great Britain. Lord Sheffield declared that "the only use and advantage of American colonies or West India islands is the monopoly of their consumption and the carriage of their produce." McCulloch, in his *Commercial Dictionary*, admits that it was "a leading principle in the system of colonial policy, adopted as well by England as by the other European nations, to discourage all attempts to manufacture such articles in the colonies as could be provided for them by the mother country." Dr. Elder, in his *Questions of the Day*, says: "The colonies were held under restraint so absolute that, beyond the common domestic industries, and the most ordinary mechanical employments, no kind of manufactures was permitted." Bancroft, in his *History of the United States of America*, says that "England, in its relations with other states, sought a convenient tariff; in the colonies it prohibited industry." A law of Virginia, passed in 1684, to encourage textile manufactures in that province, was annulled in England. In 1699 the exportation, by land or water, of wool and woolen manufactures from one colony to another was prohibited. This was done that the English woolen manufacturers might have a monopoly in supplying the colonists with woolen goods. Other instances of special hostility to the establishment of manufactures in the colonies might be cited. The pages of Bancroft abound with them.

Concerning the attitude of Great Britain toward the woolen manufactures of the colonies, Adam Smith, in his *Wealth of Nations*, said in 1776: "She prohibits the exportation from one province to another by water, and even the carriage by land upon horseback or in a cart, of hats, of wools and woolen goods, of the produce of America; a regulation which effectually prevents the establishment of any manufacture of such commodities for distant sale, and confines the industry of her colonists in this way to such coarse and household manufactures as a private family commonly makes for its own use, or for that of some of its neighbors in the same province."

In the seventeenth century the colonial iron industry was so slowly developed that it attracted but little attention in the mother country; but at the beginning of the eighteenth century, when Pennsylvania, Maryland, and Virginia began to manufacture iron and to export it to England, the possibilities of its development in competition with the English iron industry became a terror to English ironmasters. In 1719 the House of Commons passed a bill containing the clause "that none in the plantations should manufacture iron wares of any kind out of any sows, pigs, or bars whatsoever." The House of Lords added, "that no forge, going by water, or other works, should be erected in any of the said plantations, for the making, working, or converting of any sows, pigs, or cast iron into bar or rod iron." "The opposition of the northern colonies defeated the bill," says Bancroft; "England would not yet forbid the colonists to manufacture a bolt or a nail; but the purpose was never abandoned."

The distinguished American historian records in the following language the culmination of the repressive policy of the mother country toward the iron industry of the colonies: "America abounded in iron ore; its unwrought iron was excluded by a duty from the English market; and its people were rapidly gaining skill at the furnace and the forge. In February, 1750, the subject engaged the attention of the House of Commons. To check the danger of American rivalry, Charles Townshend was placed at the head of a commission. . . . After a few days' deliberation he brought in a bill which permitted American iron in its rudest forms to be imported duty free; but, now that the nailers in the colonies could afford spikes and large nails cheaper than the English, it forbade the smiths of America to erect any mill for slitting or rolling iron, or any plating-forge to work with a tilt-hammer, or any furnace for making steel. . . . The House divided on the proposal that every slitting mill in America should be abolished. The clause failed only by a majority of twenty-two; but an immediate return was required of every mill already existing, and the number was never to be increased." The act of Parliament to which Bancroft here alludes contained many elaborate provisions, but its principal provisions were as follows:

> WHEREAS, The Importation of Bar Iron from His Majesty's Colonies in America into the Port of London, and the Importation of Pig Iron from the said Colonies, into any Port of Great Britain, and the Manufacture of such Bar and Pig Iron in Great Britain, will be a great Advantage, not only to the said Colonies, but also to this Kingdom, by furnishing the Manufacturers of Iron with a supply of that useful and necessary Commodity, and by means thereof large sums of Money, now annually paid for Iron to Foreigners, will be saved to this Kingdom, and a greater quantity of the Woollen, and other Manufactures of Great Britain, will be exported to America, in Exchange for such Iron so imported; be it therefore enacted by the King's Most Excellent Majesty, by and with the advice and consent of the Lords, Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, That from and after the Twenty-fourth day of June, one thousand seven hundred and fifty, the several and respective Subsidies, Customs, Impositions, Rates, and Duties, now payable on Pig Iron, made in and imported from His Majesty's Colonies in America, into any Port of Great Britain, shall cease, determine, and be no longer paid; and that from and after the said Twenty-fourth day of June, no Subsidy, Custom, Imposition, Rate, or Duty whatever, shall be payable upon Bar Iron made in and imported from the said Colonies into the Port of London; any Law, Statute, or usage to the contrary thereof in any wise notwithstanding.
>
> And, that Pig and Bar Iron made in His Majesty's Colonies in America may be further manufactured in this Kingdom, be it further enacted by the Authority aforesaid, That from and after the Twenty-fourth day of June, one thousand seven hundred and fifty, no Mill or other Engine for Slitting or Rolling of Iron, or any Plateing Forge to work with a Tilt Hammer, or any Furnace for making Steel, shall be erected, or after such Erection continued in any of His Majesty's Colonies in America; and if any Person or Persons shall erect, or cause to be erected, or after such Erection continue, or cause to be continued, in any of the said Colonies, any such Mill, Engine, Forge, or Furnace, every Person or Persons so offending shall, for every such Mill, Engine, Forge, or Furnace, forfeit the Sum of Two Hundred Pounds of lawful Money of Great Britain.
>
> And it is hereby further enacted by the Authority aforesaid, That every such Mill, Engine, Forge, or Furnace, so erected or continued, contrary to the Directions of this Act, shall be deemed a Common Nuisance, and that every Governor, Lieutenant Governor, or Commander-in-Chief of any of His Majesty's Colonies in America, where any such Mill, Engine, Forge, or Furnace, shall be erected or continued, shall, upon Information to him made and given, upon the Oath of any Two or more Credible Witnesses, that any such Mill, Engine, Forge, or Furnace, hath been so erected or continued (which Oath such Governor, Lieutenant Governor, or Commander-in-Chief, is hereby authorized and required to administer) order and cause every such Mill, Engine, Forge, or Furnace, to be abated within the Space of Thirty Days next after such Information given and made as aforesaid.

The provision in the above act which repealed the duties on colonial pig iron and bar iron was wholly based on the necessities of the mother country, and was not in the least due to a desire to build up a colonial iron industry for the benefit of the colonies themselves. There was in 1750 a scarcity of timber in England for the supply of charcoal, which was then the principal fuel used in the smelting and refining of iron, but forests everywhere abounded in the colonies, and iron ore had been found in many places. The manufacture of pig iron and bar iron in the colonies, and their exportation to England, to meet a scarcity of the domestic supply of these products, and to be exchanged for British woolen and other manufactures, was therefore encouraged. The provision relating to articles made *from* pig iron and bar iron was intended to be prohibitory of their manufacture in the colonies. Adam Smith thus described in 1775 the character of this legislation, which had not been repealed nor altered down to that period, the beginning of our Revolution: "While Great Britain encourages in America the manufactures of pig and bar iron, by exempting them from duties to which the like commodities are subject when imported from any other country, she imposes an absolute prohibition upon the erection of steel furnaces and slit-mills in any of her American plantations. She will not suffer her colonists to work in those more refined manufactures even for their own consumption, but insists upon their purchasing of her merchants and manufacturers all goods of this kind which they have occasion for."

As may easily be imagined, the passage of this act aroused anew the feeling of discontent in the colonies which had been created and kept alive by many repressive measures of the mother country directed against their infant manufactures. These measures of repression formed the principal part of that "long train of abuses and usurpations" which led to the war of independence.

From the passage of the act of 1750 down to the Revolution our iron industry was mainly confined to the production of pig iron and bar iron. The effect of the act was to repress the development of our steel industry and of the finished branches of our iron industry. During this period we made pig iron and bar iron in sufficient quantities for our own use, and the surplus was sent to the mother country.

But the colonies suffered also from the general restrictive policy of Great Britain affecting the manufactures of all foreign countries. Adam Smith gives us the following view of this policy.

> By the 7th and 8th of William III. [1696 and 1697], chapter 20, section 8, the exportation of frames or engines for knitting gloves or stockings is prohibited under the penalty not only of the forfeiture of such frames or engines so exported, or attempted to be exported, but of forty pounds—one-half to the king, the other to the person who shall inform or sue for the same.
>
> By the 5th George I. [1718], chapter 27, the person who shall be convicted of enticing any artificer of, or in any of the manufactures of, Great Britain, to go into any foreign parts in order to practice or teach his trade, is liable, for the first offense, to be fined in any sum not exceeding one hundred pounds, and to three months' imprisonment, and until the fine shall be paid; and, for the second offense, to be fined in any sum at the discretion of the court, and to imprisonment for twelve months, and until the fine shall be paid. By the 23d George II. [1749], chapter 13, this penalty is increased, for the first offense, to five hundred pounds for every artificer so enticed, and to twelve months' imprisonment, and until the fine shall be paid; and, for the second offense, to one thousand pounds, and to two years' imprisonment, and until the fine shall be paid.
>
> By the former of those two statutes, upon proof that any person has been enticing any artificer, or that any artificer has promised or contracted to go into foreign parts for the purposes aforesaid, such artificer may be obliged to give security at the discretion of the court that he shall not go beyond the seas, and may be committed to prison until he give such security.
>
> If any artificer has gone beyond the seas, and is exercising or teaching his trade in any foreign country, upon warning being given to him by any of his majesty's ministers or consuls abroad, or by one of his majesty's secretaries of state for the time being, if he does not within six months after such warning return to this realm, and from thenceforth abide and inhabit continually within the same, he is from thenceforth declared incapable of taking any legacy devised to him within this kingdom, or of being executor or administrator to any person, or of taking any lands within this kingdom by descent, devise, or purchase. He likewise forfeits to the king all his lands, goods and chattels, is declared an alien in every respect, and is put out of the king's protection.

The policy which is epitomized above by the great English political economist was continued after the American colonies secured their independence. We copy below the leading provisions of an act of the British Parliament, adopted in 1781, the twenty-first year of the reign of George the Third, which prohibited the exportation from Great Britain of machinery used in the manufacture of cotton, linen, wool, and silk.

> An Act to explain and amend an Act made in the fourteenth Year of the Reign of his present Majesty, intituled, *An Act to prevent the Exportation to foreign Parts of Utensils made use of in the Cotton, Linen, Woollen, and Silk Manufactures of this Kingdom* . . . That if, at any Time after the twenty-fourth Day of *June*, one thousand seven hundred and eighty-one, any Person or Persons in *Great Britain* or *Ireland* shall . . . put on Board of any Ship or Vessel, which shall not be bound directly to some Port or Place in *Great Britain* or *Ireland*, . . . any Machine, Engine, Tool, Press, Paper, Utensil, or Implement whatsoever, which now is, or at any Time or Times hereafter shall or may be used in, or proper for the preparing, working, pressing, finishing, or completing, of the Woollen, Cotton, Linen, or Silk Manufactures of this Kingdom . . . ; or any Model or Plan, or Models or Plans, of any such Machine, Engine, Tool, Press, Paper, Utensil, or Implement, or any Part or Parts thereof, . . . the Person or Persons so offending shall, for every such Offence, not only forfeit all such Machines, Engines, Tools, Press, Paper, Utensils, or Implements, Models or Plans, or Parts thereof respectively, together with the Packages, and all other Goods packed therewith, if any such there be, but also the Sum of two hundred Pounds of lawful Money of *Great Britain* ; and shall also suffer Imprisonment . . . for the Space of twelve Months, without Bail or Mainprize, and until such Forfeiture shall be paid. . . . Provided always, That nothing herein contained shall extend to the preventing Wool Cards, or Stock Cards, not exceeding in Value four Shillings *per* Pair, and Spinners Cards not exceeding in Value one Shilling and Sixpence *per* Pair, used in the said Woollen Manufacture, from being exported to any of his Majesty's Colonies or Plantations in *America*.

In 1785, the twenty-fifth year of the reign of George the Third, an act was passed to cripple if possible the iron industries of foreign countries, the principal provisions of which were as follows:

> An Act to prohibit the Exportation to foreign Parts of Tools and Utensils made use of in the Iron and Steel Manufactures of this Kingdom; and to prevent the seducing of Artificers or Workmen, employed in those Manufactures, to go into Parts beyond the Seas.
>
> Whereas, the Exportation of the several Tools and Utensils made use of in preparing, working up, and finishing the Iron and Steel Manufactures of this Kingdom, or either of them, will enable Foreigners to work up such Manufactures, and thereby greatly diminish the Exportation of the same from this Kingdom; therefore, for the preserving, as much as possible, to his Majesty's Subjects the Benefits arising from those great and valuable Branches of Trade and Commerce, may it please your Majesty that it may be enacted, and be it enacted by the King's most Excellent Majesty, by and with the Advice and Consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the Authority of the same, That if, at any Time after the first Day of *August*, one thousand seven hundred and eighty-five, any Person or Persons in *Great Britain* shall, upon any Pretence whatsoever, export, load, or put on board, or pack, or cause or procure to be loaden, put on board, or packed, in order to be loaded or put on board of any Ship or Vessel which shall be bound to some Port or Place in Parts beyond the Seas (except to *Ireland*), or shall lade, or cause or procure to be laden, on Board any Boat or other Vessel, or shall bring, or cause to be brought, to any Quay, Wharf, or other Place, in order to be so laden or put on board any such Ship or Vessel, any Tool or Utensil hereafter mentioned; that is to say, Hand Stamps, Dog Head Stamps, Pulley Stamps, Stamps of all sorts, Hammers and Anvils for Stamps, Screws for Stamps, Iron Rods for Stamps, Presses of all Sorts, in Iron, Steel, or other Metal, which are used for giving Impressions to Metal, or any Parts of these several Articles; Presses of all Sorts called *Cutting-out Presses*, Beds and Punches to be used therewith; Piercing Presses of all Sorts, Beds and Punches to be used therewith, either in Parts or Pieces, or fitted together; Iron or Steel Dies to be used in Stamps or Presses either with or without Impressions on them; Rollers of Cast Iron, Wrought Iron, or Steel, for rolling of Metal, and Frames for the same; Flasks or Casting Moulds, and Boards used therewith; Lathes of all Sorts for turning, burnishing, polishing, either the Whole together, or separate Parts thereof; Lathe Strings, polishing Brushes, Scoring or Shading Engines, Presses for Horn Buttons, Dies for Horn Buttons, Sheers for cutting of Metal, Rolled Steel, Rolled Metal with Silver thereon, Parts of Buttons not fitted up into Buttons, or in an unfinished State; Engines for Chafing, Stocks for casting Buckles,

Buttons, and Rings; Cast Iron Anvils and Hammers for Forging Mills for Iron and Copper; Roles, Slitters, Beds, Pillars and Frames for Slitting Mills; Die-sinking Tools of all Sorts, Engines for making Button Shanks, Laps of all Sorts, Drilling Engines, Tools for pinching of Glass, Engines for covering of Whips, Polishing Brushes, Bars of Metal covered with Gold or Silver, Iron or Steel Screw Plates, Pins, and Stocks for making Screws, or any other Tool or Utensil whatsoever, which now is, are, or at any Time or Times hereafter shall or may be used in, or proper for the preparing, working, finishing, or completing of the Iron or Steel Manufactures of this Kingdom, or either of them, by what Name or Names soever the same shall be called or known, or any Model or Plan, or Models or Plans, of any such Tool, Utensil, or Implement, or any Part or Parts thereof; the Person or Persons so offending shall for every such Offence, not only forfeit and lose all such Tools or Utensils, or Parts or Parcels thereof, together with the Packages, and all other Goods packed therewith, if any such there be, . . . the Person or Persons so offending shall, for every such Offence, forfeit the Sum of two hundred Pounds of lawful Money of *Great Britain*, and shall also suffer Imprisonment, in the Common Gaol, Prison, or House of Correction, . . . for the space of twelve Months, without Bail or Mainprize, and until such Forfeiture shall be paid.

And whereas, for the encouragement of such Manufactories in this Kingdom, it is necessary that Provision should be made to prevent Artificers, and others employed therein, from departing, or from being seduced to depart out of this Kingdom; be it therefore enacted by the Authority aforesaid, That from and after the said first day of August, one thousand seven hundred and eighty-five, if any Person or Persons shall contract with, entice, persuade, or endeavor to seduce or encourage any Artificer or Workman concerned or employed, or who shall have worked at, or been employed in, the Iron or Steel Manufactures in this Kingdom, or in making or preparing any Tools or Utensils for such Manufactory, to go out of Great Britain to any Parts beyond the Seas (except to Ireland), and shall be convicted thereof . . . shall, for every Artificer so contracted with, enticed, persuaded, encouraged, or seduced, or attempted so to be, forfeit and pay the Sum of five hundred Pounds of lawful Money of Great Britain, and shall be committed to the Common Gaol, . . . there to remain without Bail or Mainprize for the Space of twelve Calendar Months, and until such Forfeiture shall be paid; and in Case of a subsequent Offence of the same Kind, the Person or Persons so again offending shall, upon the like Conviction, forfeit and pay, for every Person so contracted with, enticed, persuaded, encouraged, or seduced, or attempted so to be, the Sum of one thousand Pounds of lawful Money of Great Britain, and shall be committed to the Common Gaol as aforesaid, there to remain, without Bail or Mainprize, for and during the Term of two Years, and until such Forfeitures shall be paid.

In 1786 some trifling changes were made in the list of articles the exportation of which was prohibited, but the principal articles used in the manufacture of iron and steel were carefully preserved in the list. At the same time tools for making paper, for making and working glass, and for making pottery and harness were added to the list. In 1799 an act was passed providing that,

Whereas, there have of late been many attempts to seduce colliers out of Scotland into foreign countries, be it therefore further enacted that all persons seducing, or attempting to seduce, colliers . . . from the Kingdom of Great Britain shall be punished in the same manner as persons seducing, or attempting to seduce, manufacturers or other artisans are punishable by law.

The prohibition of the exportation of machinery for the manufacture of iron and steel, and other machinery, continued until after the beginning of the present century. Machinery for the manufacture of linen was not permitted to be exported until 1842. The statutes interfering with the emigration of artificers were not wholly repealed until 1825.

During our Revolution and immediately after its close the iron industry of Great Britain was greatly stimulated by the general substitution of bituminous coal for charcoal, by the application of the steam engine to the blowing of furnaces, and by the introduction of the puddling furnace and grooved rolls in the refining and finishing of iron. These improvements greatly increased and cheapened the iron products of Great Britain, so that, instead of being dependent upon this country for a supply of pig iron and bar iron, she was enabled to send these and other iron products to her former colonies in successful competition with their manufactures. The effect was to greatly retard the extension of our iron industry after the Revolution. The competition which produced this result might have been averted if the emancipated colonies had followed the example of the mother country and imposed duties upon foreign iron and steel that would have protected the domestic manufacture of these products. Under the Articles of Confederation and for many years after the establishment of our "more perfect union" duties upon foreign imports of every description were so low that they afforded no adequate protection to American manufactures. From 1789 to 1812 the duty on pig iron and bar iron ranged from 5 per cent. to 19¼ per cent. of their value. In the same years the duty on steel ranged from 50 cents to $1.10 per cwt.

The following petition, presented to the General Assembly of Pennsylvania on November 30, 1785, two years before the adoption of the Federal Constitution, shows the effect at that time of foreign competition upon the manufacture of bar iron in Pennsylvania.

To the Honorable the Representatives of the Freemen of the Commonwealth of Pennsylvania in General Assembly met.

The Petition of the Subscribers, Manufacturers of Bar Iron within the Commonwealth aforesaid, respectfully sheweth

That, by an Act passed during the last Session of the late Assembly, additional Duties are laid on the Importation of divers Manufactures of Europe and other foreign Parts, for the Purpose of protecting and encouraging the Manufactures of this State, wherein your Petitioners find the Article of Bar Iron has been omitted.

That the manufacturing of Bar Iron within this State has not only been found very Useful and important during the late War, but has always been considered as a Source of public Wealth and Benefit; as great Sums of Money were thereby kept within the Country; which circulating through the Hands of several Thousand Persons, employed in the Manufactures of Bar Iron and furnishing the requisite Materials, enabled them to maintain themselves and their Families and contribute to the Support of Government by Payment of Taxes—and an Influx of Specie and other considerable Advantages were also derived to the Trade of this State by the Exportation of great Quantities of Bar Iron to other Parts of the Continent.

That, although most of the Iron manufactured within this State is confessedly superior in Quality to the Iron imported from foreign Parts, yet, because Iron can not be manufactured at so low a Price here as in Countries where the Labourers are but little removed above the Condition of Slaves, the Sale of divers large Quantities of foreign Iron lately imported into this State, notwithstanding its inferior Quality, operates so much to the Prejudice of all Persons concerned in the Manufacture of Bar Iron here, that there is great Reason to apprehend, unless the Legislature shall extend their Aid, further Importations of foreign Iron will in a short Time occasion a total Stoppage and Destruction of that very useful and beneficial Manufacture amongst us.

Your Petitioners trust that, on full Consideration of the Premises, the Manufacture of Bar Iron within this State will appear to your Honorable House essentially entitled to public Protection and Encouragement, and therefore pray your Honorable House may be pleased to grant Relief in the Premises by laying such Additional Duties on foreign Bar Iron as will prevent further Importations thereof becoming destructive or oppressive to the Manufacture of Bar Iron within this State.

And your Petitioners as in Duty bound shall ever pray, &c.

Jacob Morgan, Jr.
David Potts.
James Hartley.
Andw. Pettit.
Jesse Grunfield.
Thos. Humphreys.
Thos. Rutter.
Thos. Mayburry.

Saml. Potts.
J. Hockley.
Wm. Hayes.
John Patton.
George Ege.
Jacob Winey.
Valentine Eckert.
Peter Grubb, Jr.

Curttis Grubb.
Peter Grubb, Sr.
Robt. Coleman.
Matthias Hough.
William Olde.
David Jenkins.
James Old.
Jno. Edwards.

William Bird.
Jacob Leshet.
Michl. Ege.
Jn. Hellings.
Abrm. Sharples.
Hilary Baker.
C. Douglass.
Richd. Backhouse.

The petition was referred on the day of its presentation to a committee composed of Mr. Fitzimmons, Mr. Clymer, and Mr. Whitehill, who submitted an adverse report on the 7th of December, as follows: "That with respect to bar iron it appears that a sufficient quantity may be made in the state, not only for its particular use, but a large overplus for exportation, but that, by the large importations lately made, the price is so much reduced as to disable the owners of forges to go on with their business. Your committee, however, viewing bar iron as necessary to the agriculture and manufactures of the state, are doubtful of the propriety of imposing a tax upon the importation thereof at this time." The committee, however, recommended the imposition of an additional duty of one penny per pound on all nails or spikes imported into the state. The report of the committee was adopted.

Further evidence of the injurious effects of foreign competition upon our domestic iron industry immediately after the peace is furnished in the following extract from the account of Dr. John D. Schoepf's travels in the United States, published at Erlangen in 1788.

> America is richly supplied with iron, especially in the mountainous districts, and the ore is moreover easily obtained; nevertheless, and in spite of the abundance of wood, at present European iron can be brought to America cheaper than the founders and forgers of that place are able to produce it, by reason of the high wages of the workmen. The owners of the iron works in the different provinces, particularly in Pennsylvania and Jersey, tried in vain to induce their governments to prohibit the importation of foreign iron, or to clog it with high duties. As this proposition conflicted directly with the interests of the members of the assembly, as well as with those of their fellow countrymen, it certainly could not be expected that they should decide to pay dearer for their native iron and iron implements, when foreigners could supply them cheaper. Formerly the Americans were able to send their pig and bar iron to England with advantage, for they were relieved of the heavy tax which Russian and Swedish iron paid there. This was the case principally from the middle colonies, and in the year 1768–'70 the exports to England amounted to about 2,592 tons of bar iron and 4,624 tons of pig iron, with which they paid for a part at least of their return cargoes in England. In return they took back axes, hoes, shovels, nails, and other manufactured iron implements, for, although some of these articles were occasionally manufactured in America just as good as in Europe, yet it could not be done under at least three times the cost. Therefore, up to this time, the manufacture of cast iron alone has been found to be particularly advantageous.

It was not until our second war with Great Britain that duties were so increased as to be really protective of domestic industries against foreign competition.

WAGES AND COST OF TRANSPORTATION IN THE IRON AND STEEL INDUSTRIES OF THE UNITED STATES AND GREAT BRITAIN.

The present condition of the iron and steel industries of the United States is one of great prosperity; yet they are subject to disadvantages from which the corresponding industries of other countries are relieved. It is true that it cannot now be said, as it was once said, that they lack the skill, or the capital, or the extensive and complete establishments of other countries; they are no longer infant industries in any sense; nor can it be said that the natural resources for the manufacture of iron and steel in our country are not abundant and varied. But in comparison with the iron and steel industries of other countries they are at a disadvantage in two important particulars. The wages of labor are much higher in this country than in any other ironmaking country in the world; and the raw materials of production, rich and abundant as they are, are in the main so remote from each other that a heavy cost for their transportation is incurred to which no other ironmaking country is subjected.

With reference to wages, a single illustration will show the disparity which exists in the iron and steel industries of this country and Europe. At Pittsburgh the price of puddling, or boiling, iron was fixed for one year on the 30th of May, 1881, in an agreement between the employers and their workmen, at a *minimum* of $5.50 per ton, the price to be advanced if the price of bar iron should advance beyond 2½ cents a pound. Of the $5.50 the puddler's helper receives about one-third. At Philadelphia, in an agreement between the employers and their workmen, on the 24th of July, 1880, the *minimum* price of puddling was fixed for an indefinite period, which still continues, at $4 per ton, of which sum the helper receives about one-third. When the price of bar iron is

2½ cents a pound the price of puddling is to be $4.50 per ton, the helper to receive about one-third. If the price of bar iron advances beyond 2½ cents a pound the price of puddling is to be advanced. The Pittsburgh schedule of wages for puddling prevails in the western parts of the United States, and the Philadelphia schedule is fairly representative of the wages paid in eastern rolling mills. In England the wages of iron and steel workers are probably higher than in any other part of Europe. The north of England is the principal seat of the iron industry of that country. A board of arbitration and conciliation for the manufactured-iron trade of the north of England adjusts the wages of all rolling-mill workmen in the district every three months, upon the basis of the average net selling price of rolled iron during the three months preceding the month in which the board meets. The average net selling price of rolled iron for the three months which ended on the 30th of June, 1881, (a period of prosperity and good prices,) was £6 2*s.* 2*d.*, and the wages of puddlers for the three months beginning on the 1st of August was officially declared to be 7*s.* per ton, or about $1.75, of which sum the puddler's helper, in accordance with the English custom, receives about one-third. The official announcement of the adjustment of wages, dated July 29, is as follows: "In accordance with the sliding-scale arrangement and the resolution of the employers' meeting of February 24, the above-named figure of £6 2*s.* 2*d.* gives 7*s.* per ton as the rate for puddling over the three months commencing on the 1st of August, and a reduction of other forge and mill wages of 2½ per cent. upon last quarter." This announcement is signed by J. R. Winpenny and Edward Trow, secretaries. The difference in puddlers' wages in the north of England and at Pittsburgh and Philadelphia in the same period of time is thus seen to be very great. The wages of other rolling-mill workmen correspond with the wages of puddlers in both countries.

With regard to the cost of transporting raw materials in the United States and Europe, the testimony of a distinguished English ironmaster will be sufficient to show the great disparity which exists in the distances over which they must be transported. Mr. I. Lowthian Bell, a commissioner from Great Britain to the Philadelphia Exhibition of 1876, says in his official report: "The vast extent of the territory of the United States renders that possible which in Great Britain is physically impossible; thus it may and it does happen that in the former distances of nearly 1,000 miles may intervene between the ore and the coal, whereas with ourselves it is difficult to find a situation in which the two are separated by even 100 miles." From the ore mines of Lake Superior and Missouri to the coal of Pennsylvania is 1,000 miles. Connellsville coke is taken 600 miles to the blast furnaces of Chicago, and 750 miles to the blast furnaces of St. Louis. The average distance over which all the domestic iron ore which is consumed in the blast furnaces of the United States is transported is not less than 400 miles, and the average distance over which the fuel which is used to smelt it is transported is not less than 200 miles. Great Britain is our principal competitor in the production of iron and steel. In France, Germany, Belgium, Sweden, and other European ironmaking countries the raw materials of production may not be found in such close proximity as in Great Britain, but they lie much nearer to each other than is usual in the United States. Even when it is necessary to transport raw materials from one European country to another, as in taking the iron ores of Spain to England or Germany, the cost of removal is usually an unimportant consideration because of the short distances they are carried and the facilities which in most cases exist for carrying them by water. When this country is obliged, from any cause whatever, to import iron ores from Spain or from Mediterranean ports, the cost of transportation across the Atlantic and from the Atlantic ports inland imposes a heavy tax upon the consumer.

But it is not only on the raw materials that the cost of transportation operates as an impediment to low prices for manufactured products. The manufactured products themselves must frequently be transported long distances to find consumers. The conditions favorable to the production of iron and steel are not equal in many sections of the Union, and in some sections do not exist at all; iron and steel cannot, therefore, be extensively or profitably manufactured in all sections. The country, too, is of vast extent, while its railroad and other enterprises which consume iron and steel are found in every part of it. It is noticeable, also, that railroads form the principal means of communication between producers and consumers of iron in this country, and that railroad transportation is much more expensive than transportation by natural water routes. Heavy products of iron and steel, for instance, can be carried much more cheaply from Liverpool to the Gulf ports of the United States than from our own rolling mills and blast furnaces which are not situated on the sea-coast or on the Mississippi river, and very few of them are so situated. Iron and steel rails for railroads on the Pacific coast can be carried more cheaply from Liverpool to San Francisco than from Chicago or St. Louis.

To illustrate the influence of transportation charges upon the cost of production of iron and steel the following list of charges upon a few leading routes of transportation in the month of December, 1880, except on Lake Superior iron ores, which are for the summer of 1880, is appended.

1. Freight on the Pennsylvania railroad: The rate on iron ore, cinder, scrap iron, pig iron, blooms, and muck bars, from Philadelphia to Harrisburg, was $1.27 per 2,000 pounds, the distance being 110 miles; from Philadelphia to Johnstown, $2.60 per 2,000 pounds, the distance being 280 miles. These rates are by the car load, and average 1⅙ cents per mile per ton of 2,240 pounds.

The rate on coke from Everson to Harrisburg was $2.32 per 2,000 pounds, the distance being 235 miles; from Everson to Philadelphia it was $2.97 per 2,000 pounds, the distance being 345 miles. These rates are also by the car load, and average about 1 cent per mile per ton of 2,240 pounds.

The rate on manufactured iron from Pittsburgh to Philadelphia was $4 per 2,000 pounds, the distance being 360 miles; from Pittsburgh to New York it was $4.40 per 2,000 pounds, the distance being 452 miles. These rates average 1⅓ cents per mile per ton of 2,240 pounds.

2. Freight on Lake Superior ores: The average lake freight on iron ore from Marquette, Michigan, (the port of shipment near the mines,) to Lake Erie ports during the past season, including season charters and single trip charters, was from $2.50 to $2.65 per 2,240 pounds. The rail freight from Cleveland to Youngstown, 65½ miles, was $1 per 2,240 pounds; from Cleveland to Pittsburgh, which is 131 miles by one line and 151 miles by another, it was $2 per 2,240 pounds. These rail freights average about 1½ cents per mile per ton of 2,240 pounds.

3. Freight on Missouri ores: The railroad which furnishes the principal supply of ore for St. Louis furnaces charges 2½ cents per mile freight per ton, and other railroads in Missouri charge even a higher rate.

4. Freight on coke on Ohio railroads: From Connellsville, Pennsylvania, to Cleveland, Ohio, the freight on coke was $3 16 per 2,240 pounds, the distance being 188 miles by one line and 208 miles by another. The average of these rates is about 1⅗ cents per mile per ton of 2,240 pounds.

5. Freight on pig iron on western railroads, partly in Ohio: From the Mahoning valley, Ohio, to Chicago, Illinois, the rate was about $2.80 per 2,240 pounds, and the distance was about 385 miles, averaging about ¾ of a cent per mile per ton of 2,240 pounds.

SOME NOTABLE ACHIEVEMENTS BY AMERICAN IRON AND STEEL WORKS.

Without extended preface we now present a record of good work by American iron and steel works which has never been equaled in any other country. This record is compiled from information which we have obtained directly from the manufacturers, and relates to the operations of the past few years. It is not claimed that in every instance it gives the *best* work of the works mentioned, nor that it invariably gives the best work done at *any* iron and steel works in our country. While these pages are being prepared for the press better work than they record may have been achieved. Nor is it probable that every achievement that would have deserved a place in this chapter has been reported to us. Incomplete as it necessarily is, the record is valuable in affording a fair conception of our wonderful progress in the manufacture of iron and steel to the present time, and in furnishing the data for comparisons in after years.

BESSEMER STEEL WORKS.

The following statement embraces a correct and very full report of the operations of the Edgar Thomson Steel Works, with two converters, in the calendar year 1880, in tons of 2,240 pounds.

	Gross tons.	Pounds.
Ingots, 86.50 per cent	123, 303	1, 710
Scrap from converters, 3.12 per cent	4, 445	1, 805
Loss in conversion, 10.38 per cent	.14, 799	2, 122
Ingots bloomed	123, 676	810
Blooms produced, 94.19 per cent	116, 487	450
Scrap produced in blooming department, 4.01 per cent	4, 965	2, 050
Loss in blooming, 1.80 per cent	2, 222	2, 190
Blooms rolled	111. 705	1, 710
Rails produced, 89.60 per cent	100, 094	1, 064
Scrap produced in rail department, 7.14 per cent	7, 971	156
Loss in rail mill, 3.35 per cent	3, 640	488
Average number of tons steel per cupola		655. 86
Average number of tons steel per vessel lining		12, 330. 00
Average number of tons steel per vessel bottom		90. 00
Average number of tons steel per steel ladle		91. 62
Average number of tons steel per ingot mold		110. 00

In the twelve months ending January 31, 1881, the two converters of the Edgar Thomson Steel Works made 130,694 gross tons of Bessemer steel ingots; the steel-rail mill rolled 106,722 tons of steel rails; and the billet mill rolled 3,421 tons of billets.

The production of the Edgar Thomson Steel Works in the six months ending June 30, 1881, was as follows: Ingots, 76,758 gross tons; rails, 65,087 tons; forgings, 1,193 tons. The largest runs made in these six months were as follows: Best 24 hours, 623 tons of ingots and 534 tons of rails; best week, 3,433 tons of ingots and 2,823 tons of rails; best month, 14,033 tons of ingots and 11,673 tons of rails. But two converters were used. The percentage of increase in the production of ingots in the first six months of 1881 over the same period in 1880 was 38.48, and in the production of rails it was 50.40.

The Edgar Thomson Steel Works, with two converters, made the following product in the ten months ending October 31, 1881: Ingots, 129,284 gross tons; rails, 112,835 tons; forgings, 1,226 tons. The largest runs made in these ten months were as follows: Best 24 hours, 654 tons of ingots and 578 tons of rails; best month, 14,461 tons of ingots and 13,246 tons of rails. In the week ending November 5, 1881, these works surpassed their previous record, making 3,580 tons of ingots and 3,112 tons of 56-pound rails, but they subsequently exceeded even this large product. In November, 1881, a thirty-day month, they produced 16,193 tons of Bessemer steel ingots and 13,646 tons of rails. The best week's work was 3,902 tons of ingots and 3,202 tons of 56-pound rails. The best 24-hours' work was 700 tons of ingots and 608 tons of 56-pound rails.

In the twelve months ending January 31, 1881, the two converters of the Cambria Iron Company made 126,194 gross tons of Bessemer steel ingots. In the month of January they made 13,343 tons of ingots. In the week ending January 29 they made 3,318 tons of ingots. The best 24 hours' work was 595 tons of ingots.

The blooming mill of the Cambria Iron Company rolled 127,837 gross tons of blooms in 1880; its best month's work was 14,709 tons in March, 1881; its best week's work was 3,306 tons in the week ending November 27, 1880; its best day's work was 612 tons on February 28, 1881.

The rail mill of the Cambria Iron Company rolled 9,985 gross tons of steel rails in May, 1881; in the week ending May 21, 1881, it rolled 2,415 tons.

The Bethlehem Iron Company, with two converters, in October, 1881, made 14,646 gross tons of ingots. Its best week's work was 3,857 tons, and best 24 hours' work was 654 tons. Although the Bethlehem Iron Company has four converters it had at the time sufficient blowing apparatus for only two of them. One of the two new converters was, however, occasionally used in place of one of the two old ones.

The best work by the Bethlehem Iron Company's blooming mill and steel-rail mills has been as follows: Best 24 hours, 679 gross tons of blooms and 458 tons of rails; best week, 3,589 tons of blooms and 2,875 tons of rails; best month, 14,663 tons of blooms and 11,336 tons of rails. In the same month for which the rail production is here given the billet mill rolled 1,214 tons of steel billets.

In the week ending September 11, 1880, the Lackawanna Iron and Coal Company's steel works made 2,830 gross tons of Bessemer steel ingots with two converters. The steel-rail mill in the same week made 2,156 tons of first-quality Bessemer steel rails.

In the week ending October 29, 1881, the two converters of the Albany and Rensselaer Iron and Steel Company made 2,906 gross tons of Bessemer steel ingots; the blooming mill rolled all of these ingots. In this week the best 8 hours' work was 210 tons of ingots; the best 24 hours' work was 544 tons of ingots. The rail mill rolled 2,230 tons of steel rails in this week.

In the month of October, 1881, the Albany and Rensselaer Iron and Steel Company, with two converters, and but three cupolas—running only two of them at one time, made 11,629 gross tons of Bessemer steel ingots; the blooming mill rolled all of these ingots, and the rail mill rolled 8,748 tons of steel rails; the 18-inch steel merchant train rolled 1,070 tons of steel billets and merchant bars; the 16-inch train rolled 1,398 tons of steel billets and merchant bars, losing one week owing to repairs; the sheet mill rolled 343 tons of steel slabs and sheets; the 9-inch train rolled 332 tons of merchant steel.

In the month of January, 1880, the two converters of the Joliet Steel Company produced 10,640 gross tons of Bessemer steel ingots, and the steel-rail mill, although four turns were lost, produced in the same time 8,000 tons of Bessemer steel rails.

The steel works of the Vulcan Steel Company, at Saint Louis, were not put in complete running order until September, 1881. Their record for October is as follows: Ingots, 8,977 gross tons; blooms, 7,778 tons; rails, 6,403 tons.

ANTHRACITE BLAST FURNACES.

One of the furnaces of the Bethlehem Iron Company, at Bethlehem, Pennsylvania, 70 feet by 17 feet, made 1,737 gross tons of pig iron in one month, 428 tons in one week, and 61 tons in one day in 1878.

The Crane Iron Company's furnace No. 5, at Catasauqua, Pennsylvania, 65 feet by 18 feet, made 340 gross tons of No. 1 foundry pig iron in one week in August, 1875; in four weeks it made 1,301 tons.

One of the Coleraine furnaces, at Redington, Northampton county, Pennsylvania, 60 feet by 18 feet, made 13,193 gross tons of pig iron in 1874; weekly average, 253½ tons.

The Durham furnace, belonging to Cooper & Hewitt, situated at Riegelsville, Bucks county, Pennsylvania, 76 feet by 20 feet, made 425 gross tons of pig iron in the week ending May 31, 1879; the largest day's work was 65 tons. On Saturday, June 7, the product was 70 tons.

The No. 1 furnace of the Lackawanna Iron and Coal Company, at Scranton, Pennsylvania, during the fourteen weeks ending March 13, 1880, made an average of 544 gross tons weekly, and the Franklin furnace, owned by the same company, but situated in Sussex county, New Jersey, made, during the same time, 478½ tons weekly. Each furnace is 67 feet by 21½ feet.

The furnace of the Warwick Iron Company, at Pottstown, Pennsylvania, 55 feet by 16 feet, made the following record in the two weeks ending May 24 and 31, 1879, respectively.

Cubic feet of air used per minute	8,655	8,655
Pressure of blast	8.40	8.60
Area of all tuyere nozzles	57.60	57.60
Tons of pig iron produced (2,268 pounds)	414	410
Tons of coal consumed per ton of iron	1.24	1.25
Cubic feet of air to one ton of iron	201,696	196,296
Cubic feet of air consumed per pound of coal	72.61	70.55
Minutes stopped during week	433	782
Yield of ore, per cent	48.78	46.51
Temperature of blast, Fahrenheit	825°	825°

The furnace of the Pottstown Iron Company, at Pottstown, Pennsylvania, in the week ending February 26, 1881, made 461 gross tons of pig iron. The dimensions of the furnace are 60 feet by 16 feet.

The No. 1 furnace of the Phœnix Iron Company, at Phœnixville, Pennsylvania, made the following record for the week ending April 23, 1881.

Dimensions	15 feet bosh, 52 feet working height.
Pig iron made	456.13 gross tons.
Fuel used per ton of pig iron	2,464 pounds.
Temperature of blast, Fahrenheit	840°.
Blast pressure	8 pounds.
Revolutions of engine, 7 feet by 7 feet	20
Volume of air per minute	10,775 cubic feet.
Yield of ore	50 per cent.
Burden	1.6 tons ore to 1 ton of coal.
Quality of iron	Open gray.
Extraordinary stoppage	6 hours.

The No. 3 furnace of the Phœnix Iron Company, 58 feet by 14 feet, in the week ending July 23, 1881, made 359.6 gross tons of pig iron, consuming 2,954 pounds of anthracite coal per ton of pig iron made; in the week ending September 17, 1881, it made 397.5 tons.

One of the Onondaga furnaces, at Geddes, New York, 60 feet by 15 feet, *on part coke*, made 2,093 gross tons of pig iron in two months in 1876.

The Clove furnace of the Parrott Iron Company, in Orange county, New York, 55 feet by 16 feet, made a continuous blast of 10 years and 19 days, from May 26, 1871, to June 14, 1881, during which time it produced 101,245 tons of pig iron of 2,240 pounds to the ton, 75 per cent. of which was No. 1 foundry pig iron. The fuel used for the first seven years was exclusively anthracite coal, but in the last three years a small quantity of coke was occasionally used as a mixture.

BITUMINOUS BLAST FURNACES.

On March 28, 1880, the A furnace of the Edgar Thomson Steel Works, near Pittsburgh, Pennsylvania, 65 feet by 13 feet, made 113 gross tons of pig iron, with a consumption of 1,965 pounds of coke per ton of pig iron, and on ores yielding 54.02 per cent. The B furnace, 80 feet by 20 feet, made 208 tons of pig iron on November 22, 1880. The C furnace, 80 feet by 20 feet, made 224 tons of pig iron on April 28, 1881, the fuel consumption being at the rate of a ton of coke to the ton of pig iron. The best week's work of the C furnace was 1,357 tons, and the best month's work was 5,598 tons.

In the week ending March 28, 1879, the Lucy furnace No. 1, 75 feet by 20 feet, at Pittsburgh, Pennsylvania, made 857 gross tons of pig iron; in the seven days ending March 31 it made 945 tons; in the month of March it made 3,684 tons, a daily average of 118 tons. On November 21, 1880, it made 202 tons in 24 hours.

The Isabella furnace No. 1, at Etna, Allegheny county, Pennsylvania, 75 feet by 18 feet, made 702 gross tons of pig iron in one week in 1875. The Isabella furnace No. 2, 75 feet by 20 feet, made 770 tons in one week in November, 1875; its best day's work in the same week was 116 tons. In one calendar month in 1875 it made 3,163 tons. No. 1 has recently been widened to 20 feet, and has made 1,130 tons in one week in 1881.

One of Shoenberger, Blair & Co.'s furnaces, at Pittsburgh, Pennsylvania, 65 feet by 13½ feet, made 423 gross tons of pig iron in one week in December, 1876.

One of Laughlin & Co.'s Eliza furnaces, at Pittsburgh, Pennsylvania, 61 feet by 16 feet, made in one day, in 1880, 130 gross tons of pig iron; in two consecutive days it made 253 tons.

The Neshannock furnace, at New Castle, Pennsylvania, 60 feet by 16 feet, made 679 gross tons of pig iron in one week in December, 1881, its daily product being 82, 83, 91, 97, 104, 108, and 114 tons.

The Ormsby furnace, at Sharpsville, Mercer county, Pennsylvania, 50 feet by 12 feet, made 301 gross tons of pig iron in the week ending January 22, 1876.

The Rebecca furnace of the Kittanning Iron Company Limited, at Kittanning, Armstrong county, Pennsylvania, 65 feet by 16 feet, made 475 gross tons of pig iron in one week in March, 1881.

Dunbar furnace No. 1, at Dunbar, Fayette county, Pennsylvania, 77 feet by 20 feet, made in a thirty-day month, in 1880, 2,182 gross tons of pig iron on 83 bushels of coke to the ton; the ores yielded for that month 42.5 per cent. of metallic iron. The best week's work during the month was 520 tons, and the best day's work was 80 tons. The best three days' work during this entire blast was 83, 85, and 87 tons, respectively.

The Centennial furnace of the Cambria Iron Company, at Johnstown, Pennsylvania, 75 feet by 20 feet, made 578 gross tons of pig iron in one week in May, 1877.

The No. 2 furnace of the Pennsylvania Steel Company, at Steelton, Dauphin county, Pennsylvania, 75 feet by 20 feet, on fuel consisting of one-third anthracite and two-thirds coke, made 2,916 gross tons of pig iron in November, 1878; 725 tons in one week; and 107 tons in one day.

The furnace of the Low Moor Iron Company of Virginia, at Low Moor, Alleghany county, Virginia, 75 feet by 18 feet, made 110 tons of pig iron on October 8, 1881, each ton weighing 2,300 pounds; 703 tons in the week ending October 8, 1881; and 2,563 tons in the month of September, 1881. The fuel used was coke made at the company's coke ovens from New river coal.

The following details show small fuel consumption in smelting lean ores by the furnace of the Furnaceville Iron Company, in Wayne county, New York, in 1881.

Dimensions of furnace	50 feet by 11 feet.
Average yield of ore for five weeks	40.58 per cent.
Temperature of blast	845 degrees.
Burden per gross ton of coal	1.762 tons of ore.
Anthracite coal used per ton of pig iron made	3,132 pounds.

With an ore yielding 56½ per cent. the consumption of coal would have been but 2,251 pounds.

IRON ROLLING MILLS.

The Union Iron Company of Buffalo, New York, in July, 1874, rolled two beams 15 inches deep, having two flanges 5⅜ inches wide and web five-eighths of an inch thick. The beams, including crop ends, were 53 feet long; the piles weighed 3,851 pounds, and were 13 feet 5 inches long; the finished beams weighed 200 pounds to the yard, were 50 feet in length, and the total weight of each was 3,333 pounds.

The Phœnix Iron Company, of Phœnixville, Pennsylvania, in October, 1881, rolled a 1½-inch "guide round" bar of iron, which, when trimmed, measured 65 feet 5 inches in length, and a ¾-inch "guide round" bar which trimmed 116 feet.

In seven weeks ending May 3, 1879, the Central Iron Works, at Harrisburg, Pennsylvania, made 1,070 gross tons of boiler plate and tank iron from three heating furnaces. The last week's work was 177½ tons, and the average of the last three weeks was 171 tons.

The Pennsylvania Iron Works, at Danville, Pennsylvania, in 12 hours, in October, 1874, heated, rolled, straightened, and punched, ready for use, 156 gross tons of iron rails, using one train of rolls.

Graff, Bennett & Co., of Pittsburgh, Pennsylvania, in October, 1875, rolled some thin sheet iron, of which it took 15,500 leaves to make an inch in thickness.

The Iron and Steel Company of Ironton, Ohio, in September, 1874, rolled a thin sheet of iron, a piece of which, 3 inches wide by 5 inches long, weighed only 19 grains.

The Cleveland Rolling Mill Company, of Cleveland, Ohio, on October 12, 1877, rolled 51,030 pounds of No. 4 wire rods in 9 hours.

NAIL FACTORIES.

The Wheeling Iron and Nail Company, of Wheeling, West Virginia, in February, 1874, cut 6,826 kegs of nails in one week with 105 machines. One man cut 176 kegs of eightpenny nails that week.

In the week ending May 3, 1879, Charles L. Bailey & Co.'s Chesapeake nail works, at Harrisburg, Pennsylvania, made 3,782 kegs of cut nails with 66 nail machines, running single turn.

CRUCIBLE STEEL WORKS.

Park, Brother & Co., of Pittsburgh, Pennsylvania, in September, 1874, rolled a crucible steel plate 180 inches long, 53 inches wide, and three-fourths of an inch thick, weighing 2,700 pounds.

Singer, Nimick & Co., of Pittsburgh, Pennsylvania, in July, 1877, rolled for Emerson, Smith & Co., of Beaver Falls, Pennsylvania, a band saw in one continuous piece, 54 feet long, 8 inches wide, and of No. 15 gauge.

FORGINGS.

In May, 1881, the Nashua Iron and Steel Company, of Nashua, New Hampshire, forged a steamboat shaft weighing 20,230 pounds from an open-hearth steel ingot weighing 26,000 pounds. The largest hammer owned by this company is rated at ten tons, and is double-acting, the steam following the piston in its descent. Iron shafts weighing 15 tons can be readily worked under this hammer.

The Reading Iron Works, at Reading, Pennsylvania, have five hammers in their forge department, weighing from 750 pounds to 10 tons. One marine shaft made by them during the civil war weighed 42 tons.

THE LARGEST STEAM HAMMER.

On the 6th of September, 1881, Park, Brother & Co., of Pittsburgh, put in operation for the first time their 17-ton steam hammer, which is the largest in the United States. It will work steel ingots 2 feet square. The hammer itself was built by Wm. B. Bement & Son, of Philadelphia. The anvil, which is the heaviest iron casting ever made in this country, weighing 160 tons, was cast a few feet from its place with five cupolas, under the direction of Park, Brother & Co., on October 5, 1880; its dimensions are 11 feet high, 8 by 10 feet at the base, and tapering to 4 by 6 feet at the top. The hammer and its fittings occupy a ground space 26 feet long by 13 feet wide. Its height from the ground is 32 feet. The framing is of wrought-iron plates from ⅞ of an inch to 1⅛ inches thick, bolted and riveted and strengthened with angle irons. The weight of the cast-iron cylinder is about 11 tons, the bore 40 inches, and the stroke 9 feet. The piston, rod, ram, and die weigh about 17 tons. When the steam is admitted on top of the piston it will produce an additional force or weight of about 50 tons, making 67 tons pressure in all when the ram or hammer is stationary. The whole cost of the hammer, anvil, and fittings, ready for operation, is estimated at $52,000.

HEAVY CASTINGS.

In the spring of 1881 a large steam cylinder was cast in the city of New York at the Morgan iron works of John Roach & Co. It was intended for a vessel for the Old Colony Steamboat Company. The weight of the rough casting was 30 tons. This cylinder has a stroke of 16 feet 1½ inches, and a diameter of 110 inches.

On the 24th of October, 1881, the breech section of a large cannon was cast in the city of Reading, Pennsylvania, by the Reading Iron Works. The weight of the rough casting was 20 tons. The breech section is 15 feet in length. The barrel section will be 10 feet long, to be made of steel by the Midvale Steel Company, and the entire length of the cannon will be 25 feet. It is a Lyman-Haskell accelerating gun, intended to throw a ball 12 miles, although it will have but a 6-inch bore.

In July, 1862, the I. P. Morris Company's Port Richmond iron works, at Philadelphia, cast an anvil block for a steam hammer for the Lackawanna Iron and Coal Company which was 9 feet square at the base and 7 feet 9 inches high, its rough weight being 61,000 pounds.

During the civil war Charles Knap's Fort Pitt foundry, at Pittsburgh, then under the management of William Metcalf, cast several 20-inch Rodman guns weighing 80 tons in the rough and 116,000 pounds when finished. For each of these guns 100 tons of iron was melted to provide against accidents.

In 1881 the Atlas Works, at Pittsburgh, cast two anvils for the Siemens-Anderson Steel Company, which weighed 22 tons and 16 tons, respectively.

IRON AND STEEL RAILS.

The excellent wearing qualities of American iron rails have been conclusively demonstrated by long experience. This was illustrated at the Philadelphia Exhibition in 1876, when the Cambria Iron Company displayed an iron rail that had been in use nineteen years, three rails that had been in use eleven years, and five rails that had been in use ten years, all under severe wear. The same company also exhibited two iron rails which bridged a gap 12 feet wide and 12 feet deep that had been washed out under the track of a western railroad, and which carried safely over the gap an engine weighing 57,400 pounds and a train of seven cars. The American Iron and Steel Association collected a mass of statistics in 1879 from American railroads relative to the wear of domestic and foreign steel rails, and the general conclusion was derived that American steel rails are superior to English steel rails, while the testimony of the Pennsylvania Railroad Company demonstrated that the American steel rails which had been laid in its tracks were wearing almost twice as well as the foreign steel rails it was also using.

AN INNOVATION IN THE EMPLOYMENT OF LABOR.

In this connection reference may be made to the innovation which has taken place at a few of the blast furnaces and steel works of the country in dividing the day of 24 hours into three turns, or shifts, of 8 hours each, with one set of hands for each turn. The recent experience of the general superintendent of the Edgar Thomson Steel Works may be quoted in favor of the proposition that this new departure in the employment of labor in exhausting situations at American iron and steel works is beneficial alike to the employer and his workmen. He says: "In increasing the output of these works I soon discovered that it was entirely out of the question to expect human flesh and blood to labor incessantly for 12 hours; therefore it was decided to put on three turns, reducing the hours of labor to 8. This has proved to be of immense advantage to both the company and the workmen, the latter now earning more in 8 hours than they formerly could in 12 hours; while the men can work harder constantly for 8 hours because they have 16 hours for rest."

FOREIGN TESTIMONY TO THE EXCELLENCE OF AMERICAN METALLURGICAL PRACTICE.

English technical journals frankly confess the superior skill and mechanical enterprise displayed in the management of the iron and steel works of the United States. On the 7th of January, 1881, *The Engineer*, of London, said:

> The United States ironmasters are beating us by 100 per cent. in the output from their plant. With one pair of converters they can do as much as and more than we can do with two pairs; and, while our blast furnaces turn out 480 tons of pig per week, theirs, much smaller, give as much as 1,100 tons a week. In the rail mills, and bar and sheet mills, matters are in much the same condition. If we are asked to what is this superiority due, we reply that it is to be traced, to some extent, to better organization, and in others to better plant. In the Bessemer works, for example, the drill of the men employed is perfect, and a converter is never stopped for days while being lined up and rebottomed. The converter alone represents but a small part of the plant; but when a converter is standing so to a certain extent do the blowing engines, the hydraulic appliances, ingot molds, and very probably the hammer, the cogging mill, and the rail train. What would be thought of a foundry which was closed while a 5-ton ladle was being relined? In the United States, for a long time back, the moment a converter is burned out it is taken away, and a new one put in its place. The operation requires, we understand, about half an hour at the most. In how many English steel works is the same plan pursued? A great deal of the blast-furnace plant of Great Britain is antiquated, and the sooner it is replaced with more modern plant the better. We may cite, as an

CONCLUSION.

In reviewing the historical pages of this report the most striking fact that presents itself for consideration is the great stride made by the world's iron and steel industries in the last hundred years. In 1788 there were only 85 blast furnaces in Great Britain, most of which were small, and their total production was only 68,300 tons of pig iron. In 1880 Great Britain had 967 furnaces, many of which were very large, and their production was 7,749,233 tons. A hundred years ago there were no railroads in the world for the transportation of freight and passengers. Iron ships were unknown, and all the iron bridges in the world could be counted on the fingers of one hand. Without railroads and their cars and locomotives, and without iron ships and iron bridges, the world needed but little iron. Steel was still less a necessity, and such small quantities of it as were made were mainly used in the manufacture of tools with cutting edges.

The great progress made by the world's iron and steel industries in the last hundred years is as marked in the improvement of the processes of manufacture as in the increased demand for iron and steel products. A hundred years ago all bar iron was laboriously shaped under the trip-hammer; none of it was rolled. Nor was iron of any kind refined at that time in the puddling furnace; it was all refined in forges, and much of it was made in primitive bloomary forges directly from the ore. Nearly all of the blast furnaces of a hundred years ago were blown with leather or wooden bellows by water-power, and the fuel used in them was chiefly charcoal. Steam-power, cast-iron blowing cylinders, and the use of bituminous coal had just been introduced. Less than sixty years ago heated air had not been used in the blowing of blast furnaces, and fifty years ago anthracite coal had not been used in them, except experimentally. Thirty years ago the Bessemer process for the manufacture of steel had not been heard of, and the open-hearth process for the manufacture of steel had not been made a practical success. Thirty years ago the regenerative gas furnace had not been invented. The nineteenth century has been the most prolific of all the centuries in inventions which have improved the methods of manufacturing iron and steel, and which have facilitated their production in large quantities.

The next most important fact that is presented in the historical chapters of this report is the astonishing progress which the iron and steel industries of the United States have made within the last twenty years. During this period we have not only utilized all cotemporaneous improvements in the manufacture of iron and steel, but we have shown a special aptitude, or genius, for the use of such improvements as render possible the production of iron and steel in large quantities. Enterprising and courageous as the people of this country have always been in the manufacture of iron and steel, they have shown in the last twenty years that they have in all respects been fully alive to the iron and steel requirements of our surprising national development. If we had not applied immense blowing engines and the best hot-blast stoves to our blast furnaces our present large production of pig iron would have been impossible. If we had not built numerous large rolling mills we could not have had a sufficient supply of plate iron for locomotive and other boilers, the hulls of iron ships, oil tanks, nails and spikes, and other important uses; nor of sheet iron for stoves and domestic utensils; nor of tee, angle, and channel iron for bridge-building and general construction purposes; nor of iron rails for our railroads; nor of bar iron and rod iron for a thousand uses. If we had not promptly introduced the Bessemer process the railroads of the country could not have been supplied with steel rails, and without the four and a half million tons of American steel rails that have been laid down in the past twelve years our trunk railroads could not have carried their vast tonnage of agricultural and other products, for iron rails could not have endured the wear of this tonnage. If we had not established the manufacture of crucible steel and introduced the open-hearth process there would have been a scarcity of steel in this country for the manufacture of agricultural implements, springs for railway passenger cars, tires for locomotives, etc. Foreign countries could not in late years have supplied our extraordinary wants for pig iron, rolled iron, iron and steel rails, and crucible and open-hearth steel, for, if there were no other reasons, the naturally conservative character of their people would have prevented them from realizing the magnitude of those wants. If our iron and steel industries had not been developed in the past twenty years as they have been it is clear that our railroad system could not have been so wonderfully extended and strengthened, and without this extension of our railroads we could not have produced our large annual surplus of agricultural products for exportation, nor could our population have been so largely increased by immigration as it has been.

We cannot fully comprehend the marvelous nature of the changes which have taken place in the iron and steel industries of this country in recent years unless we compare the early history of those industries with their present development.

In Alexander Hamilton's celebrated *Report on the Subject of Manufactures*, presented to Congress on the 5th of December, 1791, just ninety years ago, it was stated with evident satisfaction that "the United States already in a great measure supply themselves with nails and spikes," so undeveloped and primitive was our iron industry at that time. In the preceding year, 1790, Morse's *Geography* claimed, in a description of New Jersey, that "in the whole state it is supposed there is yearly made about 1,200 tons of bar iron, 1,200 ditto of pigs, and 80 of nail rods," and in 1802 it was boastingly declared in a memorial to Congress that there were then 150 forges in New Jersey, "which at a moderate calculation would produce twenty tons of bar iron each annually, amounting to 3,000 tons."

In 1880 there were several rolling mills in New Jersey and several hundred in the United States which could each produce much more bar iron in a year than all of the 150 forges of New Jersey would produce in 1802.

Less than fifty years ago the American blast furnace which would make four tons of pig iron in a day, or 28 tons in a week, was doing good work. We had virtually made no progress in our blast-furnace practice since colonial days. In 1831 it was publicly proclaimed with some exultation that "one furnace erected in Pennsylvania in 1830 will in 1831 make 1,100 tons of pig iron." But, as George Asmus has well said, "a time came when men were no longer satisfied with these little smelting-pots, into which a gentle stream of air was blown through one nozzle, which received its scanty supply from a leather bag, squeezed by some tired water-wheel." After 1840 our blast-furnace practice gradually improved, but it was not until about 1865 that any furnace in the country could produce 150 tons of pig iron in a week. Ten years later, in 1875, we had several furnaces which could each make 700 tons of pig iron in a week; in 1880 we had several which could each make 1,000 tons in a week; and in 1881 we had one furnace which made 224 tons in a day, 1,357 tons in a week, and 5,598 tons in a month.

In 1810, seventy years ago, we produced only 917 tons of steel, none of which was crucible steel. In 1831, fifty years ago, we produced only about 2,000 tons of steel, not one pound of which was crucible steel of the best quality. So imperfect were our attainments as steelmakers in 1831 that we considered it a cause of congratulation that "American competition had excluded the British common blister steel altogether." In 1880 we had virtually ceased to make even the best blister steel, better steel having taken its place, and in that year we produced 1,247,335 gross tons of steel of all kinds, 64,664 tons of which was crucible steel. Our production of Bessemer steel and Bessemer steel rails in 1880 was larger than that of Great Britain.

It was not until 1844 that we commenced to roll any other kind of rails than strap rails for our railroads, and not even in that year were we prepared to roll a single ton of T rails. In 1880 we rolled 1,305,212 gross tons of rails, nearly two-thirds of which were steel rails, and nearly all of which were T rails.

The growth of the iron and steel industries of the United States during the present century is perhaps best exemplified in the statistics of the production of our blast furnaces at various periods. In 1810 we produced 53,908 gross tons of pig iron and cast iron; in 1840 we produced 315,000 gross tons; in 1860 we produced 821,223 gross tons; and in 1880 we produced 3,835,191 gross tons. Our production in 1881 will be about 4,500,000 gross tons.

The position of the United States among iron and steel producing countries in 1880 is correctly indicated in the following table of the world's production of pig iron and steel of all kinds, which we have compiled from the latest and most reliable statistics that are accessible. This table places the world's production of pig iron in 1880 at 17,688,596 gross tons, and the world's production of steel in the same year at 4,343,719 gross tons. The percentage of pig iron produced by the United States was nearly 22, and its percentage of steel was nearly 29.

Countries.	Pig iron.		Unwrought steel.				
	Year.	Tons of 2,240 pounds.	Year.	Tons of 2,240 pounds.			
				Bessemer.	Open-hearth.	Crucible and other kinds.	Total.
Great Britain	1880	*7, 749, 233	1880	*1, 044, 382	*251, 000	†120, 000	1, 415, 382
United States	1880	*3, 835, 191	1880	*1, 074, 262	*100, 851	*72, 222	1, 247, 335
Germany, including the Grand Duchy of Luxemburg	1879	*2, 397, 818	1880	*686, 500	†50, 000	†40, 000	776, 500
France	1880	*1, 705, 249	1880	†300, 000	†47, 327	*31, 118	378, 445
Belgium	1880	*586, 051	1879	†125, 000	†5, 000	†5, 000	135, 000
Austria and Hungary	1880	*448, 197	1880	*99, 741	*27, 194	†5, 000	131, 935
Russia	1879	*429, 865	1879	†153, 636	†50, 000	*7, 368	211, 004
Sweden	1879	*336, 992	1879	†20, 400	†5, 718	†2, 000	28, 118
Other countries	1880	†200, 000	1880	....	†15, 000	†5, 000	20, 000
Total	......	17, 688, 596	......	3, 503, 921	552, 090	287. 708	4, 343, 719

* Official. † Estimated.

Although this country can not produce iron and steel as cheaply as European countries which possess the advantages of cheap labor and proximity of raw materials, it is not excelled by any other country in the skill which it displays or the mechanical and scientific economies which it practices in any branch of their manufacture, while in certain leading branches it has displayed superior skill and shown superior aptitude for economical improvements. Our blast-furnace practice is the best in the world, and it is so chiefly because we use powerful blowing-engines and the best hot-blast stoves, possess good fuel, and carefully select our ores. The excellent quality of our pig iron is universally conceded. Our Bessemer steel practice is also the best in the world. We produce much more Bessemer steel and roll more Bessemer steel rails in a given time by a given amount of machinery, technically termed a "plant," than any of our European rivals. No controversy concerning the relative wearing qualities of European and American steel rails now exists, and no controversy concerning the quality of American Bessemer

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REPORT

ON THE

SILK MANUFACTURING INDUSTRY

OF THE

UNITED STATES.

BY

WILLIAM C. WYCKOFF,
SPECIAL AGENT.

LETTER OF TRANSMITTAL.

NEW YORK, N. Y., *October* 7, 1881.

Hon. FRANCIS A. WALKER,
Superintendent of Census, Washington, D. C.

DEAR SIR: I have the honor to submit herewith a report upon the silk manufactures of the United States. The report covers the entire period from the earliest introduction of silk into America to June 30, 1880. I am under obligations, which I take great pleasure in acknowledging, for assistance in the historical references, to Mr. J. Carson Brevoort, of Brooklyn, to the Long Island Historical Society, and to the Society Library of New York; and for efficient aid, in the statistical portion of the work, to Mr. P. T. Wood, of New Providence, New Jersey. In closing my labors I embrace the opportunity to express my hearty thanks for the uniform promptness and courtesy of your office at Washington.

Yours respectfully,

WM. C. WYCKOFF,
Special Agent.

SILK MANUFACTURE.

The Spanish conquest of Mexico was the means of introducing the silk industry on this continent. We may dismiss the vexed question alluded to by Prescott (*a*) as to whether the Aztecs made fabrics containing silk. Humboldt declares that the material they used was not the product of the *Bombyx mori.*(*b*) Herrera asserts that there was no silk,(*c*) and Acosta, that there were no mulberry trees in the Indies prior to their introduction from Spain. The voluminous work of Hernandez (*d*) gives full accounts of the plants and animals of the new world, and does not mention the silkworm or the mulberry.

In the year 1522, Cortes, as ruler of New Spain (Mexico) prepared a plan for its government; the details included the appointment of officials in charge of the silk industry. The first step was the planting of mulberry trees, and we learn that these were flourishing near the city of Mexico a few years afterward. The record of certain legal proceedings has secured to history the date of the introduction of the silkworm into America. After Cortes withdrew from personal rule in New Spain, the authorities who were placed in charge by the king made an investigation of what had been done by the board of auditors who preceded them. This was in the year 1531. Among the items of this procedure is a statement (*e*) that a quarter of an ounce of silkworm seed (eggs) was sent on public account from Spain to Francisco de Santa Cruz, a citizen of Mexico. The seed arrived in safety, and was placed by Francisco with Auditor Diego Delgadillo, who was a native of Granada, and presumably knew something of silk culture in his own country, where it was introduced by the Moors. Delgadillo made use of the eggs in a garden about a league from the capital, where mulberry trees were in good condition for the support of the worms. The experiment was eminently successful. The auditor returned two ounces of eggs to Francisco, and retained enough to supply various amounts to other people. The point of the accusation against Delgadillo was that he sold this seed at $60 per ounce; thus disposing of the property of the crown for his own benefit. He was convicted of the crime, though credited with the introduction of silk into the country.

This was the beginning of an industry in the culture of silk, its manufacture into woven goods, and their export abroad, which has not generally attracted the notice of modern writers on the subject. Acosta gives the following account:

> But the silke that is made in New Spaine is transported into other countries, as to Peru. There were no mulberrie trees in the Indies but such as were brought from Spaine, and they grow well, especially in the province which they call Mistecqua, where there are silkwormes, and they put to worke the silke they gather, whereof they make very good taffetaes: Yet to this day they have made neyther damaske, sattin nor velvet.(*f*)

By the end of the sixteenth century this manufacture had almost wholly ceased.(*g*)

So far as silk culture is concerned, however, the industry was after a short interval to reappear on this continent, and unfold itself in the sunshine of royal favor. A brief reference to European events may throw light on the causes that brought about the new effort. At the beginning of the seventeenth century Henry IV, of France, was at the height of his glory and power. Olivier de Serres, whom the French call "the father of agriculture", published in the year 1600 an important and suggestive book on field husbandry. The work attracted the attention of the king, and he bestowed high honor and authority upon its author. Upon the recommendation of de Serres, 14,000 mulberry trees were brought from Italy and planted in the royal gardens of France. Shortly afterward silkworm eggs were similarly procured, and other measures were taken to encourage the nascent manufacture. The prime minister of the king looked coldly upon this enterprise. An old and respectable citizen, the spokesman of a

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a Conquest of Mexico, vol. i, p. 144; note.

b Essai Politique, book v, chap. 12.

c Historia General, decade v, book vi, chap. 12.

d Rerum Medicarum Novæ Hispaniæ Thesaurus (Rome, 1651), first published in 1607.

e Historia General, decade iv, book ix, chap. 4. Also, Descripcion, chap. x.

f The Naturall and Morall Historie of the East and West Indies, by Joseph de Acosta, book iv, chap. 32. Edwd. Grimestone's transl.; London, 1604.

g Essai Politique, Humboldt, book v, chap. 12.

deputation from the silk merchants of Paris, was at this time treated with extreme rudeness by Sully. The quaint garb of the merchant, ornamented with various silks, was made the subject of mockery; the old man, while on his knees to the great minister, was twirled around and dismissed with a sneer. Returning to his friends, the merchant reported that the servant was above his master. Never was there a greater mistake. The king had a will of his own, and was about to help the silk merchants of France toward a prosperity far beyond their dreams. Sully tells the story of his own discomfiture.(*a*) "I exclaimed against this project, which I never liked; but the king was prepossessed; all that I could say was futile." In vain the minister argued that luxury should be repressed, most certainly not encouraged. "I could not persuade him. 'Are these,' he said to me, 'the good reasons you have to offer? I would much rather fight the king of Spain in three pitched battles than all those gentlemen of the robe, of the inkstand, and of the city, beside their wives and daughters, whom you will bring down upon me with your fantastic regulations.'"

The industry was established in France and made notable progress, as to both culture and manufacture. It soon excited the envy of (*b*) James I of England, and he proceeded to copy, even in details, the performance of Henry of Navarre. So the royal gardens at Oatlands were stocked with mulberry trees and the worms were fed on English soil. In 1608 King James addressed a long letter on the subject, written with his own hand, to the lords-lieutenant of every county in his kingdom. He orders that they shall "persuade and require such as are of ability to buy and distribute in your county the number of ten thousand mulberry plants, which shall be delivered to them at the rate of three farthings the plant, or at six shillings the hundred".(*c*) Mulberry seeds were to be furnished also in the following spring, and to be similarly distributed, *i. e.*, at a price. The supposed wants of England having received attention, America was next looked after. In fact, however, nearly a century elapsed after their introduction by the Spaniards before silkworm eggs were again brought to this continent from Europe, and King James supplied the "seed". The undertaking met with delay at the outset. The expedition of Sir George Summers with a fleet of seven vessels bound for the shores of Virginia in 1609, suffered shipwreck and disaster. Two vessels were lost entirely; the rest were driven by storm to the Bermudas. A part of the expedition ultimately reached Virginia, but brought no silkworm eggs. This was two years after the settlement of Jamestown (named in honor of the king) by the London Company, the holders of a grant which covered the region between 34° and 41° of latitude. There is abundant evidence that the colonists were in no condition at this period to prosecute silk culture. Indeed they were soon afterward on the verge of starvation.

The historian of the unlucky voyage of 1609, William Strachy, seems to have taken much interest in silk. He mentions that they found silkworms on the Bermuda islands rolled up in the leaves of the palmetto, and that these worms were like those described by Acosta, that were found on the *tunall* tree. The two statements are bewildering errors, and it is worth while to notice them as of a piece with many records of native silkworms found in the Bermudas and on the American continent. The true silkworm does not roll itself in palmetto leaves. Acosta had evidently not seen the "worms" he refers to; his description of the cactus on which they feed and the red dye that is obtained from them, shows that he was giving an account on hearsay, being very imperfectly informed, respecting the cochineal insect. No doubt there were strong representations made to King James of the fitness of the colony for silk raising. Sir Thomas Gates, about the year 1610, was adjured by the Council of Virginia to "deal plainly with them" as to the capabilities of the new country and the prospects of the colony. He replied under "a solemn and sacred oath". In the course of this testimony he says:

> There are innumerable white mulberry trees, which in so warme a climate may cherish and feede millions of Silkewormes, and return us in a very short time as great plenty of Silke as is vented into the whole world from all parts of Italy.(*d*)

For some years the colony was in a forlorn condition,(*e*) but in 1619 great efforts were made for its relief. Silk culture appears prominently as among the means to help the people out of their poverty, in the measures taken by legislative and governing powers on both sides of the Atlantic. The colonial assembly, in its first brief session of five days, found time to order the planting of mulberry trees and the rearing of silkworms.(*f*) The following is recorded as one of the items in a sort of invoice described as "A Note of the Shipping, Men and Provisions sent to Virginia by the Treasurer and Company in the Yeere 1619":(*g*)

> Silke: for which that Countrey is exceeding proper, having innvmerable store of Mvlberry Trees of the best, and some Silkwormes naturally found upon them, producing excellent Silke: some whereof is to be seene. For the setting vp of which Commoditie his Majesty hath beene graciously pleased now the second time (the former having miscarried) to bestow vpon the Company plenty of Silkwormes-seed of his owne store, being the best.

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a Mémoires de Sully, année 1603, liv. xvi; London, 1778, vol. v, pp. 150–159.

b An Essay upon the Silk-Worm, by Henry Barham; London, 1719, p. 46.

c *Ibid.*, p. 50. This letter was printed with "Instructions for the Increasing of Mulberrie Trees and the Breeding of Silke-Wormes" (illust.), London; 1609.

d Purchas, his Pilgrimes, vol. iv, p. 1734.

e Sir Dudley Diggs asserts in 1615: "The great Expence that the Nobility and Gentry have been at in planting Virginia is in no way recompensed by the poor Returns from thence." An Historical and Chronological Deduction of the Origin of Commerce, by Adam Anderson; London, folio edition, 1764, vol. i, p. 494.

f A Reporte of the Manner of Proceedings in the General Assembly, convented at James City in Virginia July 30, 1619, by John Pory, the Secretary and Speaker.

g Purchas, vol. iv, p. 1777.

The royal gardens at Oatlands furnished this supply of eggs, and from there also a person skilled in silk culture was sent to give instruction to the colonists. In the same year King James issued his famous "decree and proclamation" against tobacco, checking its import into England by an almost prohibitory duty. Nor was that duty intended to protect home industry in the Virginia weed, for another proclamation in that year forbade the cultivation of tobacco in England and Wales, and the plants growing in the kingdom were uprooted. The king was undoubtedly anxious to have silk raised instead of tobacco throughout his domain. Another circumstance made 1619 a memorable year; it was then that this most christian monarch, while striving to check the comparatively harmless vice of using tobacco, sanctioned and authorized by royal charter a joint-stock company in London with the exclusive privilege of taking negroes from Africa into slavery in the colonies. The effects of that enterprise were permanent.

Sending out silkworm eggs from England was followed in 1622 by the most peremptory and urgent directions to encourage silk culture. Aid was promised on the one hand to colonists who entered heartily into the work, and on the other hand punishments were ordered for those who neglected the matter. As will be seen by the documents, the king was impatient and would brook no further delay:

His Maiesties gracious Letter to the Earle of South-hampton, Treasurer, and to the Counsell and Company of Virginia here: commanding the present setting vp of Silke Workes, and planting of Vines in Virginia:(a)

Right trusty and wellbeloued, We greete you well: whereas We understand, that the soyle in Virginia naturally yieldeth store of excellent Mulberry trees, We have taken into our Princely consideration the great benefit that may grow to the Adventurers and Planters, by the breede of Silkewormes, and setting vp of Silkeworkes in those parts. And therefore of Our gracious Inclination to a designe of so much honour and advantage to the publik, We have thought good, as at sundry other times, so now more particularly to recommend it to your speciall care, hereby charging and requiring you to take speedy order, that our people there use all possible diligence in breeding Silkewormes, and erecting Silkeworkes, and that they rather bestow their travell in compassing this rich and solid Commodity, then in that of Tobacco; which, beside much vnnecessary expence, brings with it many disorders and inconueniences. And for as much as Our seruant, John Bonoell(b) hath taken paines in setting downe the true vse of the Silkeworme, together with the Art of Silkemaking, and of planting Vines, and that his experience and abilities may much conduce to the aduancement of this businesse; We doe hereby likewise require you to cause his directions, both for the said Silkeworkes and Vineyards, to be carefully put in practice thorowout our Plantations there, that so the worke may goe on cheerefully, and receive no more interruptions nor delayes.

Giuen vnder Our Signet, at Our Pallace of Westminster, the ninth day of Iuly, in the twentieth yeare of our Raigne of England, France and Ireland, and of Scotland the fiue and fiftieth.

To our right trusty and right wellbeloued Cousin and Councellour, HENRY, Earle of South-hampton, Treasurer of our Plantation in Virginia, and to Our trusty and wellbeloued, the Deputy, and others of our said Plantation.

WINDEBANK.

Virginia.

The royal instructions were transmitted and strongly enforced, as appears by the following communication:

The Treasurour, Counsell and Company of *Virginia*, to the Gouvernour and Counsell of State in *Virginia* residing:

After our very hearty commendations: His Sacred Majesty, out of his high wisedome and care of the noble Plantation of Virginia, hath beene graciously pleased to direct his Letters to us here in *England*, thereby commanding vs to aduance the setting vp of *Silkworkes*, and planting of *Vineyards;* as by the Copy herewith sent, you may perceiue. The intimation of his Maiesties pleasure, we conceiue to be a motiue sufficient, to induce you to imploy all your indeuors to the setting forward those two Staple Commodities of *Silke* and *Wine;* which brought to their perfection, will infinitely redound to the honour, benefit, and comfort of the Colony, and of this whole Kingdome: yet we, in discharge of our duties, doe againe renew our often and iterated Instructions, and inuite you cheerefully, to fall vpon these two so rich, and necessary Commodities. And if you shall finde any person, either through negligence or wilfulnesse, to omit the planting of *Vines*, and *Mulberry trees*, in orderly and husbandly manner, as by the Booke is prescribed, or the planting of conuenient roomes for the breeding of *Wormes;* we desire they may by seuere censures and punishment, be compelled thereunto. And on the contrary, that all fauour and possible assistance be giuen to such as yeelde willing obedience to his *Highnesse* Commands therein. The breech or performance whereof, as we are bound to giue a strict account, so will it also be required of you the *Gouernour* and *Counsell* especially. Herein there can be no Plea, either of difficulty or impossibility; but all the contrary appeares, by the naturall abundance of those two excellent Plants afore-named euerywhere in *Virginia;* neither will such excuses be admitted, nor any other pretences serue, whereby the businesse be at all delayed; and as wee formerly sent at our great charge the *French Vignerons* to you, to teach you their Art; so for the same pvrpose we now commend this Booke vnto you, to serue as an Instructour to euery one, and send you store of them to be dispersed ouer the whole Colony, to euery Master of a Family one, Silke-seede you shall receiue also by this Ship, sufficient to store euery man: so that there wants nothing, but indvstry in the Planter, svddenly to bring the making of *Silke* to its perfection: which either for their owne benefit (we hope) they will willingly indeuour, or by a wholesome and necessary seuerity they must be inforced.

The letter goes on to state that it is of urgent character, and not to be taken as a common instruction. There is a marginal note stating that the "Booke" referred to contains good rules for silkworks, vines, and other husbandry. The document itself is signed by the Earl of Southampton. In 1623 the legislature of the colony issued further orders requiring mulberry trees to be planted, the fine for neglect being 20 pounds of tobacco. The act also offered a premium of 50 pounds of tobacco for every pound of reeled silk produced.(c)

At this point we can give what is probably the earliest quotation for raw silk in this country. It includes also the price of cocoons; here described as "coddes" and elsewhere as "bottomes". Too much stress should not be

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a Purchas, vol. iv, p. 1787, *et seq.* b This name is also spelled "Bonoeil". Vid. Barham's Essay, which also gives these letters.

c This curious act was reproduced in full in a monthly publication, *The American Silk Grower*, Philadelphia, December, 1838.

laid upon the accuracy of the record, as it was put in print nearly thirty years after the period to which it refers. The traffic could not have been large, but there is other evidence that some silk was made, and we may in any case regard the quotations as "offering prices" of that date:

From "A valuation of the commodities growing and to be had in Virginia: valued in the year 1621. And since those Times improved in all more or lesse, in some ⅛, in others ⅓, in many double, and in some treble.

"Silk Coddes, two shillings sixpence the pound.

"Raw silk, 13*s.* 4*d.* the pound, now at 25*s.* and 28*s.* per pound.

"Silk grasse to be used for Cordage, 6*d.* the pound." This has reference to a fibrous plant growing wild and extensively in the colony. Queen Elizabeth had a gown made of this material, described as "a substantial and rich peace of Grograine". It was hoped that by cultivation the fibre of this grass could be improved so as to equal the silk which it was said to resemble.(*a*)

The art of weaving broad silks was introduced into England, and those who were so engaged were included in the great company of weavers, at or about this period; the date generally assigned for the event being 1620. The silk-throwsters of London formed a corporation and were chartered in 1629.(*b*) The needs of the growing manufacture in the mother country probably caused the advance of price of the raw material in the colony. Royal encouragement was of brief duration. The king and the Virginia Company quarreled, and the latter were ousted from all their rights and powers by proclamation of James I, July 15, 1624. On his accession to the throne in the next year, Charles I took the government of the colony into his own hands.(*c*) Very little progress in silk culture seems to have been made during the reign of that unfortunate monarch. Under the Protectorate, interest in the subject was revived, and several curious tracts were written on behalf of the industry. The most noted of these essays were by ("E. W.") Edward Williams (*d*) (1650) and Hartlib (1652–'55). Williams regards the production of silk as one of the wonders of nature; a mystery, which if taught to the savages, might impress them with pious awe. He says:(*e*)

1. First, the Indian is naturally curious and very ingenious, which they show in all their works and imitations; the only thing that frights them from bringing any work to perfection, is the labour attending it.

2. But to feed his curiosity, there is nothing in the world more proper then this curious atome of Nature the Silkeworme: to see this untaught Artist spin out his transparent bowels, labour such a monument out of his owne intralls, as may be the shame, the blush of Artists, such a Robe that Solomon in all his glory might confesse the meannesse of his apparell, in relation to the workemen, cannot but bring them to admiration; and that those spirits whose thoughts are of a higher wing then ordinary, may bee convinced of a divine power of the hand of God in the Creation: which gayned upon him, it will not be impossible to drive him to an acknowledgement of Redemption, if private ends or any other respect then that to God's glory, possesse not those who should cover a multitude of sinnes, by winning a soule to his Creator, and forcing him from the jawes of his Destroyer.

3. In this curiosity there is little or no labour (a thing which they abhorre) their women and children will bee sufficient to goe through with it: and if they could but be brought to it, our Trade with them for Silke would be of greater consequence, then all their Furs or other commodities put together.

This is followed by an estimate that the silk thus produced might be purchased in barter at five shillings per pound; the barter to be for British cloths which it was hoped the Indians might be induced to want when they were so far civilized as to require clothing. A similar idea impressed itself on Samuel Hartlib, who was an enterprising merchant of London, and who has a better chance of remembrance in literature than the other silk essayists of the period, since Milton dedicated to him a Treatise on Education. The title of one of Hartlib's books is itself a curiosity:

"The Reformed Virginian Silk-Worm, or, a Rare and New Discovery of a speedy way, and easie means, found out by a young Lady in *England*, she having made full proof thereof in *May*, *Anno* 1652. For the feeding of Silk-worms in the Woods, on the Mulberry-Tree-leaves in *Virginia:* Who after fourty dayes time, present their most rich golden-coloured silken Fleece, to the instant wonderful enriching of all the Planters there, requiring from them neither cost, labour, or hindrance in any of their other employments whatsoever. And also to the good hopes that the *Indians*, seeing and finding that there is neither Art, Skill, or Pains in the thing: they will readily set upon it, being by the benefit thereof inabled to buy of the *English* (in way of Truck for their Silk-bottoms) all those things that they most desire."(*f*)

In his introduction, Mr. Hartlib refers to the efforts of King James to extend silk culture in England by planting mulberry trees and rearing silkworms. The Hartlib essay is addressed to the planters of Virginia, and is designed to urge them in the same industry and to exhibit the superior advantages they may enjoy by obtaining the cocoons of certain native insects producing wild silk. The Indians were to be pressed into this service, in the hope of converting them to christianity and making a profit at the same time, and the essay overflows with pious phrases and calculations of gain, curiously intermingled. The insect and its cocoon are described as of extraordinary size, as follows:

"The fashion of the Botome.(*g*) The Silk Bottome of the naturall Worm in *Virginia*, found there in the woods, is ten Inches about, and six Inches in length to admiration: & whereas ours in Europe have their Sleave and loose Silke on the outside; and then in a more

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a Virginia: More especially the South part thereof * * * —the fertile Carolana, by Edward Williams; second edition, London, 1650; reprint, Force's Tracts, vol. iii, No. xi, p. 51.

b Act 5, Charles I. Anderson's Origin of Commerce, ii, pp. 4 and 36.

c Jefferson's Notes on Virginia, p. 182.

d Virginia's Discovery of Silke-Wormes, with their Benefit. And Implanting of Mulberry Trees, by E. W., London, 1650. The engravings in this work are exquisitely quaint.

e Force's Tracts, vol. iii, No. xi, p. 93.

f London, 1655.

g This word is variously spelled.

closer covering they intombe themselves. These rare Worms, before they inclose themselves up, fill with silk the great emptinesse, and afterward inclose themselves in the middle of it, so they have a double Bottom. The loose Sleave silk is all on the outside of that compass, for if that were reckoned in, the compasse of the Bottom would far exceed this proportion: But this is sufficient to be the Wonder of the whole world: to the Glory of the Creatour, and Exaltation of VIRGINIA."(*a*)

The essay concludes with "Ryming lines", "collected by a young Scholar, out of Letters", sent from Virginia to England. A few specimens will suffice:

Where Wormes and Food doe naturally abound,
A Gallant Silken Trade must there be found:
Virginia excells the World in both,
Envie nor malice can gaine say this troth.(*b*)

* * * * * *

Her Worms are huge whose bottoms dare
With Lemmons of the largest size compare.

* * * * * *

Master William Wright of Nansamound
Found Bottoms above seven Inches round.(*c*)

But although a governor of the Colony, Edward Diggs, joined the ranks of the essayists,(*d*) it does not appear that the planters were stirred to much activity in raising silk. The hopes that illumine the pages of many writers of the period were slenderly if at all fulfilled. The causes of such complete failure are not obvious. The historian Bancroft has summed up the subject in a resounding sentence which declares that "the culture of silk, long, earnestly, and frequently commended to the attention of Virginia, is successfully pursued only where a superiority of labor exists in a redundant population".

Punishments and rewards were alike in vain. An act of the colonial assembly in 1656 imposed a fine of ten pounds of tobacco on any planter who had not at least ten mulberry trees to every hundred acres. A premium of 4,000 pounds of tobacco was given as a reward for remaining in the business of silk culture in the colony. In 1657, 10,000 pounds of tobacco were offered to any one exporting £200 worth of raw silk, and 5,000 pounds of tobacco to any one producing 1,000 pounds of "wound silk" in a year. The act of 1656 was repealed in 1658, but was revived in 1660. A reward was offered in 1662,(*e*) of 50 pounds of tobacco for every pound of silk raised, and Sir William Berkeley, the governor of Virginia, received, September 12, pressing instructions from King Charles II to urge forward the industry. But it is difficult to find any record of the product. There is indeed a tradition, treated rather incredulously by historians, that the king at his coronation in 1660 wore a robe and hose of Virginia silk. A letter of instructions to Governor Berkeley gives color to this legend in the following phrase: "We ourself having made experience of the Silk grown there and finding it to be equal to any we have seen."(*f*)

In 1666 all acts giving bounties for silk or requiring mulberry trees to be planted were repealed; in 1669 there was a brief revival of the bounties, but after that, all legislative encouragement ceased.(*g*) The mulberry had been abundantly planted, and one claimant for bounties proved that he had 70,000 trees growing in 1664. Governor Berkeley "made essays" of flax, hemp, silk, and other productions,(*h*) and in 1671, in an answer to the committee on plantations, used the cautious expression: "Of late we have begun to make silk." In that year the number of persons engaged in silk manufacture in England was estimated at 40,000. Perhaps if the pressure brought to bear upon silk culture had been equally applied to the making of silk goods, Virginia might have shared in England's prosperity, and both branches of the industry could have been sustained. But this was no part of the colonial policy of Great Britain. Even the trained skill of Piedmont was not welcomed. Cromwell's navigation laws of 1651 not only prohibited receipt or export by other than English-built ships, manned by Englishmen, but also forbade that any alien should manage a trade or factory in the colonies.(*i*)

The Virginia legislature did indeed make an effort toward manufacture, by ordering each county to establish a loom and support a weaver, but the act was repealed in 1684, and seems to have been of no practical effect. There are no records of any further noteworthy production of silk in Virginia, though we are told that "the mulberry tree grows there like a weed, and silkworms have been observed to thrive extremely and without hazard".(*j*) Virginia's weed supplanted even the thrifty mulberry. Formerly, says the historian of the colony, "there was great encouragement given for making of linen, silk, etc., and all persons not performing several things toward producing of them were put under a fine. Now, all encouragement of such things is taken away or entirely dropped by the assemblies, and such manufactures are always neglected when tobacco brings anything of a price."(*k*) Lastly, about the year 1698, Governor Nicholson sent a memorial to England, in which he urged parliament to pass an act forbidding the plantations to make their own clothing. But there was no necessity for choking the provincial industry; it was dying a natural death.

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a Hartlib, p.18. *b* *Ibid.*, p. 33. *c* *Ibid.*, p. 34.

d Writing in 1654, Governor Diggs mentions that he had raised "400 pound weight of silk bottomes", and he adds: "This next spring there will be divers tryals made of the hopeful natural Worms that you so highly prize, and not without good cause." *Ibid.*, p. 28; also, Barham, p. 100.

e History of Virginia, by Robert Beverley; London, 1705, vol. i, p. 58. *f* Hazard's Historical Collections, vol. ii, p. 608.

g Twentieth Congress, 1st sess., H. R. Doc. 158, p. 14.

h Beverley's Virginia, i, p. 58. *i* *Ibid.*, i, p. 51. *j* *Ibid.*, iii, p. 239. *k* *Ibid.*, iii, p. 261.

During the latter part of the seventeenth century a large body of French Huguenots settled in the southern part of the province of Carolina.(*a*) They brought with them a knowledge of various industries, and are probably to be credited with the earliest production of silk-mixed fabrics in this country. "South Carolina hath gained a manufacture of linens by means of the French refugees, and invented a new kind of stuff by mixing the silk it produces with its wool."(*b*) At about the same period, 1693 to 1702, a vigorous though restricted attempt at silk culture was made by Sir Nathaniel Johnson, and the locality of this undertaking bore the name of Silk Hope for more than a century.(*c*) The results are thus summarized: "However, Sir Nathaniel Johnson, after all his pains, rather showed what might have been done toward the culture of silk in that province, than made such progress in it as to render the commodity of national advantage."(*d*) There was no slackening of demand for raw silk in the mother country; the silk-throwing mill of Sir Thomas Lombe was started at Derby, England, in 1719.(*e*) A writer of that date states the whole case with precision:

> Silk is a Commodity of great Use in England for many Manufactures, it being imported to us from *France, Italy, Sicily, Turkey*, and the *East Indies;* and there is no Foreign Commodity, which exhausts more of our Treasure. I am not so vain as to promise, this country can furnish Great-Britain with so much Silk as is therein manufactured, which would amount to above a Million *Sterling* annually: But if this Province is ever settled (it abounding in most Parts with Forests of Mulberry Trees both White and Red) and we keep a good Correspondence with the Natives, which is both our Duty and Interest, certainly a considerable Quantity of Silk may be here produced. It hath been already experimented, in *South Carolina*, by *Sir Nathaniel Johnson* and others, which would have return'd to great Account, but that they wanted Hands, Labourers being not to be hir'd but at vast Charge. Yet if the Natives or *Negroes* were employ'd who delight in such easy light Labours, we could have that done for less than One shilling, which costs them more than six. Now I appeal to all good *Englishmen*, if we can raise only a Tenth part of the Silk expended in *Great Britain*, etc., and perhaps half an Age hence the Fifth, whether it would not be very beneficial to our Native Country?(*f*)

The foregoing extract seems likely to be of interest to modern promoters of schemes for employing southern negroes in silk raising, since the suggestion of such service as peculiarly suitable for the colored race is thus antedated more than 150 years. Joshua Gee, an eminent English publicist, made an estimate that the labor of slaves employed in raising silk would produce about twice as much value as in planting sugar or tobacco.(*g*) Nor is the list of possible silk culturists ended when it includes planters, Huguenots, Indians, and negroes. Another writer, who has taken great pains with calculations of profit, urges that the mother country should send her paupers and "small offenders" to South Carolina; "it must be a weak Hand indeed that cannot earn bread where Silkworms and white mulberry trees are so plenty."(*h*) The argument will commend itself to the managers of state charities:

> Let us suppose that Twenty Five Thousand of the most helpless People in Great Britain were settled there at an expence of half a Million of Money; the Easiness of the Labour in winding off the Silk and tending the Silk Worm would agree with the most of those who throughout the Kingdom are chargeable to the Parishes. That Labour with the Benefit of Land stock'd for them *gratis*, would well subsist them, and save our Parishes near Two Hundred Thousand Pounds a Year directly in their annual Payments; not to compute (what) would also be saved indirectly, by the Unwillingness of many pretended Invalids to go the Voyage, who would then betake themselves to industrious Courses to gain a Livelyhood.(*i*)

There was a general belief that England lost money by the sums paid to foreigners for the raw material from which goods were made. This notion appears prominently in writings upon economical subjects throughout the seventeenth and eighteenth centuries. It began with the birth of English textile manufacture, and lasted till the use of the steam engine altered the conditions and problems of industry. Silk had to bear the brunt of this obloquy.

> As this Nation very much inclines to the Wearing Silk Garments in imitation of the French, to the great Discouragement of our Woollen Manufacture, the Manufacture of Silk from our Plantations would not only enable us to supply ourselves, but to be capable of Exporting very great Quantities of Silk fully Manufactured.(*j*)

In fact, however, the silk industry of the mother country had made some notable advances. English manufacturers, who had long been dependent upon Italy for thrown silk, were now making their own tram and organzine. The machinery in general use was, indeed, such as is driven by the hand or foot of the operative; but there was one great exception, a power-driven machine in the factory of Sir Thomas Lombe. The importance of this invention seems to have been fairly recognized:

> As we have but one Water engine for throwing silk in the Kingdom, if that should be destroyed by Fire or any other Accident, it would make the Continuance of throwing fine Silk among us very precarious; and it is very much to be doubted whether all the Men now living in the Kingdom could make such another.(*k*)

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a The official division of the Carolinas into North and South was not made until 1728, when the province was taken under direct control of the crown. Philos. and Polit. Hist. of the Carolinas, by the Abbé Raynal; Edinburgh Transl., i, p. 210.

b Raynal, i, p. 213.

c Ramsay's Hist. S. C., ii, p. 475.

d Hist. Acct. S. C. and Ga., by Dr. Alex. Hewatt, i, p. 157.

e 20th Congress, 1st sess., H. R. Doc. 158, p. 13. This document will hereafter be cited simply as the "Rush Letter".

f A Description of the English Province of South Carolana, by Daniel Coxe; London, 1722, p. 90.

g The Trade and Navigation of Great Britain, London; 1738, chap. xxx, p. 146.

h A New and Accurate Account of the Provinces of South Carolina and Georgia; London, 1732, chap. v, p. 55.

i *Ibid.*, chap. iv., p. 51.

j Gee's Trade and Navigation, chap. xxx.

k *Ibid.* "This amazingly grand machine contains 26,586 wheels and 97,746 movements, which work 73,726 yards of organzine silk thread every time the water-wheel goes round, being thrice in one minute, and 318,504,960 yards in one day and night." The buildings occupied by this machinery were an eighth of a mile in length. Anderson, Origin of Commerce, ii, p. 284.

Far more anxiety for silk culture in the colonies was displayed in England than in America. The planters did not take serious interest in the business. A colony of Swiss who settled in South Carolina about 1733–'35 (a) under the leadership of John Peter Purry, of Neufchatel, was successful in raising silk and cotton, and was credited with some progress in manufacture. The mulberry tree flourished in the light and sandy soil of the pine lands.(b) The excellent quality of South Carolina silk was certified by Sir Thomas Lombe, who considered it equal in strength and beauty to that of Italy.(c) But as to amount produced, the following figures speak for themselves:

Raw silk exported from North and South Carolina to Great Britain between 1731 *and* 1755.(*d*)

	Pounds.
1731 to 1741	—
1742	18½
1743–1747	—
1748 (8 boxes)	52
1749	46
1750	118
1751 and 1752	—
1753	11
1754	—
1755	5½
Total in twenty-five years	251

In the last-named year Mrs. Pinckney, who is also famous as the introducer of the indigo plant into South Carolina, took with her to England some silk which she had raised and spun near Charleston; three complete dresses were made therefrom; one was presented to the princess dowager of Wales, one to Lord Chesterfield, and one remained an elegant heirloom in possession of the family for more than fifty years.(e) (During the Revolutionary War the Pinckneys won renown which outshone that of the arts of peace.) It is said that 630 pounds of silk were raised in 1765 at Silk Hope plantation. Perhaps South Carolina did not get full credit for her silk products, as much of it went to Georgia to be reeled, resulting in its ultimate shipment from Savannah. There is some curious evidence of popular belief or rumor to this effect, which will be mentioned hereafter. Charleston people wanted a filature in their city to prevent the diversion of trade, and an act was passed to meet the wish, in 1766, by the colonial assembly. This was followed by a grant of £1,000 to support the enterprise. Meanwhile the London Society of Arts was giving handsome bounties for cocoons and raw silk, and kept up the offer till 1772; Parliament in 1769 granted a bounty of 25 per cent. for seven years on all raw silk imported from the colonies.(*f*) But the Revolutionary War put a stop to the bounties, and the silk industry of South Carolina ceased to exist. The Abbé Raynal has pronounced its funeral oration. That philosophical writer of course offers a theory; silk was not exported because negresses were not imported. He concludes:

> Yet the progress of this branch of trade has not been answerable to so promising a beginning. The blame has been laid on the inhabitants of the colony, who, buying only negro men from whom they receive an immediate and certain profit, neglected to have women who, with their children, might have been employed in bringing up silkworms, an occupation suitable to the weakness of that sex and to the tenderest age.(*g*)

Tracing the silk industry in the order of its starting at different points in this country, we find it introduced into Louisiana next after South Carolina. In 1716 the notorious John Law formed, at Paris, the Mississippi Company, which was a leading feature in a series of speculative schemes that were afterward called the great South Sea bubble. Louisiana had been settled by the French. The city of New Orleans was founded in 1718, and about that time the whole colony was transferred to the Mississippi company by a grant of the French crown. Law organized and sent out a large expedition in 1718. In the glittering prospectus (*h*) of this speculation, one of the items was the culture of silk on the banks of the Mississippi, and this part of the programme was in a measure

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a Raynal, vol. i, p. 223.
b Description of the Province of South Carolina, by George Milligen; London, 1770, p. 8.
c Letter of Thomas Lombe to the Trustees of Georgia, January 31, 1732.
d A Description of South Carolina, London, 1761, p. 96 (authorship somewhat uncertainly ascribed to Governor Glen, of that province).
e Ramsay, i, p. 221.
f Raynal, ii, p. 160.
g *Ibid.*, ii, p. 159.
h Anderson gives a long abstract of the projects of the South Sea Company. Under one section there are the following details:

"For the *Silk* and *Cotton* manufactures, viz:

1. For the raising of *Silk-worms.*
2. Another for the planting of *Mulberry Trees* and breeding of *Silk-worms* in *Chelsea Park* where 2,000 of those trees were actually planted and many large and expensive edifices were erected; the remains whereof are now (1764) scarcely to be seen. (Particulars about these trees and their estimated value as assets of a stock company can be found in *Barham's Essay*, pp. 95, 105, and 278. It was expected that they would produce 14,000 pounds of silk, worth £14,000 per year.)
3. For making of *Muslin.*
4. For improving the Cotton and the Silk and Cotton Manufactures.
5. Another for improving the Silk Manufactures." Origin of Commerce, ii, p. 295.

carried out. Many mulberry trees were planted in and near New Orleans. Failure to reach profitable results seems, however, to have overtaken every branch of Law's schemes. "The Ancient India Company never sent more than a few shiploads of its products to France, and the unfortunate Mississippi colony furnished next to nothing."(*a*) After the South Sea bubble burst, the ownership of the land and the control of the colony reverted to the crown. The French held possession till 1762, when they ceded it to Spain. We do not read of any considerable silk product. Favorable soil and climate, and a knowledge of the business on the part of the colonists, were not wanting; but legislative bounties were.

Georgia, which had been part of the "fertile Carolinas", was made by royal charter a separate province in 1732, and placed in control of a board of trustees. This event became the occasion of an urgent pressure in favor of silk culture. The trustees themselves heartily favored the project, and fixed upon silk and wine as the leading staples to be raised for export,(*b*) silk being chief in their esteem.(*c*) Sir Thomas Lombe wrote a forcible letter on the subject to the trustees, declaring that silk culture "appears to me as beneficial to the kingdom, attended with as little hazard or difficulty, as much wanted, and which may as soon be brought to perfection in a proper climate, as any undertaking so considerable in itself that I ever heard of".(*d*) The trustees at their meeting in June, 1732, adopted a rule requiring settlers to plant a certain proportion of mulberry trees. In their respective grants ten years were allowed for the cultivation of the soil, and 100 white mulberry trees were to be planted on every ten acres when cleared. Power was vested in the trustees to enter upon lands that remained uncultivated.(*e*) A colonial seal was ordered, containing on one side a representation of silkworms, some beginning and others having finished their webs, with the motto: *Non sibi sed aliis.* This, says one historian, was "a very proper emblem, signifying that neither the first trustees nor their successors could have any views to their own interest".(*f*) It does not seem to have been meant, by the use of this motto, to suggest that the colonists, in raising silk for British manufacturers, were laboring not for themselves but for others.

Late in 1732 a man from Piedmont was sent out by the trustees to teach the colonists the art of reeling. Several public writers urged the enterprise on various grounds of economy and profit. An estimate in 1733 (based on the assumption that the yearly import of raw silk by Great Britain from Piedmont amounted to £300,000 in value) set forth that the successful raising of silk in Georgia would save the mother country £100,000 per annum.(*g*) Another estimate in the same year made the annual import by Great Britain of thrown silk alone—excluding raw silk—300,000 pounds, equal to £300,000 in value.(*h*) It was therefore an occasion of much congratulation in 1734-'35 when General Oglethorpe took with him to England eight pounds of colonial silk, and showed it to the trustees, who presented it to Queen Caroline. Under royal instructions Sir Thomas Lombe took charge of the precious consignment, and had it thrown and woven at his factory; so that in 1735, upon the king's birthday, the queen honored the colony by appearing at a levee in a dress said to be entirely made of Georgia silk.(*i*) But even this neat little episode has suffered by the breath of detraction. A certain Dr. Patrick Tailfer and others, who perhaps bore no good will to General Oglethorpe, have stated in a spiteful way, that most, if not all of this silk, was raised in South Carolina.(*j*)

In 1735 a plot of ground was laid out at one end of the town of Savannah, and was planted with vines and mulberry trees at public expense. The "trustees' garden", as the plot was termed, proved to have been ill-located, the soil being sandy and arid; though on this and similar points authorities vary. It is certain that the trustees requested the selection of some other spot of ground, but their wishes were not fulfilled.(*k*) The site was on the bank of the river within view of the ocean. Plants and trees, native and foreign, in great variety, including the fig, orange, pomegranate, olive, coffee, cocoa, and cotton, were set out; but chief attention was given to the mulberry. Every planter wanting mulberry trees was supplied with them, gratis, from this nursery. The promise to supply these trees was a feature and condition of the land-grants to colonists.(*l*) One writer, describing the garden in glowing terms of praise, declares the soil excellent and the situation "delightful".(*m*) Others hold a totally opposite opinion and say that the place was "one of the most barren spots of land in the colony, being only a hill of dry sand; great sums of money were thrown away upon it from year to year to no purpose".(*n*)

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a The Eighteenth Century, by Paul Lacroix; London, 1876, p. 222.

b Judge Law's Oration, Georgia Historical Society Collections, i, p. 26.

c An Impartial Inquiry into the State and Utility of the Province of Georgia, by Benj. Martin, secretary of the trustees of the colony; London, 1741, reprint Ga. Hist. Soc., i, p. 160.

d Appendix, Ga. Hist. Soc. Collns., ii, p. 311.

e History of Georgia, by Thomas McCall, i, p. 21.

f Hewatt's Hist. S. C. and Ga., ii, p. 18. McCall's History, i, p. 25.

g A New and Accurate Account of the Provinces of So. Ca. and Ga.; chap. v, pp. 58, 59.

h Reasons for Establishing the Colony of Georgia; London, 1733, reprint Ga. Hist. Soc., i, p. 208.

i The Dead Towns of Georgia, by Charles C. Jones; Savannah, 1878, p. 26.

j A True and Historical Narrative of the Colony of Georgia; Charleston, 1741, reprint Ga. Hist. Soc., ii, p. 205.

k McCall, i, pp. 55, 57.

l *Ibid.*, i, p. 63.

m A Voyage to Georgia, by Francis Moore; London, 1744, pp. 29, 30.

n A True and Historical Narrative; reprint Ga. Hist. Soc., ii, p. 205.

Several Italians of both sexes were brought in 1736 at the trustees' expense from Piedmont in charge of a Mr. Amatis. The foreigners were proficient in the arts of silk culture and reeling; the men were ordered to teach male English colonists to raise mulberry trees, the women to take English girls as apprentices in rearing worms and reeling from cocoons.(*a*) "In Italy and in the south of France, young girls carry the eggs in their bosom, and hatch them by their natural heat. In other countries this is done by means of manure or hot-houses."(*b*) It is not specified which of these processes was taught to the English girls. Some of the Italians behaved badly; one of them stole the reels, broke the copper pans,(*c*) spoiled all the eggs he could not steal, and fled to South Carolina; but a little seed and a few faithful Piedmontese were left.(*d*)

Meanwhile a number of Protestants, driven out of their home in the valley of the Salza, Bavaria, had emigrated to Georgia and founded a town, which they called Ebenezer, about 25 miles above Savannah, near to, but not quite on the river.(*e*) They brought with them several useful arts, and soon accomplished more in the business of raising silk, with far less fuss, than their neighbors at Savannah. They co-operated with the trustees, and before long had two reels busy. There are notices at this period of a scheme for interesting the Chickasaw Indians in the work of silk culture.(*f*) English writers were again urging the need of the mother country, and the annual expenditure for silk from Piedmont was estimated at £500,000.(*g*) Even the muse was invoked to stir the lagging colonists, and a poem on the return of General Oglethorpe to Georgia in 1736, winds up—

Nor less the care
Of thy young province to oblige the fair;
Here tend the silkworm in the verdant shade
The frugal matron and the blooming maid.(*h*)

But as to the export of raw silk, it was admitted in 1740 that "no great entries have been seen of any yet in the custom-house";(*i*) statements verified by oath declare that "the quantity of silk hitherto made has not been great";(*j*) the small portion exported "was produced by an Italian family settled in Savannah".(*k*) Another informant sums up the situation with the remark, "there are not as many mulberry trees in the whole province as many a one of the Carolina planters have, nor so much silk as many a one of them makes."(*l*) In fact, the colony of Georgia was at this time in a very weak and impoverished condition, and scarcely able to produce enough of the necessaries of life for its own sustenance. Despite the poverty of the province, the trustees firmly adhered to the line of policy they had marked out: wine and silk were to be cultivated in preference to all other staples.(*m*) "The tracts of land which had been planted with mulberry trees scarcely retained the vestiges of cultivation" in 1744, but new bounties were offered for silk; a filature was built at Savannah, and the implements for reeling were ordered to be furnished.(*n*) The premiums were afterward fixed at two shillings per pound for first quality of cocoons, one shilling for second, and eight pence for third.(*o*) Bounties were also offered in 1749 for proficiency in the art of reeling, and the trustees supplied the requisite apparatus to competitors. In the following year fourteen young women claimed the bounty and were given permanent employment at the filature, which by this time had an outfit of tools and implements. Special commissioners were sent to the province by the trustees, charged with the duty of promoting the industry.

We are now approaching the period when silk culture in the colonies attained its highest development. An exaggerated notion of the results has been formed by several of the writers who have recorded them. This is chiefly due to neglect in discriminating between cocoons and raw silk. The records, from 1757 to 1768, are mostly of the production of cocoons; and of these articles, when fresh or not specially dried, ten or twelve to fourteen pounds

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a A Voyage to Georgia, p. 31.

b Treatise on Rearing Silk Worms, by Count Von Hazzi, of Munich; Transl. U. S. 20th Cong., 1st Sess., H. R. Doc. 226, sec. 61, p. 77. There are precise instructions on this point in Noël Chomel's Dictionnaire Œconomique (2 vol. fol., Paris, 1718) as follows: "In order to hatch the eggs at their proper time, the women must keep them in their bosoms and the men in their pockets, and on nights between warm pillows put under your bolster or bed, and thus to continue for three days without looking upon them, for fear lest the cold air injure them." Barham's Essay, p. 118.

c The pans were used for baking the cocoons, to kill the chrysalides.

d A Voyage to Georgia, p. 31.

e Raynal, i, p. 223. McCall, i, p. 49. The Long Island Historical Society of Brooklyn, N. Y., possesses very complete records of this emigration and settlement.

f Letter to the Trustees; Ga. Hist. Soc. Collns., i, p. 193.

g Life of Oglethorpe, by Thomas Spalding; Ga. Hist. Soc. Collns., i, p. 259.

h A True and Historical Narrative, Preface; reprint, *ibid.*, ii, p. 175. See also Lines addressed to Oglethorpe, *ibid.*, ii, pp. 64, 66.

i An Impartial Inquiry, etc., reprint, *ibid.*, i, p. 160.

j A State of the Province of Georgia, Attested upon Oath; London, 1742; reprint, *ibid.*, ii, p. 71.

k An Impartial Inquiry, etc.; reprint, *ibid.*, i, p. 192.

l A True and Historical Narrative; reprint, *ibid.*, ii, p. 265.

m McCall, i, p. 199.

n *Ibid.*, i, p. 203.

o *Ibid.*, i, p. 238.

are required to furnish one pound of reeled or raw silk.(*a*) The following statements of Georgia production are believed to be authentic:

Years.	Product or export.
1750	6,300 pounds cocoons received at filature.
1750 to 1754, inclusive	Value of raw silk exported, $8,800.
1756	Amount of raw silk exported, 268 pounds.
1757	1,052 pounds cocoons received at filature.
1758	7,040 pounds cocoons received at filature.
1759	Considerably over 10,000 pounds cocoons received at Savannah.
1764	15,200 pounds cocoons produced.
1766	20,000 pounds cocoons produced.
1768	1,084 pounds raw silk sent to England.
1758–1768, inclusive	Nearly 100,000 pounds cocoons received at filature.
1770	291 pounds raw silk produced at Ebenezer; none elsewhere.
1771 (*b*)	438 pounds raw silk produced at Ebenezer; shipped to England.
1772	485 pounds raw silk produced at Ebenezer; shipped to England.
1755–1772, inclusive	Amount of raw silk exported, 8,829 pounds.

A careful examination of the foregoing figures will show that they do not involve any contradiction in themselves. They indicate a varying product which culminated in 1766, furnishing from 1750 to 1772 an export averaging 500 pounds of raw silk per annum, and rarely exceeding 1,000 pounds in a single year. It remains to be explained why an assertion has so frequently found place and comment in histories and essays, that in the year 1759 10,000 pounds of raw silk were exported from Georgia to England. The discrepancy between this statement and that of the total export from 1755 to 1772 (which was furnished by the collector of customs at Savannah) has been noticed by some of the more careful writers; others have ignored it; none have traced the error to its origin. It arose in an ambiguous, not to say erroneous, publication from Charleston, South Carolina, which Adam Anderson has fortunately quoted in full. He says:(*c*)

> We had public Advices, in this Year 1759 from *Charles-Town* in *South Carolina*, of a very hopeful Prospect in that Province of the gradual and considerable Progress and Increase of the Production of *Raw-Silk* there and in the adjoining Province of *Georgia, viz:* "In the year 1757, 1,052 Pound weight of *Raw-Silk Balls* were received at the *Filature* in *Georgia:* and the next Year produced no less than 7,040 Pound Weight thereof. And that in this year 1759, there has been received at *Savannah*, the Capital of *Georgia*, considerably above 10,000 Pound Weight of *Raw-Silk*, although the Season has not been favourable. This great Increase of that rich, new, and valuable Production in these Provinces is owing to the increased Number of Hands in raising the same."

It will be seen that the foregoing treats of production, not of export; and therefore presumptively of cocoons, not of reeled silk. At all events the facts were so understood by the Rev. Jared Eliot, of Killingworth, Connecticut (grandson of John Eliot, the "apostle of the North American Indians"), writing in the very year when the advices were received. His version is as follows:

> By a late account from *Georgia* it appears that the Silk Manufactory is in a flourishing way. In the year 1757, the Weight of Silk Balls received at the Filature was only 1,052, last Year produced 7,040, and this Year already above 10,000, and it is very remarkable that the Raw Silk, exported from *Georgia* sells at *London* from two to three Shillings a Pound more, than that from any other Part of the World.(*d*)

This seems quite correct, except in calling the business a "silk manufactory". On the other hand, the complete error appears in, and has no doubt been mostly propagated among later writers through, the account given in 1816 by Major McCall, which turns the cocoons into raw silk and the production into export, as follows:

> In the year 1757, one thousand and fifty pounds of raw silk were received at the filature in Savannah. In 1758, the silk-house was consumed by fire, with a quantity of silk and seven thousand and forty pounds of cocoons or silk balls. In 1759, the colony exported upward of ten thousand weight of raw silk, which sold two or three shillings per pound higher in London, than that of any other country. (*e*)

Great as was the mistake which ascribed to one year as large an export as was reached in twenty, it was surpassed in error by a subsequent writer, who says:

> In 1776 more than twenty thousand pounds of raw silk were imported into England from Georgia.(*f*)

This statement was probably based on the production of 1766, and though brief, had the misfortune to be incorrect in every particular.

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[a] *E. g.*, the *Bulletin des Soies et des Soieries*, speaking of a recent crop of Upper Italy, says: "34 millions de kilog. de cocons représentant environ 2,400,000 kil. de soie."

[b] Operations at the filature were discontinued in 1771, and the basins and reels which had been in use there, were distributed among the colonists of Ebenezer.

[c] Origin of Commerce; fol. ed., ii, p. 413.

[d] Essays upon Field Husbandry in New England; Boston, reprint, 1760, note to sixth essay, p. 154. The sixth essay was first published in 1759, printed at New London and New York.

[e] History of Georgia, i, p. 251.

[f] Manual on the Mulberry Tree and Silk Culture, by Jonathan H. Cobb, 4th ed. enlarged; Boston, 1839, app., p. 128. One step in this second series of errors appears in the report of the Committee on Agriculture, United States House of Representatives, May 2, 1826, which says: "In 1766 more than 20,000 pounds of cocoons were exported from thence to England."

The policy of raising silk by means of bounties was pushed to its extreme in 1751, when the trustees of Georgia established the following scale of premiums, which has certainly never been surpassed:

For first quality cocoons, 2*s.* per pound; if delivered at filature, 3*s.* 6*d.*

For second quality cocoons, 1*s.* 3*d.* per pound; if delivered at filature, 1*s.* 8*d.*

For third quality cocoons, 6*d.* per pound; if delivered at filature, 1*s.* 1*d.*

This was at least two or three times what the cocoons were worth, and is "truly astonishing".(*a*) The patent of the trustees expired in 1752, and with it all the chartered privileges of the colony, which then became a royal province directly dependent upon the crown for government.(*b*) Acts of parliament of almost equal liberality soon replaced the measures of the trustees for spurring the silk industry. These acts were various, and the encouragement they gave was fluctuating. One of them, in 1749, admitted raw silk from the American plantations free of duty, and provided that Georgia and South Carolina should thereafter "have the honour of being denominated *Silk Colonies*".(*c*) In the same vein of sweetness, George II, June 21, 1754, directed a silver seal to be made for Georgia, bearing on one side a figure representing the genius of the colony offering a skein of silk to the king, with the motto: *Hinc laudem sperate coloni.*(*d*) For a while the parliamentary bounties were three shillings per pound; in 1766 they were reduced one-half; in 1769 they were applied to raw silk exported, giving £25 to every £100 in value. The last-named rate was to continue for seven years, when it was to be reduced to 20 per cent., and again for seven years more at 15 per cent.,(*e*) the political occurrences of 1776 being evidently not anticipated.

The silk product rose while the bounties for delivery at Savannah were most liberal, but sank with marvelous rapidity shortly after their reduction, falling to 290 pounds in 1770. Throughout the entire period of silk culture in Georgia the Saltzburghers of Ebenezer were among the largest producers, and were almost the only ones in the years immediately preceding the war of the Revolution who prepared raw silk for export. During the war the French settlers at New Bordeaux, 70 miles above Augusta, are said to have supplied "much of the high country" with sewing-silk made from cocoons of their own raising.(*f*) The industry ceased, however, to attract attention; the last parcel of raw silk offered for sale in Georgia during the century being in the year 1790, when over two hundredweight was purchased for export at prices ranging from 18 to 26 shillings per pound.(*g*)

Pennsylvania was blest with silk culture at an early date in her history. It was recommended by James Logan to the Penn family in 1725, as "extremely beneficial and promissing"; the next year he mentioned that silk from the colony had been sent to England; he "is glad it proves so good".(*h*) A bill had been introduced in 1719 into parliament to restrain the increase of woolen and other manufactures in the colonies.(*i*) A more definite application of the *non sibi sed aliis* principle was urged a few years later, based on a complaint that the colonists were engaged in textile manufacturing, especially in the provinces north of Virginia. The British board of commissioners on trade and plantations made an elaborate report on this subject to parliament in 1732. They say:

> It were to be wished that some Expedient might be fallen upon to divert their thoughts from Undertakings of this Nature: So much the rather, because those Manufactures in Process of Time may be carried on in a greater Degree, unless an early Stop be put to their Progress, by employing them in *Naval Stores.*(*j*)

The conclusion arrived at is as follows:

> We would humbly beg Leave to report and submit to the Wisdom of this honourable House, the Substance of what we formerly proposed in our *Report* on the *Silk, Linen* and *Woollen* Manufactures hereinbefore recited: namely, whether it might not be deemed expedient to give those Colonies proper Encouragements for turning their Industry to such Manufactures and Products as might be of Service to *Great Britain,* and more particularly to the Production of all kinds of *Naval Stores.*(*k*)

Ultimately it seems to have been considered that the encouragement of silk culture was one of the "expedients" for preventing manufacture. The commissioners addressed a letter in 1734 to the deputy governor of Pennsylvania, Patrick Gordon, asking him what encouragement should be given in order to "engage the colonists to apply their industry to the cultivation of naval stores of all kinds, and likewise of such other products as may be proper for the soil of the said colonies, *and do not interfere with the trade or produce of Great Britain*".(*l*) To this Governor Gordon replies that it was the whole study of the merchants how to make returns for the large importations of British manufactures. He recommends among other things that the culture of silk be encouraged, and mentions that small quantities had already been produced in the colony, equal to the best European.(*m*)

A London paper of February 7, 1765, states that within four days one hundred journeymen silk-throwsters had engaged passage to New York and Philadelphia, under extraordinary encouragements, intending at both places to establish the manufacture of silk.(*n*) Perhaps the "encouragements" arose partly out of reports concerning efforts

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a History of Georgia, by Rev. Wm. Bacon Stevens, M. D.; New York, 1847, vol. i, p. 275.

b Discourse on Georgia, same author; Boston, 1841, reprint Ga. Hist. Soc., ii, p. 25.

c Anderson, Origin of Commerce, fol. ed., ii, p. 392. *d* Stevens, Hist. Ga., i, p. 383. *e* Raynal, ii, p. 106.

f Letter of Thomas McCall to the Secretary of the Treasury in answer to a circular of inquiry sent out in 1826.

g Letter of Charles Harris to the Secretary of the Treasury, in answer as above.

h Annals of Philadelphia, by John F. Watson; Philadelphia, 1830, p. 618.

i Anderson's Origin of Commerce, ii, p. 283. *j Ibid.*, ii, p. 343. *k Ibid.*, ii, p. 345.

l Archives of Pennsylvania, year 1734, p. 434. *m* Hazard's Register of Pennsylvania, i, p. 444.

n History of American Manufactures, by Dr. J. L. Bishop; Philadelphia, 1864, i, p. 362.

which were begun about this time by Dr. Benjamin Franklin. Several hundred pounds sterling were paid to American colonists between 1755 and 1772, for premiums on silk and mulberry trees, by the London Society for the Encouragement of Arts, Manufactures, and Commerce. A pamphlet published by the society mentions that in 1761 the following corresponding members were authorized to pay premiums in their respective colonies: Dr. Jared Eliot, the Rev. T. Clap (president of Yale College), and Jared Ingersoll, of Connecticut; Benjamin Franklin, LL. D., and John Hughes, of Pennsylvania; George Pollock, Cullen Pollock, and John Rutherford, of North Carolina; M. Ortolengi (superintendent of the filature at Savannah), of Georgia. The bounties paid in other colonies by the society were probably the same as those announced at that date for Georgia, viz, for first quality of cocoons, 3*d.* per pound; for second quality, 2*d.*, and for third quality, 1*d.* per pound.(*a*) About the year 1766, Dr. Nathaniel Aspinwall, of Mansfield, Connecticut, who had a nursery of white mulberry trees on Long Island, and who was a person of large public spirit and enthusiasm in respect to silk culture, gave a number of such trees to be planted near Philadelphia.(*b*) An act giving bounty for planting the tree had been recently passed by the legislature of New Jersey, and considerable interest was manifested in the subject by other neighboring colonies. The American Philosophical Society of Philadelphia, of which Dr. Franklin was a leading member, gave much consideration to plans for silk culture in 1768 and 1769. Early in 1770 Dr. Franklin, who was then in London, wrote a letter to the society urging these projects and inclosing his correspondence with Dr. Cadwallader Evans, of Philadelphia, upon the subject.(*c*) This seems to have determined the society's course; they took prompt steps for establishing a filature. A subscription for the purpose was started, and during the first year the sum of £875 14*s.* was obtained. Measures were taken to procure supplies of mulberry trees and silkworm eggs, and Dr. Franklin, who was always ready to contribute good advice, sent a copy of a useful work by the Abbé Sauvage.(*d*) An application was made to the assembly to authorize "a public filature", the managers to have power to grant premiums equal to about £500 per annum for five years. The filature was actually opened in June, 1770.(*e*) It was situated in Seventh street, between Arch and High streets. About 2,300 pounds of cocoons were brought thither in 1771; of this amount, 1,754 pounds were bought by the managers; two-thirds of the cocoons had been raised in New Jersey.(*f*) There is room for doubt as to the disposal of the products. It is more than hinted that all the silk made was absorbed in garments for members of the society.(*g*) J. d'Homergue, who was a competent witness, though perhaps not wholly disinterested, says:

> I have not heard of any raw silk having been prepared at this filature, or sold out of it, yet I have been told that a lady of this city (Philadelphia) had a *négligée* dress manufactured in England out of silk of her own raising.(*h*)

A considerable number of successful attempts at silk culture were made at this time in Pennsylvania, several of which have passed into history. Susannah Wright, of Columbia, Lancaster county, a Quaker lady of some literary celebrity, reeled and wove from home-grown cocoons a piece of mantua 60 yards in length. A dress was made from this fabric for Queen Charlotte, and for a second time the wife of a British sovereign honored the colonies by appearing at court in American silk. It is further recorded that Susannah Wright had 1,500 worms in 1772, "and could have raised large quantities if encouraged;"(*i*) she also made sewing-silk. Another Quaker lady, Grace Fisher, who was a noted preacher, made some silk fabrics which were presented by Governor Dickinson to Mrs. Catherine Macaulay, the historian. There are several instances about this time of Pennsylvania ladies raising the material for their own clothing, and at least one of a bride thus providing her own wedding garment; but, it is significantly added, "the best dresses worn with us were woven in England."(*j*)

This was the era of the dawn of independence. Many writers have lamented the complete interruption which the Revolutionary War caused to the silk enterprises. In fact, however, the war made the real industry practicable. Silk culture here, to supply manufacturers abroad, was precisely the reverse of a profitable arrangement for this country. "If when we plough, sow, reap, gather, and thresh, we find that we plough, sow, reap, gather, and thresh for others, why should we repeat the unprofitable toil?"(*k*) Legislation to stop manufacturing in America was now the order of the day in England. An act of Parliament, 3 Geo. II, c. 29, sec. 9, passed in 1750, provided that—

> From and after the 24th day of June, 1750, no Mill or other Engine for slitting or rolling of bar Iron, or any plaiting Forge to work with a Tilt-hammer, or any furnace for making of Steel shall be erected or after erection continued in any of His Majesty's colonies in America.(*l*)

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a Treatise on the Mulberry and Silkworm, by John Clarke; Philadelphia, 1839, note to p. 111. The Society's premiums for planting mulberry trees were very liberal, vid. Tracts on Practical Agriculture and Gardening, by R. Weston; London, 1773, pp. 31 to 34.

b Historical Collections of Connecticut, by Dr. J. W. Barber; New Haven, 1837, p. 550.

c Watson's Annals, p. 618.

d Mémoires sur l'Éducation des Vers à Soie, by l'Abbé Boissier de Sauvage; Nismes, 1763, 2 vols., 8vo. A summary of this treatise was afterward, 1792 (?), published by Mr. Odell, of Burlington, New Jersey (Cobb's Silk Manual, p. 85). The Bossière family are still engaged in silk culture in France. Also, Mr. E. V. Boissiere is now, and for some years past has been, carrying on this business in connection with his silk factory at Williamsburg, Franklin county, Kansas.

e J. d'Homergue says the filature was established in 1769, but is probably in error.

f Watson's Annals, p. 618.

g Clarke's Mulberry and Silkworm, p. 115.

h *Ibid.*, note at foot of page. J. d'Homergue was a silk-culturist from Nismes.

i Watson's Annals, p. 619.

j *Ibid.*

k Letters from a Farmer in Pennsylvania, by Mr. Dickinson; Boston, 1768; London reprint, 1774; Letter xii, p. 130.

l Letters from a Farmer, p. 13.

Act 14 Geo. III, c. 71, was passed in 1774, "To prevent the exportation to foreign parts of utensils made use of in the cotton, linen, woollen, and silk manufactures of this kingdom." The statute imposed a fine of £200 for transgression; such machinery could be seized and confiscated, its holder anywhere was liable to arrest, and even the ship that carried it and the owners of the vessel were reached by the stringent penalties of that law.(*a*) The United Society for Promoting American Manufactures (Philadelphia) recommended in 1776 an appropriation of £40 for the encouragement of John Marshall, who had constructed some novel machinery for throwing and twisting silk.(*b*) The invention was at once too early and too late. The arts of peace were suspended, and the people were preparing for war.

Legislation concerning silk culture in Connecticut in 1732 indicated that the industry had made some progress there, even at that early date. The first coat and stockings made of New England silk were worn by Governor Law in 1747; the first silk dress by his daughter, in 1750.(*c*) Dr. Ezra Stiles, president of Yale college, began a long series of experiments in 1758 by planting three mulberry trees. His carefully kept record of the growth, treatment, and product of the silkworms fills a quarto volume of manuscript still preserved by the college. A professor's gown was made from the fruits of his industry. The experiments were continued till 1790, and during this period Dr. Stiles liberally distributed seeds, eggs, and advice. Nathaniel Aspinwall, who, as has already been mentioned, had a nursery of mulberry trees on Long Island, began about the year 1760 to introduce silk culture into Windham county and other localities in Connecticut. He was successful in planting mulberry orchards at New Haven and Mansfield,(*d*) and laid the foundation in the latter town of an industry that lasted three-fourths of a century, and paved the way for the present silk manufacture of this country. Half an ounce of mulberry seed was sent in 1766 to every parish in Connecticut.(*e*) Several dresses were made from the resulting silk shortly before the Revolution; the town of Mansfield taking the lead in raising the raw material. William Hanks of that town, a large producer, in company with others, projected a silk factory; it is said that one was already built at Lebanon. The outbreak of war checked these enterprises.

There are brief records of silk enterprises in other northern colonies prior to 1776, but they are generally unimportant. The most promising was an attempt of William Molineaux to employ the poor of Boston in spinning, dyeing, and manufacturing silk. He claimed that he had expended £1,200 to £1,500, chiefly for machinery; and he undertook to buy and to manufacture all the silk raised in the province.(*f*) The authorities gave him in 1770 the use of a factory, rent free, to carry out his purpose. It is probable that he undertook to make sewing-silk only, the experiments in weaving at this factory being confined to linen, cotton, and worsted.

Silk history in this country is almost a blank during the struggle for independence, and for several years afterward its records are very faint.

> The great demand and high price of breadstuffs, owing to the wars growing out of the French revolution, rendered the cultivation of grain so profitable for many years that the mulberry was neglected.(*g*)

Subsequent revivals of interest in culture and manufacture seemed unimportant at the outset. But small as were these beginnings, they proved more permanent (because they obtained a home market) than all the carefully nursed silk culture for export which had been attempted since the country was settled. The manufacture of sewing-silk gave new life to an industry that had sickened and died when fed on royal favor and parliamentary bounty.

It may here be mentioned, however, that at the period of the Revolution, and for at least fifty years afterward, the making of sewing-silk in this country was chiefly a household art rather than an organized business carried on in a mill or factory. This was the bridge between the silk culture of the colonies and the full-fledged manufacture of the present century: a bridge of essential service, though a chasm yawned at its farther end where many fortunes were engulfed. Connecticut became the chief seat of this new industry, beginning with an act of the assembly of that state in 1783, to take effect March 1, 1784.(*h*) The passage of the act was chiefly due to the urgent representations of Dr. Stiles and Mr. Aspinwall. The premiums thereby authorized were ten shillings per hundred for planting mulberry trees and preserving them in thrifty condition till three years old; and three-pence per pound for producing "raw silk", which was, perhaps, meant to apply to cocoons. In a few years the bounty for planting trees served its purpose throughout the state, and was then discontinued, but the premiums for silk were kept up during a considerable period. In 1789, 200 pounds of silk were raised at Mansfield; in 1793, 362 pounds.(*i*) The quantity steadily increased, and the value of sewing and raw silk made in the counties of New London, Windham, and Tolland, in 1810, aside from consumption of refuse silk in domestic garments, was estimated by Tench Coxe at $28,503. Careful inquiries in the year 1825 showed that the silk product of Windham county was then double that of 1810.(*j*) The Hon. Zalmon Storrs, of Mansfield, replied to the circular of inquiry of July, 1826, that—

> Three-fourths of the families in Mansfield are engaged in raising silk, and make, annually, from 5 to 10, 20, and 50 pounds in a family, and one or two have made, each, 100 pounds in a season. It is believed there are annually made in Mansfield and its vicinity from three to four tons.

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a Force's American Archives; 4th series, vol. i, p. 222. *b* Bishop, Hist. Mfrs., i, p. 579. *c* Bishop, Hist. Mfrs., i, p. 360.

d Memorial of Sundry Inhabitants of the counties of Windham and Tolland; 20th Congress, 1st sess., H. R. Doc. 159, p. 4.

e Barber, Hist. Coll. Conn., p. 550. *f* Bishop, i, pp. 362, 376.

g Report of the Committee on Agriculture to the U. S. House of Reps., May 2, 1826.

h Holmes's American Annals; Cambridge, 1805, vol. ii, p. 470. *i* Memorial of Windham and Tolland, p. 4. *j* Rush Letter, p. 18.

The last statement was replaced by the more definite figures of 7,000 pounds in 1827.(*a*)

The methods of reeling from the cocoon and of making sewing-silk were of the most primitive kind.(*b*) The writer has in his possession a specimen of the reeled silk; it was called "tow", and it looks like that material, being coarse, of irregular thickness of fiber, and wholly wanting in luster. By a laborious hand-process, this was converted into sewing-silk of fair quality; but only half the amount in weight could thus be successfully manipulated; the rest was a knotted, irregular refuse, barely available in making homespun garments. The sewing-silk or "twist" had a low reputation as compared with that imported from Italy. It was put up in small parcels, called "sticks", containing a definite number of yards. Twenty-five skeins were tied in a bunch, and four bunches were fastened together; this gave a merchantable package of 100 skeins—a unit of trade that was used in barter and took the place of currency. Very little money was used at that time in the state, and the sewing-silk became the "circulating medium". An act of the legislature defined the length of the skein, and was enforced by penalty, as follows:

> Any person or persons who shall offer for sale any sewing-silk, unless each skein consists of twenty threads, each thread of the length of two yards, shall forfeit the sum of seven dollars to any person who shall prosecute the same to effect.(*c*)

Naturally enough, when the medium of trade had thus acquired an artificial value, it became the interest of each producer of this currency to debase it. This was effected in two ways: by making the thread as fine as possible, so as to get the greatest length out of a given weight of material, and by putting only half the length in a skein and calling it a "half-skein". The object of the latter device was to give an opportunity, as the silk went from hand to hand, of passing half-skeins as whole ones. The chance of this immoral advantage made the half-skeins the more popular currency.(*d*) An improvement in the spinning wheel was patented in the year 1800 by Horace Hanks; it was known as the "double wheel-head". This gave the spindle an increased speed of 145 turns to one as compared with the old-fashioned machinery.

Connecticut's industry at the close of the last century included the manufacture of "some silk buttons, handkerchiefs, ribands, and stuffs", but of a much less value than the sewing-silk. In 1790 the manufacture of silk laces was begun at Ipswich, Massachusetts;(*e*) it lasted for many years, and the product rose to 41,979 yards of laces, edgings, etc. Silk shoes are also mentioned as an item of some importance among the early manufactures of Massachusetts. These branches of industry were gradually supplanted by others. The change at Ipswich is thus described:

> The machinery which once turned out thread and silk laces, those non-conducers to health and comfort, is now profitably employed in manufacturing cotton and other useful fabrics.(*f*)

The making of fringes, coach-laces, and tassels at Philadelphia, Pennsylvania, began in the year 1793. It was expanded in 1815 to include silk trimmings of various kinds, by William H. Horstmann.(*g*) There is a record of fresh exertions by Mr. Aspinwall, in 1790, to extend the planting of the mulberry in Pennsylvania, New York, and New Jersey.(*h*) During the war of 1812 Samuel Chidsey, of Scipio, Cayuga county, New York, made and sold 600 pounds of sewing-silk, the product of native worms.(*i*)

A small mill, 12 feet square, was built by Rodney and Horatio Hanks, in 1810, at Mansfield, Connecticut, to manufacture sewing-silk by water-power. A larger attempt of the same kind was made by the same persons, associated with others, at Gurleyville, Connecticut, on the Fenton river, in 1814. Neither of these enterprises met the hopes of their projectors; but in 1821 Rodney Hanks built another mill at Mansfield, which was kept in operation for seven years. The Mansfield Silk Company, formed in 1829 by Alfred Lilly, Joseph Conant, William A. Fisk, William Atwood, Storrs Hovey, and Jesse Bingham, undertook the same kind of business, with far better though not complete success; their throwing machinery, devised by Edmund Golding from plans with which he had been familiar in England, being serviceable, though somewhat crude.

The insuperable difficulty during all this period arose from the bad reeling of domestic silk. No power-driven machinery that has ever been devised is capable of making a good uniform thread from such reeled silk as was then produced in the households of New England, although, as has been stated, a fair sewing-silk could be extracted from it by hand-work, with great loss of raw material. The bad reeling which was customary seems more remarkable since several excellent kinds of hand-reels, with a traverse, had been constructed by inventors of that day. Among the makers or describers of improved reels may be mentioned Jonathan H. Cobb, Gideon B. Smith, J. d'Homergue, Jonathan Dennis, jr., Seth W. Cheney, Eliphalet Snow, and Nathan Rixford. The Mansfield Silk Company sought to avoid this difficulty by reeling for themselves, with a power-driven reel. Success attended this effort, and with good reeling "the native silk was found to be of superior quality and strength, winding and doubling with greater facility and less waste than China or Brussia silk".(*j*) The comparative cost is not stated.

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a Memor. Windham and Tolland, p. 5.

b A full account of these processes will be found in Cobb's Manual, pp. 121–124.

c The Silk Industry of the United States from 1766 to 1874, by A. T. Lilly; New York, 1875, p. 3.

d *Ibid.*, p. 5.

e Hayward's Massachusetts Gazetteer, p. 179.

f *Ibid.*; the date of this remark is 1847.

g American Silk Industry Chronologically Arranged, by Franklin Allen; New York, 1876, p. 5.

h Rush letter, p 17.

i *Ibid.*, p. 18.

j Lilly, Silk Industry, p. 6.

In December, 1825, the subject of silk culture began to receive national attention, being brought before Congress by a resolution of inquiry introduced by Mr. Miner, of Pennsylvania, and referred to the committee on agriculture. During the following spring the committee reported favorably, presenting, among other arguments on the subject, a statement that the value of silk goods imported in 1825 was nearly twice as great as the export of breadstuffs. The report included a resolution directing the Secretary of the Treasury to cause to be prepared a well-digested manual on the growth and manufacture of silk. Inquiries for information upon the subject were sent out by the secretary, Richard Rush, in 1826; and from the replies and other material, a manual was constructed, entitled "Letter from the Secretary of the Treasury,"(a) dated February 7, 1828. Six thousand copies were printed by order of Congress. This manual became known as the "Rush Letter"; it contains 220 pages, beside illustrations of machinery, and is a carefully executed work. Other documents relating to silk culture were received and published by Congress at this time, among which were two that have been previously referred to, viz, "Memorial from sundry inhabitants of the counties of Windham and Tolland, state of Connecticut, praying for the aid of government in the cultivation of the mulberry tree and of silk," and an elaborate "Treatise on the culture of silk in Germany, by Count von Hazzi, of Munich".(b)

A report presented to the House in 1830 by the committee on agriculture, included two interesting letters from Peter S. Du Ponceau, LL.D., who accompanied Baron Steuben to this country in 1777, and afterward rose to eminence at Philadelphia in public affairs and in studies of philology and law. Essays on American silk by John d'Homergue also formed part of the report. The essays and letters contain much useful information, largely drawn from the experience of their authors in raising silk. The report proposed a grant to M. d'Homergue of $40,000 for the establishment of a normal school of filature at Philadelphia, to supply gratuitous instruction to 60 young men for two years in the details of reeling, dyeing, and manufacturing silk. M. d'Homergue was to be authorized meantime to travel through the different states and teach the art to farmers and others. A bill containing these propositions was brought to a vote in 1832 and was defeated by a small majority. The subject was again referred to the committee on agriculture, which in 1835 made an adverse report on constitutional grounds. In the following year the matter was referred to the committee on manufactures, which reported in 1837; this report contained a letter from Hon. Andrew T. Judson, of Connecticut, which furnishes more definite statements than can be readily found elsewhere as to the spread of silk enterprises at this period. Finally the committee on agriculture again reported April 20, 1838. This last report, which was very elaborate, declared that the "silk bill" was defeated because "the ingenuity and experience of our countrymen now render it unnecessary, believing as they do that the recent improvements in reeling will do more in a few weeks than the establishment of many normal schools on the old plan will do in many years".(c) The committee recommended that all public lands in the United States be leased gratuitously wherever the cultivation of the mulberry and the sugar-beet was undertaken thereon.

During the pendency of the bill in 1830 Mr. Du Ponceau started a small filature of 10 reels and 20 operatives on his own account, under M. d'Homergue's direction, at Philadelphia. Among the first fruits of his labor were two flags of American silk; these were presented respectively to the legislature of Pennsylvania and to the United States House of Representatives. About 60 pounds of the silk prepared at this filature was submitted to different manufacturers, who reported upon it as of excellent quality. The subject of silk culture gained the public ear, and the legislatures of several states passed bills for the encouragement of the new industry. The tendency during the years immediately preceding 1837 was toward venturous enterprises, and silk culture presented an attractive field. A peculiar variety of the mulberry tree, believed to possess many advantages as compared with the white mulberry, was brought to public notice, and a speculation was started of such rapid and extensive growth that in a few years it overshadowed all silk enterprises and changed the whole course of the industry.

Gideon B. Smith, of Baltimore, claimed to have owned the first *Morus multicaulis* tree in the United States; it was planted in 1826.(d) Dr. Felix Pascalis, of New York (afterward editor of a publication called *The Silk Culturist*) called attention to the supposed merits of this plant in *The American Journal of Science*, July, 1830, and described its introduction into Europe by Samuel Perrottet, of the Linnæan Society of Paris. Dr. Pascalis predicted that by its culture two crops of silk could be raised in a season; the prediction was soon afterward verified. The tree was said to grow with marvelous rapidity, developing large, thin, tender, and succulent leaves, in profusion. It could be propagated easily by cuttings; it could be cultivated as a shrub; its leaves formed the choicest and most nutritious food for silkworms. All the agricultural literature in the country soon became suffused with descriptions of this wonderful tree. In 1831 the Massachusetts legislature ordered the preparation of a manual on silk culture. The work was performed by Jonathan H. Cobb, a silk manufacturer at Dedham, Massachusetts. The manual was printed in the same year; it passed through at least four editions, and spread the merits of the *Morus multicaulis* throughout the New England states.

The following bounties were authorized by legislatures:

Maine: 5 cents on every pound of cocoons raised. Connecticut, act of 1832: $1 on every one hundred transplanted mulberry trees two years old; 50 cents on every pound of silk reeled on an improved reel.

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a Doc. 158, Twentieth Congress, first session.

b Doc. 226, *idem*.

c Report to Twenty-fifth Congress, second session.

d Clarke's Mulberry and Silkworm, p. 121.

Vermont, act of 1835: 10 cents on every pound of cocoons raised.

Massachusetts, act of 1836: $1 on every ten pounds of cocoons raised in the state; $1 for every pound of silk reeled and thrown; 50 cents for every pound of silk reeled but not thrown.

New Jersey: 16 cents per pound for cocoons, and 50 cents per pound for reeled silk.

There were similar acts in New York, Pennsylvania, Georgia, Indiana, and probably in other states. The largest quantity of cocoons raised by any one claimant for bounty in Massachusetts was 615 pounds.(*a*) The legislation of that state was regarded as quite liberal.(*b*) Beside all this, there were premiums paid by counties, by fairs, and by stock companies interested in silk growing. A grant of 262 acres of land, owned by the United States at Greenbush, New York, was made to G. B. Clark, of New York city, on condition that he should plant 100,000 mulberry trees, and provide sufficient silkworms to consume all the foliage thereof. Certainly the new business did not lack encouragement.

A national silk convention was held at Baltimore in December, 1838; a silk convention in New Jersey, February, 1839; in New York, at Albany, February, 1839; in Connecticut, April, 1839; and there were many other gatherings of the kind. The list of stock companies formed for raising and manufacturing silk at this time is very long; their lives were very short. Many of them were slenderly equipped, in both knowledge and resources. Seven are named in Massachusetts, six in Pennsylvania, nearly as many in neighboring states, and a few at the west. A United States Silk Society was organized at the national convention. The number of private individuals engaged in silk raising cannot be estimated. In Burlington, New Jersey, says a writer of the day, "you can scarcely go into a house but you find the inmates engaged in feeding worms."(*c*)

The literature of the period on this subject was abundant and various. In the following list the titles of some of the more noted publications are presented:

Authors.—JAMES MEASE, M. D., of Philadelphia: *Letter to Secretary Rush;* U. S. Twentieth Congress, House Doc. 158. JOHN CLARKE: *Treatise on the Mulberry and Silkworm;* Philadelphia. JONATHAN H. COBB: *Manual.* PETER DELABIGARRE: *A Treatise on Silkworms;* New York. PETER S. DU PONCEAU AND JOHN D'HOMERGUE: Philadelphia. GIDEON B. SMITH (Ed. *American Farmer*): *Manual;* Baltimore. JONATHAN DAVIS: *Manual.* WARD CHENEY & BROS.: *American Silk-Grower and Farmers' Manual;* Philadelphia. THOMAS G. FESSENDEN: *The Silk-Manual and Farmer* (monthly); Boston. S. BLYDENBURGH: *The Silkworm* (monthly); Albany, N. Y. FRANKLIN G. COMSTOCK: *Manual;* also: *Silk Culturist;* Hartford. E. P. ROBERTS (Ed. *Farmer and Gardner*): *Manual;* Baltimore. WM. KENRICK: *American Silk-Grower's Guide.* DR. FELIX PASCALIS: *Instructions for Silkworm Nurseries, and Culture of the Mulberry Tree;* also: *Silk Culturist* (periodical); New York. SAMUEL WHITMARSH: *Eight Years' Experience and Observation in the Culture of the Mulberry Tree and the Care of the Silkworm;* Northampton, Mass. EDMUND MORRIS: *The Silk Record* (periodical); Burlington, N. J. JUDGE BUELL: *The Albany Cultivator* (monthly); Albany, N. Y. EDMUND RUFFIN: *The Farmers' Register* (periodical); Richmond, Va. ANNUAL REPORTS OF THE AMERICAN INSTITUTE (yearly); New York, N. Y. GENERAL HENRY ALEX. SCAMMEL DEARBORN: *Internal Improvements and Commerce of the West;* Boston, 1839. JOHN S. SKINNER: *Christmas Gift to Young Agriculturists;* Washington, D. C., 1841.

London works distributed in this country.—SAMUEL PULLEIN: *The Culture of Silk for the American Colonies, and the Culture of Mulberry Trees;* London, 1758. DR. DIONYSIUS LARDNER: *Treatise on the Origin, Improvements, and Present State of the Silk Manufacture;* London.

Translations.—M. MORIN: *Art of Raising and Feeding Silk-worms, and of Cultivating the Mulberry Tree;* Boston, 1836. JULIEN STANISLAUS: *Résumé des Principaux Traités Chinois sur la Culture des Muriers et l'Éducation des Vers à Soie;* Paris, 1838 (Translated by Peter Force, mayor of Washington, D. C., 1838). DESLONGCHAMPS: *Essai sur des Muriers et des Vers à Soie;* Paris, 1824. SIGNOR TINELLI (Doctor of Civil Law in the University of Pavia): *Hints on the Cultivation of the Mulberry.* M. BONAFOUX (Director of the Royal Gardens at Turin): *Essai sur des Muriers, etc.* COUNT VON HAZZI, Munich: *Translation of Essay;* U. S. 20th Congress, House Doc. 226. COUNT S. DANDOLO; *Manual for the Culture of Silk,* abridged; Washington, 1828. DE LA BROUSSE: *Des Muriers et de l'Éducation de Vers à Soie;* Nismes, 1789: abridged translation by W. H. Vernon, Boston, 1828.

To the foregoing should be added the various reports of Congressional committees, and especially that of the committee on agriculture in April, 1838, which gives an account of the merits of the *multicaulis* mulberry.

This literature, so far as our native authors are concerned, is in one respect peculiar. Its errors lie all in a single direction. The silk production in past years is often overstated; the probable yield from trees, eggs, and cocoons is often overestimated; plentiful profits are calculated; but the mistake of understating is nowhere made.

Gradually, but at an increasing rate of velocity, the tide of speculation rose. Large as were the anticipated profits of producing silk, they were insignificant as compared with the fortunes to be made by raising the new mulberry tree. Orchards of it were planted in every state in the Union. At least 300,000 trees were sold at Burlington, New Jersey, by September, 1838,(*d*) and all that were growing there could have been sold at 40 to 50 cents apiece, if owners had been willing to take that price. The demand raised the value abroad, so that trees which had been worth 8 to 12½ cents each in France could not be bought there on a remittance of less than 18 to 30 cents.(*e*) In December, 1838, sales were made in Boston at $1 per tree, but the owners withdrew most of the lot, being dissatisfied with the prices obtained.(*f*) Trees of a single season's growth were sometimes sold at $5 each.(*g*) A belief in the profit of silk culture was, of course, the basis of the demand for the tree, and a table was published showing that in the actual experience of fourteen people, an average of $1,000 per acre had been obtained, at $4 per pound of silk.(*h*) But the value of the trees became greater than that of the silk which they could by any possibility be the means of producing. A farmer in Belchertown, who planted $1,000 worth of the *Morus multicaulis* in 1838 on three-quarters of an acre, sold the trees the next year for $6,000.(*i*) The sales in a

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a American Silk Grower, p. 267.

b Cobb's Manual, p. 47.

c American Silk Grower, p. 54.

d American Silk Grower, p. 60.

e *Ibid.*, p. 78.

f *Ibid.*, p. 148.

g Lilly, Silk Industry, p. 8.

h American Silk Grower, p. 244.

i *Ibid.*, p. 222.

single week in Pennsylvania exceeded $300,000, and in many cases the same trees were sold two or three times at advancing prices.(*a*) In other instances, the proceeds of 15 acres were $32,500; of 2 acres, $4,000; of 10 acres, $38,000. The exact procedure at one of these sales is given as follows:

> Annexed is a correct statement of the number, prices, and proceeds of the *Morus multicaulis* sold September 18, 1839, at auction, at the Highfield Cocoonery, Germantown, Pennsylvania. The trees were sold as they stood in the ground; those under 12 inches to be rejected. Owing to a thin soil and close planting, the sizes of trees were generally small and the branches few; the average height, according to an estimate made on the ground, being about 2½ feet. The purchasers were mostly from a distance, the largest portion being from Illinois, Missouri, and other Western States. 260,000 trees were sold at prices ranging from 17 to 37½ cents per tree, averaging $31\frac{23}{100}$ cents per tree, or 12½ cents per foot in length of stalk. The total sale was $81,218 75.(*b*)

The testimony of an eye-witness at Northampton in 1839 is that—

> Mr. Samuel Whitmarsh and Dr. Daniel Stebbins were rejoicing over the purchase of a dozen *multicaulis* cuttings, not more than 2 feet long, and of the thickness of a pipe-stem, for $25. "They are worth $60," exclaimed the doctor, in his enthusiasm.(*c*)

The discovery was made that cuttings with the eyes or buds were sufficient for planting an orchard:

> On Friday last the steamboat Alabama took up to Baltimore 22,000 mulberry switches (*Morus multicaulis*) from 6 to 8 feet in length; the value of which, at the lowest calculation, based upon actual sales all through the country, cannot be less than $45,000. The number of eyes or buds on these 22,000 switches is ascertained, by carefully counting them, to be 2,254,000, which, according to prevailing prices would be considered cheap at 2 to 2½ cents apiece. The whole were raised on 15 acres of such land as would be considered well sold at $10 an acre in ordinary situations.(*d*)

The bubble burst in 1839. Silk culturists and manufacturers had everywhere been swept into the rising current. As for the tree-speculators, it is related that one, who had been among the most successful, sent an agent to France with $80,000 to buy trees and cuttings in the winter of 1838-'39.

> Before the whole of his purchase had arrived, the crisis had come. The nurseryman had failed for so large a sum that he could never reckon up his indebtedness, and the next spring his *multicaulis* trees were offered in vain to the neighboring farmers at $1 a hundred, for pea-brush.(*e*)

Agriculturists were angry and vociferous over their losses, and pulled up most of their mulberry orchards.

> In every village, numerous gardens and outlots might be seen planted with *multicaulis*; in 1843 these trees had become a worthless incumbrance, and in many instances were rooted out and thrown away.(*f*)

For a few years after the collapse of the *multicaulis*, some interest was taken in the hardier *Morus alba*. Two trees of one season's growth, raised by Elder Sharp, of North Windham, Connecticut, were sold standing in his nursery in August, 1842, at auction, for $106 and $100. Further sales were withheld because the bidding was not considered sufficiently spirited.(*g*) In 1844, a blight of a general character, to which even the hardy white mulberry yielded, gave the finishing blow, and silk culture in America ceased to exist.

Meanwhile, step by step, improvements had been effected in the manufacture of silk goods. As early as 1828, Toerhoven Brothers, of Philadelphia, had invented a machine for reeling, doubling, and twisting at once.(*h*) A later invention by Gamaliel Gay,(*i*) of Poughkeepsie, New York, had a similar object—to reel silk and to make sewing-thread by one operation—and was highly praised by his contemporaries.(*j*) But success did not lie in this direction. Improvements in the machinery for winding, doubling, and spinning, which are mostly credited to Nathan Rixford, of Mansfield, Connecticut, were introduced about 1838, and proved of permanent value. One of the most important of these is the "friction roller". This device avoids the unequal strain upon the thread which otherwise arises from the increase of diameter as the wound silk accumulates upon a bobbin.(*k*)

There are the following statistics of production in Massachusetts for the year 1837: value of sewing-silk manufactured at Dedham, in this year, $10,000; at Northampton, sewing-silk, 6,100 pounds, valued at $41,500; at Quincy and Reading, coach lace, value at latter place, $6,000; Roxbury, fringes and tassels, $15,000; total in Massachusetts, raw silk, $952; sewing-silk, $150,477; hands employed, 156.(*l*) In 1830 the manufacture of silk fringes, tassels, and the like was begun in New York city; this business, including many different kinds of trimmings, is now one of the largest branches of the silk industry, and is more extensively developed in New York than elsewhere, though for many years Philadelphia held pre-eminence. The machinery in use in 1830 in the silk factories at Mansfield, Connecticut, consisted of 32 doubling spindles, 84 for throwing, 32 for soft-silk winding, two broad looms, and one for fringe silk.(*m*)

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a Morris' Silk Farmer, September, 1839.

b Hazard's United States Statistical Register, 1839.

c The Silk Industry in America, by L. P. Brockett, M. D.; New York, 1876, p. 39.

d American Silk Grower, p. 287.

e Brockett: Silk Industry, p. 40.

f Historical Collections of Pennsylvania, by Sherman Day; Philadelphia, 1843, p. 167.

g Lilly: Silk Industry, p. 9.

h Rush Letter, p. 169.

i Mr. Gay was also the inventor of a silk power-loom, said to be capable of weaving silk more rapidly than cotton of equal fineness could be woven. Looms of this kind were put in operation about the year 1835 in silk factories at Providence, Rhode Island, and Nantucket, Massachusetts.—Bishop, ii, p. 392.

j Clarke's Mulberry and Silkworm, p. 116.

k Allen's Chronology, p. 9.

l Hayward's Massachusetts Gazeteer, p. 135.

m Historical Collections of Connecticut, by John W. Barber; Hartford, 1836, p. 550.

In addition to the preceding details, the dates of starting the silk manufacture in various localities may be briefly stated as follows:

1829. Baltimore, Maryland; ribbons.
1834. Boston, Massachusetts; dress trimmings.
1834–1838. Florence, Massachusetts; sewing-silk.
1835. Dedham, Massachusetts; sewing-silk.
1838. South Manchester, Connecticut; general silk manufacture.
1838. Windsor Locks, Connecticut; sewing-silk.
1840. Paterson, New Jersey; general silk manufacture.
1840. Canton, Massachusetts; sewing-silk.
1842. Newark, New Jersey; sewing-silk.
1843. Philadelphia, Pennsylvania; sewing-silk.
1848. Holyoke, Massachusetts; sewing-silk.
1849. Watertown, Connecticut; sewing-silk.
1852. Philadelphia, Pennsylvania; ribbons.
1863. Rockville, Connecticut; sewing silk.
1865. Trenton, New Jersey; coach lace.
1865. New York, New York; general silk manufacture.
1866. Willimantic, Connecticut; sewing-silk.
1866. Oneida, New York; sewing-silk.
1868. Hoboken, New Jersey; silk dress goods.
1870. San Francisco, California; sewing-silk and fringe-silk.
1871. Brooklyn, New York; silk laces.
1872. College Point, Long Island, New York; ribbons.
1874. Wortendyke, New Jersey; silk handkerchiefs and dress goods.
1875. Town of Union, New Jersey; silk dress goods.

It has been already mentioned that the foundation of the present silk manufacture was laid in the making of sewing-silk; this is not only true of the business in general, it is part of the individual history of many leading concerns. Each of the successful enterprises has started from very small beginnings and with very slender resources. A close competition, at first with foreign, afterward with domestic rivals, has compelled experiment in new directions, and, coupled in most branches of the business with constantly changing fashions, has required frequent alterations and improvements in machinery. In the course of a recent attempt to ascertain the percentage of decline in the prices of silk goods during the last two decades of years, the writer constantly encountered the fact that very few of the kinds of goods in the market now are like those that were made ten years ago, and scarcely any are precisely comparable with those of 1860. Many of the experiments in making new goods met partial or complete failure at first, but were again and again renewed till the difficulties were overcome; and of these most interesting trials there is little record. For these and other reasons it is not practicable to state the exact dates when the various branches of the industry were first undertaken; but the following general statements may be of service:

The beginnings of the manufacture of sewing-silk by machinery have been already described; the production of "machine-twist"—a kind of thread suited for use on the sewing-machine, and first adapted to that purpose in February, 1852—gave a great impetus to this branch of the trade. Since then the sewings and twist manufacture, keeping pace with the rapidly-increasing use of sewing-machines, has wholly freed itself from foreign rivalry, but suffers from the keenest of home competition. Manufactures of spun silk (which now include almost every kind of silk goods) were begun at South Manchester, Connecticut, about twenty-five years ago. Ribbons began to be made to supply deficiencies in imported invoices as early as 1861; their manufacture here was much stimulated during the war of the Rebellion by the high price of gold, which checked their import. Plain gros-grain dress silks were made to some extent by different manufacturers before 1866, when the business was organized in New Jersey; its most rapid growth is since 1876. Brocaded silks and satins were attempted on a large scale earlier than plain gros-grain, and were produced in several factories when that was confined to a few. The business of printing Asiatic pongees preceded the regular manufacture of handkerchiefs, which was of slow growth till 1876, when it received a remarkable impulse from the Centennial Exhibition. Hair nets and spot nets were largely produced in 1868; a lace-covering for buttons was made on a lace-machine in 1869; these undertakings paved the way for the manufacture of silk laces, which was established at Brooklyn, New York, in 1871. The making of trimmings of all kinds forms a very large branch of the silk industry, but this high position has been acquired mostly within the last ten years, although certain classes of trimmings were produced before the present century, and have since been made continuously. Silk tapestry and the like are just emerging from the experimental stage, which velvet has not yet quitted.

Throughout the silk manufacture, the condition—or rather, the character—of the raw material is a potent factor. The machinery of American silk mills is driven at the highest speed compatible with good work. Such speed is often needed to catch the demand of a short-lived fashion; and it proves generally profitable by economizing labor. For use on the swiftest spindles and looms, raw silk of the most uniform character is required. For many years the Asiatic supply was unsatisfactory, while the European was too costly to be used at a profit. An important effort was made in 1840–'41 to secure the better preparation of China silk for this market. The chief point was to secure better reeling or re-reeling by means of a winding-frame moved by a crank, in place of direct winding by hand from stationary bamboo sticks. In re-reeling, also, the sizes of the fiber were to be sorted. Improved reels made by Mr. Rixford, and provided with a traverse attachment, were sent to China. Owing to oriental prejudices, the attempt was at that time unsuccessful. About thirteen years afterward the effort was renewed, and the first re-reeled China silk was brought to New York in 1854. For a while the work was well done, but the Chinese became careless about it, and the re-reeled silk deteriorated so much that its importation ceased. A third effort to secure better reeling in China was made in 1867 and met with more permanent success,(*a*) though at best the work there falls far short of the highest standards. Imperfect reeling in the United States had destroyed the

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a Allen's Chronology, p. 9.

market for our native silk and retarded our manufactures; imperfect reeling in China was for even a longer term the chief obstacle to improvement, all progress being hampered by defects in the raw material. Among the causes of rapid advance in the arts of manufacture during very recent years, improvement in the quality of raw silk, especially from Japan, holds a prominent place.

The use of Asiatic silk in this country began with the earliest successful manufacture, about 1829, the first importation of the material being in 1828. Eventually the receipts of raw silk became a correct index of the amount of silk manufacture in this country, but there was a period during which the import was nearly balanced by an export, the Asiatic silk from around Cape Horn merely passing through our ports on its way to Europe. For instance, the following were the values of imports and exports of raw silk from September 30, 1831, to September 30, 1836:

Year.	Import.	Export.
1831	$88, 557	$134, 376
1832	48, 938	48, 800
1833	135, 348	66, 456
1834	78, 706	139, 256
1835	10, 715	4, 114
1836	37, 507	....
Total	399, 771	393, 002

Before taking the import of raw silk as our guide to the amount of manufacture, we may consider a few statistics from other sources. The manufacture of sewing-silk in the United States in 1844 is reported as "396,790 pounds, exclusive of what was used and made in families; of that quantity 176,210 pounds were made in Connecticut".(*a*) There are good reasons for regarding these figures as greatly in excess of the actual production. The census of 1850 showed a much smaller amount of manufacture, and was doubtless nearer the facts, the totals given being of sewing-silk, value $1,209,426; silk cloth, $17,050; fringe, gimp, and tassels, $583,000; total, $1,809,476. In 1855 there were made in Massachusetts, in the three counties of Hampshire, Essex, and Norfolk, 44,000 pounds of sewing-silk, worth $300,000. "That quantity was exclusive of fringes and tassels, made chiefly at Roxbury, to the value of $433,000, and ribbons and dress trimmings to the value of $38,000 by one establishment at Newton." As the silk manufacture of Connecticut was then larger than that of any other state, and there was a considerable amount in Pennsylvania and New Jersey, the value of the whole amount of silk goods made in that year certainly exceeded $3,000,000. For the year ending June 30, 1860, the census returns give a total of silk goods valued at $6,607,771. It is noteworthy that the number of pounds of sewings and twist is 89 per cent. of the whole number of pounds of raw silk said to be consumed as material, and that the latter is in excess of the estimated import. The value of silk goods made in 1870, according to that year's census, was $12,210,662. The value in 1880, net, in finished goods, was $34,519,723.

In the following table the imports of raw silk are given from 1843 to 1880, inclusive, according to the records of the United States bureau of statistics, as to value and number of pounds, except where the pounds are estimated; and the receipts of raw silk at New York and San Francisco are also presented in number of bales and cases since 1850, according to the records of the Silk Association of America:

Year.	Pounds.	Value.	Number of bales and cases at New York and San Francisco.	Year.	Pounds.	Value.	Number of bales and cases at New York and San Francisco.
1843	17, 898	$53, 350	....	1862	*b* 132, 460	$489, 526	1, 008
1844	59, 192	172, 593	....	1863	*b* 250, 740	1, 018, 468	2, 667
1845	62, 697	208, 454	....	1864	407, 935	2, 057, 964	2, 429
1846	68, 938	216, 647	....	1865	290, 021	1, 193, 870	2, 093
1847	*b* 100, 034	250, 086	....	1866	567, 904	3, 437, 900	3, 977
1848	*b* 189, 319	354, 973	....	1867	491, 983	2, 469, 001	2, 252
1849	*b* 144, 204	384, 535	....	1868	512, 449	2, 921, 573	4, 938
1850	*b* 120, 010	401, 385	....	1869	720, 045	3, 318, 496	5, 946
1851	*b* 144, 144	456, 449	....	1870	583, 589	3, 017, 958	5, 263
1852	*b* 119, 604	378, 747	1, 540	1871	1, 100, 281	5, 739, 592	8, 164
1853	*b* 234, 648	722, 931	2, 527	1872	1, 063, 809	5, 625, 620	9, 203
1854	*b* 305, 523	1, 099, 339	5, 604	1873	1, 159, 420	6, 460, 621	11, 129
1855	*b* 257, 968	751, 617	3, 776	1874	794, 837	3, 854, 008	7, 862
1856	*b* 304, 994	991, 234	4, 425	1875	1, 101, 681	4, 504, 306	9, 768
1857	*b* 190, 757	953. 734	3, 107	1876	1, 354, 991	5, 424, 408	11, 660
1858	*b* 422, 658	1, 542, 195	5, 037	1877	1, 186, 170	6, 792, 937	10, 640
1859	*b* 388, 597	1, 619, 157	3, 859	1878	1, 182, 750	5, 103, 084	10, 190
1860	*b* 297, 877	1, 340, 676	5, 241	1879	1, 889, 776	8, 371, 025	15, 949
1861	*b* 361, 891	1, 507, 876	3, 837	1880	2, 562, 236	12, 024, 699	21, 741

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a Census of 1860; Introduction, p. ci.

b Estimated from current prices; only the values being on record.

As it will be of interest to make some comparisons between the importation of silk goods and their manufacture, tables are herewith given of the imports. The first of the tables is from the records of the United States bureau of statistics, by fiscal years, giving the values of the whole imports of silk manufactures into the United States since 1825. Nine or ten per cent. of these imported goods *in the earlier years* was exported. The second table gives values of the same classes of imports by calendar years at the port of New York, and it may be accepted as representing for those years 95 per cent. of the whole:

Imports of silk manufactures by fiscal years.

Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.
1825	$10,271,527	1832	$9,094,566	1839	$21,638,828	1846	$8,827,307	1853	$30,492,024	1860	$32,961,120	1867	$18,357,052	1874	$23,996,782
1826	8,104,637	1833	9,174,199	1840	9,526,988	1847	10,821,722	1854	34,785,652	1861	23,657,269	1868	16,908,533	1875	24,380,923
1827	6,545,245	1834	2,609,349	1841	15,256,907	1848	14,582,743	1855	24,366,556	1862	7,588,376	1869	22,288,669	1876	23,745,967
1828	7,608,614	1835	16,597,983	1842	9,415,370	1849	13,791,232	1856	30,226,532	1863	12,890,760	1870	23,870,142	1877	21,830,159
1829	7,048,628	1836	22,862,177	1843	2,663,410	1850	17,679,137	1857	27,800,319	1864	20,597,723	1871	32,341,001	1878	19,837,972
1830	5,774,010	1837	14,115,171	1844	7,088,406	1851	25,820,692	1858	21,229,358	1865	8,439,145	1872	36,448,618	1879	24,013,398
1831	10,904,393	1838	9,812,338	1845	8,713,326	1852	21,623,646	1859	28,080,366	1866	28,508,696	1873	29,890,035	1880	32,188,690

Imports of silk manufactures at the port of New York by calendar years.

Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.
1851	$23,548,774	1856	$29,081,416	1861	$12,298,863	1866	$22,962,864	1871	$33,899,719	1876	$21,192,386
1852	22,519,223	1857	27,465,192	1862	10,912,938	1867	16,434,524	1872	32,677,749	1877	19,922,741
1853	33,039,081	1858	17,632,843	1863	14,761,186	1868	18,903,232	1873	24,379,322	1878	20,042,730
1854	27,931,659	1859	31,877,863	1864	14,621,202	1869	22,064,312	1874	23,292,551	1879	25,830,829
1855	23,269,544	1860	34,330,321	1865	18,393,693	1870	26,731,275	1875	23,168,118	1880	33,305,460

The following table is presented in order to show specifically the classes of silk goods imported during the past ten years, and facilitate comparison between imports and manufactures as to different kinds of articles:

Imports of silk manufactures at the port of New York, in the calendar years, specifying articles.(a)

Articles.	1880.	1879.	1878.	1877.	1876.	1875.	1874.	1873.	1872.	1871.
Total	$33,305,460	$25,830,829	$20,042,730	$19,922,741	$21,192,386	$23,168,118	$23,292,551	$24,379,322	$32,677,749	$33,899,719
Dress silks	17,665,038	15,104,026	11,834,931	11,978,135	12,707,192	12,639,397	10,581,299	9,764,650	11,080,001	13,650,246
Satins	267,929	202,672	50,219	26,795	41,403	107,501	250,756	205,524	334,403	312,060
Crapes	413,238	435,662	372,231	397,905	504,277	470,806	641,380	577,575	459,727	409,287
Pongees	8,205	1,996	394	2,617	....	10,126	2,629	561	....	451
Plushes	408,219	125,487	101,198	73,777	85,668	125,722	127,045	221,421	309,485	367,159
Velvets	2,044,139	1,976,133	1,510,240	1,049,305	1,384,450	1,151,427	1,087,131	888,143	1,512,590	1,793,906
Ribbons	3,563,848	2,180,260	1,829,838	1,689,413	1,837,537	2,984,271	3,180,647	4,740,040	8,307,009	7,815,744
Laces	1,540,892	1,059,969	921,265	1,158,689	1,248,740	1,030,055	1,708,181	1,960,672	2,218,452	2,153,989
Embroideries	....	....	....	2,020	....	699	1,224	2,644	985	2,625
Shawls	20,677	11,179	5,519	5,611	5,831	71,981	151	5,345	9,236	14,889
Gloves	228,338	126,284	112,941	41,189	29,812	46,622	23,571	40,396	17,337	31,186
Cravats	93,339	115,441	101,019	55,777	50,271	411,689	186,730	115,663	173,742	135,382
Handkerchiefs	64,077	54,688	48,761	49,932	46,294	117,368	38,754	25,862	23,357	39,837
Mantillas	....	....	....	....	573	....	....	....	....	....
Vestings	....	....	....	....	2,427	3,608	2,467	53,431	66,621	54,817
Hose	118,838	89,997	48,955	34,128	55,618	46,790	26,958	42,323	34,836	30,209
Sewings	239,072	194,103	50,632	81,764	16,557	11,367	37,898	31,611	51,030	105,565
Braids and bindings	1,646,868	1,343,760	935,933	1,143,737	964,883	1,200,555	1,038,320	1,033,906	1,044,644	962,913
Silk and worsted fabrics	199,854	156,293	136,065	136,194	165,714	421,791	476,561	599,967	707,176	1,064,137
Silk and cotton fabrics	4,751,946	2,652,228	1,981,899	1,902,033	2,034,823	2,312,654	3,876,952	4,064,077	6,253,392	4,566,028
Silk and linen fabrics	943	651	660	3,720	10,316	3,689	3,897	5,511	73,726	389,289

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a Compiled by the Secretary of the Silk Association of America, 44 Howard street, New York.

In comparing the foregoing tables with the statistics of production, it should be noticed that the imports are simply the invoiced values, to which must be added the duties, importers' profits, and other expenses of importation, before the market value here can be ascertained. Making these allowances, it appears probable that the proportion of silk goods in this country, to the whole amount used, is slowly rising, as follows:

Percentage of silk goods made in the United States as compared with whole consumption of such goods in the country.

	Per cent.
In the fiscal year 1860	13
In the fiscal year 1870	23
In the calendar year 1874	28
In the calendar year 1875	34
In the calendar year 1876	35
In the calendar year 1877	32
In the calendar year 1878	36
In the calendar year 1879	39
In the fiscal year 1880	38

If the foreign invoices are much undervalued, the foregoing calculations must be largely modified. For instance, if the undervaluation of silk goods imported in the census year amounted to twenty per cent., the manufacture of such goods in the United States was only one-third of the consumption.

Within a few years there has been a greater and swifter growth than usual in certain lines of silk manufacture, while the remainder has simply held to its annual average. This is shown in the tables that follow; the first giving the figures of production for different kinds of goods; the second and third representing graphically that production, and the importations of specified articles. In the graphic charts the scale is uniform, permitting direct comparison:

Production of finished goods in the United States.

Silk manufactures.	1874.	1875.	1876.	1877.	1878.	1879.	1879-1880.
Total	$16, 262, 157	$21, 269, 681	$21, 201, 480	$16, 613, 743	$20, 791, 055	$29, 983, 630	$34, 519, 723
Machine twist	4, 848, 839	5, 535, 754	6, 301, 059	4, 126,460	4, 393, 237	5, 891, 300	6, 007, 735
Sewing silk	917, 809	885, 079	951, 460	349, 498	499, 123	778, 250	776, 120
Floss silk	43, 000	42, 568	35, 428	32, 690	87, 710	166, 935	225, 025
Dress goods	1, 400, 000	1, 412, 500	1, 350, 535	1, 712, 083	2, 460, 115	3, 896, 525	4, 115, 205
Satins	.....	.....	.....	.....	482, 420	1, 100, 175	1, 101, 875
Tie silks and scarfs	387, 987	982, 587	679, 668	109, 950	288, 160	547, 675	606, 075
Millinery silks	775, 974	1, 696, 127	1, 119, 444	1, 119, 081	1, 007, 125	977, 495	891, 955
Broad goods, not above enumerated	.....	.....	.....	.....	236, 400	538, 655	627, 595
Handkerchiefs	313, 516	905, 115	927, 000	1, 324, 165	2, 108, 330	3, 583, 125	3, 881, 590
Ribbons	2, 776, 836	4, 815, 485	4, 526, 556	3, 927, 496	4, 140, 345	5, 535, 205	6, 023, 100
Laces	103, 000	164, 000	220, 000	156, 500	247, 235	406, 300	437, 000
Braids and bindings	308, 790	383, 100	315, 000	220, 400	460, 260	828, 255	999, 685
Fringes, dress and cloak trimmings	2, 608, 805	2, 592, 501	2, 821, 594	2, 181, 135	2, 842, 615	3, 590, 860	4, 950, 275
Cords, tassels, passementerie, and millinery trimmings	869, 601	870, 000	900, 000	727, 045	808, 320	930, 540	1, 866, 575
Upholstery and military trimmings	408, 000	492, 613	554, 036	404, 700	596, 145	947, 405	1, 392, 355
Coach laces and carriage trimmings	.....	35, 652	24, 500	18, 040	18, 420	23, 470	37, 510
Fur, hatters and undertakers' trimmings	.....	.....	.....	.....	27, 630	62, 810	59, 805
Embroideries	.....	.....	.....	.....	24, 079	54, 900	.....
Silk value in upholstery and mixed goods	.....	.....	.....	.....	54, 386	123, 750	519, 643
Foulards	500, 000	450, 000	472, 000	200, 000	.....	.....	.....
Silk hose	.....	6, 000	3, 200	4, 500	.....	.....	.....

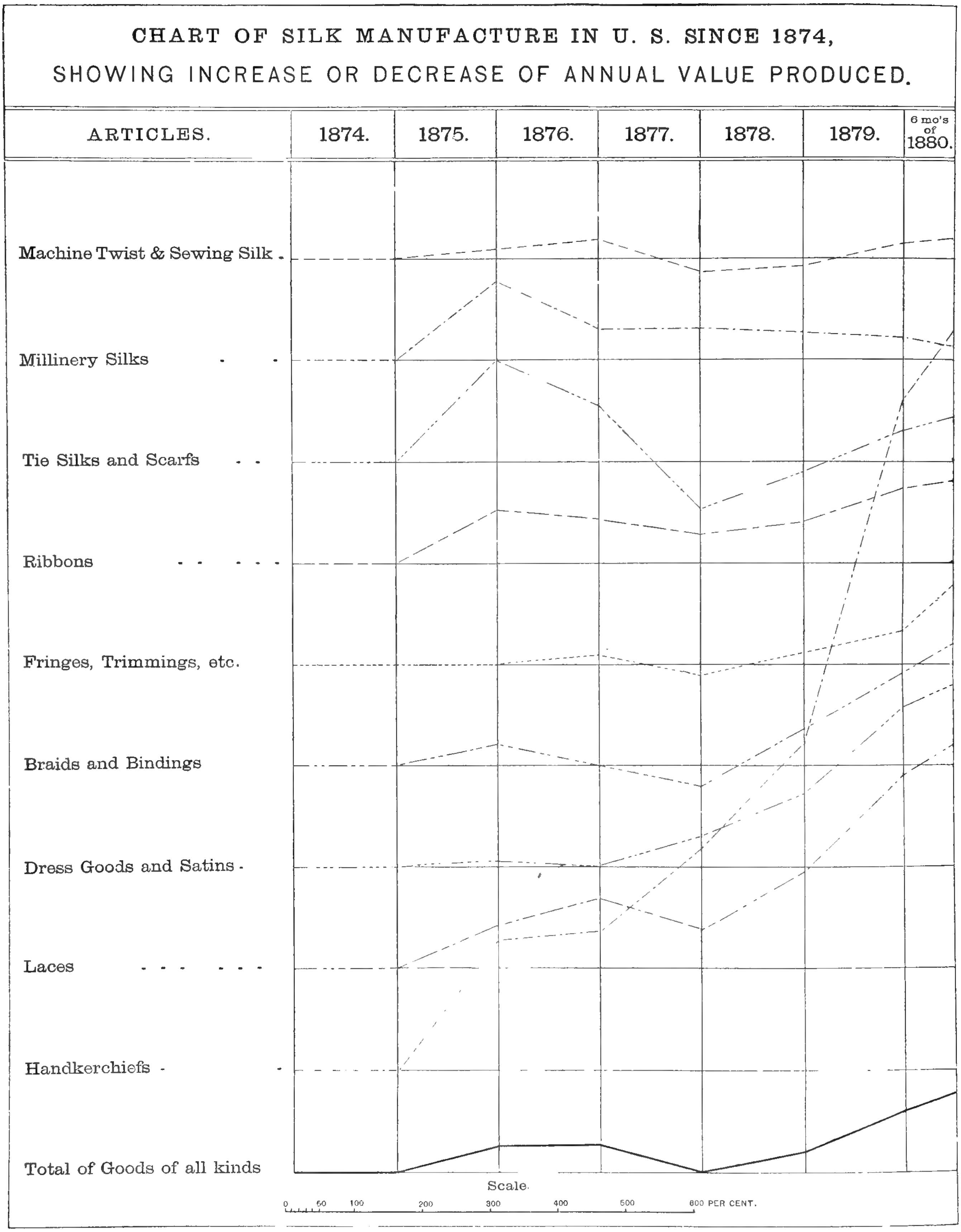
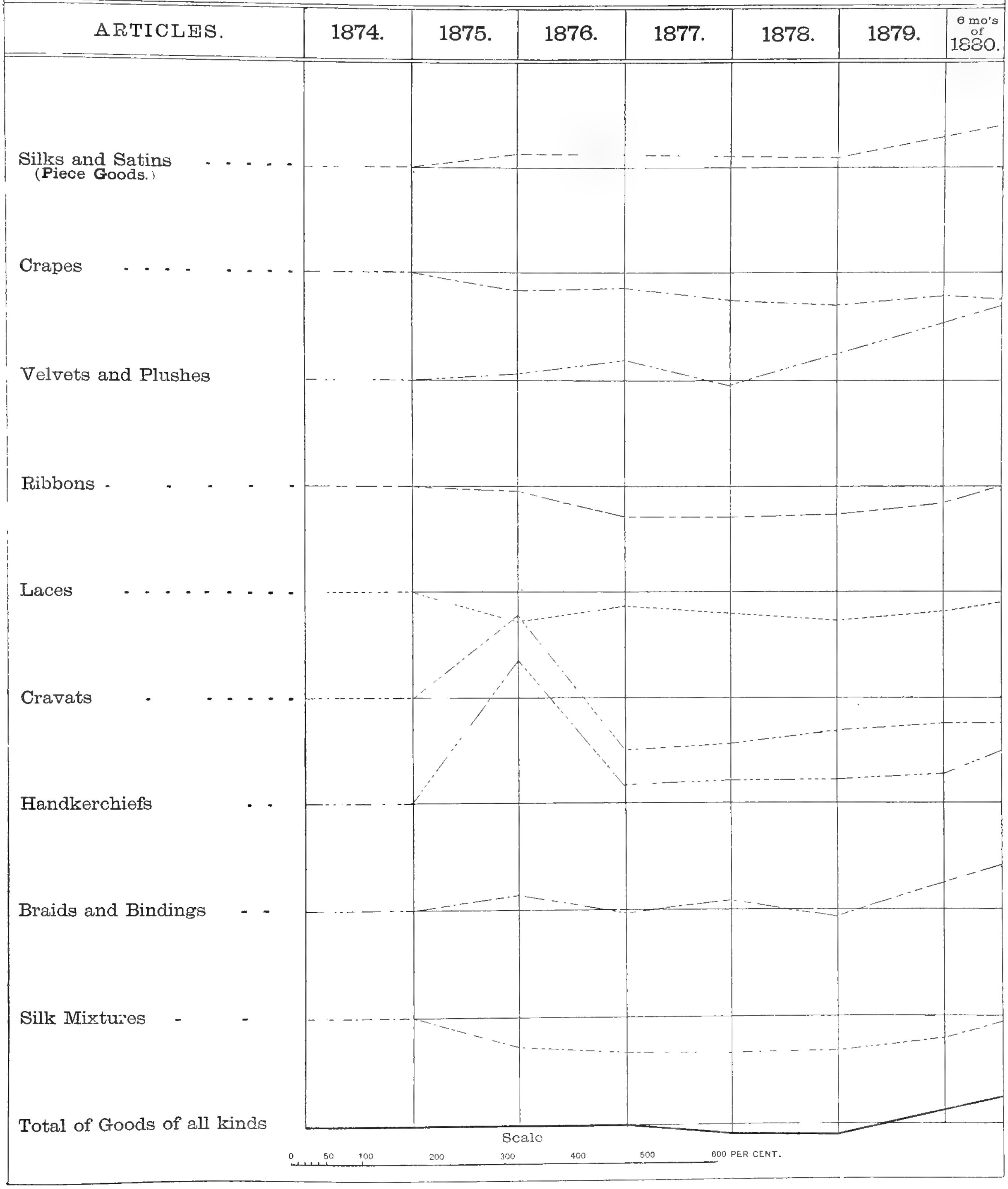


CHART OF SILK MANUFACTURE IN U. S. SINCE 1874,
SHOWING INCREASE OR DECREASE OF ANNUAL VALUE PRODUCED.

CHART OF IMPORTS OF SILK MANUFACTURES SINCE 1874,
SHOWING INCREASE OR DECREASE OF ANNUAL VALUE IMPORTED.



The following are summaries of the census returns of silk manufactures for the years 1850, 1860, 1870, and 1880:

Silk manufacture, 1850.

Articles.	Establishments.	Hands employed.			Capital.	Wages.	All materials.	Products.
		Total.	Males.	Females.				
Total	67	1, 723	503	1, 220	$678, 300	$297, 416	$1, 093, 860	$1, 809, 476
Sewing-silk	27	829	295	534	428, 350	152, 712	848, 945	1, 209, 426
Silk cloth	2	8	3	5	5, 600	1, 776	11, 235	17, 050
Fringe, gimp, and tassels	38	886	205	681	244, 350	142, 928	233, 680	583, 000

Silk manufacture, 1860.

States.	Establishments.	Hands employed.			Capital.	Wages.	Materials.		Products.	
		Total.	Males.	Females.			Raw silk.	All materials	Sewing-silk and twist.	All products.
							Pounds.	*Dollars.*	*Pounds.*	*Dollars.*
The United States	139	5, 435	1, 585	3, 850	$2, 926, 980	$1, 050, 224	462, 965	3, 901, 777	409, 429	6, 607, 771
Connecticut	22	1, 137	288	849	997, 900	155, 760	151, 191	821, 807	145, 835	1, 301, 400
Maryland	3	35	22	13	35, 800	9, 336	....	18, 121	....	39, 800
Massachusetts	20	781	234	547	330, 700	191, 720	89, 000	814, 970	63, 900	1, 297, 050
New Hampshire	2	23	5	18	9, 000	3, 780	6, 000	28, 000	5, 440	36, 480
New Jersey	9	716	160	556	207, 600	111, 492	121, 634	631, 725	107, 310	969, 700
New York	44	1, 159	405	754	323, 980	268, 624	29, 140	644, 911	25, 444	1, 154, 296
Ohio	4	25	11	14	11, 300	5, 732	....	14, 300	....	41, 200
Pennsylvania	35	1, 559	460	1, 099	1, 010, 700	303, 780	66, 000	927, 943	61, 500	1, 767, 845
Vermont	....	....	....	....	....	....	....	....	....	....

Silk manufacture, 1870.

States.	Establishments.	Steam-engines.		Water-wheels.		Machines.						Hands employed.				Capital.	Wages.
		Horse-power.	Number.	Horse-power.	Number.	Braiders.	Looms.	Looms, hand.	Spindles.	Spoolers.	Winders.	Total.	Males above 16.	Females above 15.	Youth.		
The United States	86	1, 122	48	785	45	30	1, 251	188	12, 040	2, 427	3, 038	6, 649	1, 734	3, 529	1, 586	$6, 231, 130	$1, 942, 286
Connecticut	23	401	11	300	20	......	255	......	....	170	139	1, 703	466	1, 003	234	1, 414, 130	569, 425
Maryland	......	......	......	......	......	......	......	......	....	......	......	......	......	......	......	....	....
Massachusetts	9	75	6	90	7	......	5	......	....	84	520	453	97	286	70	412, 000	154, 300
New Hampshire	1	......	......	20	1	......	......	......	....	4	2	15	5	10	......	5, 000	1, 600
New Jersey (*a*)	28	425	16	246	11	......	308	188	8, 840	2, 071	2, 251	2, 790	733	1, 162	895	2, 166, 500	625, 816
New York	14	135	8	121	5	......	216	......	....	69	63	739	154	413	172	800, 500	262, 345
Ohio	......	......	......	......	......	......	......	......	....	......	......	......	......	......	......	....	....
Pennsylvania	10	86	7	......	......	30	467	......	3, 200	27	61	936	266	655	15	1, 429, 000	326, 400
Vermont	1	......	......	8	1	......	......	......	....	2	2	13	13	......	......	4, 000	2, 400

States.	Materials.					Products.						
	Raw silk.	Silk yarn.	Chemicals.	Other materials	All materials.	Silk goods.	Silk ribbons.	Machine-silk.	Spool-silk.	Silk thread.	Other products.	All products.
	Pounds.	*Pounds.*	*Dollars.*	*Dollars.*	*Dollars.*	*Yards.*	*Yards.*	*Pounds.*	*Pounds.*	*Pounds.*	*Dollars.*	*Dollars.*
The United States	684, 488	48, 456	209, 224	853, 796	7, 817, 559	1, 026, 422	3, 224, 264	370, 031	127, 590	19, 000	3, 880, 357	12, 210, 662
Connecticut	175, 839	....	81, 674	407, 727	2, 049, 834	636, 282	447, 664	145, 702	36, 790	....	....	3, 314, 845
Maryland	....	....	....	....	....	....	....	....	....	....	....	....
Massachusetts	101, 650	....	46, 500	23, 900	937, 000	....	160, 000	82, 800	68, 900	....	....	1, 402, 500
New Hampshire	2, 000	....	350	....	14, 350	....	....	2, 000	....	....	....	25, 000
New Jersey	259, 727	22, 440	43, 800	90, 555	2, 678, 161	352, 100	1, 294, 600	55, 529	13, 400	....	2, 182, 784	3, 998, 964
New York	111, 843	....	....	24, 805	1, 211, 385	....	22, 000	77, 500	7, 500	....	644, 573	1, 826, 073
Ohio	....	....	....	....	....	....	....	....	....	....	....	....
Pennsylvania	32, 429	26, 016	36, 700	306, 664	919, 024	38, 040	1, 300, 000	6, 500	....	19, 000	1, 053, 000	1, 632, 900
Vermont	1, 000	....	200	145	7, 805	....	....	....	1, 000	....	....	10, 380

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a Two establishments, using 2 water-wheels of 4 horse-power, employing 42 females and 8 youths, and $12,000 capital, paying $11,020 wages, using $507,014 materials, producing $528,700, included in "Silk, sewing, and twist", are excluded from this table, as they do not manufacture, but simply wind sewing-silk and twist.

Silk manufacture, 1880.

States.	Number of establishments.	Capital.	Number of hand looms on broad goods.	Number of hand-looms on narrow goods.	Number of power-looms on broad goods.	Number of power-looms on narrow goods.	Number of spindles winding, cleaning, and doubling.	Number of spindles spinning and twisting.	Number of spindles braiding.	Value of machinery.	Value of buildings.	Greatest number of hands.	Average number of hands.			Hours in day labor.		Total amount paid in wages during the year.
													Males above 16 years.	Females above 15 years.	Children and youth.	May to November.	November to May.	
Total	382	$19, 125, 300	1, 629	1, 524	3, 103	2, 218	164, 218	262, 312	81, 607	$5, 227, 500	$3, 836, 600	34, 521	9, 375	16, 396	5, 566			$9, 146, 705
California	5	164, 300		24			200	150	754	62, 000	16, 400	185	20	106	25	10	10	41, 400
Connecticut	28	4, 436, 500	2	10	448	155	35, 353	53, 472		1, 247, 550	746, 000	5, 766	785	1, 990	653	10	10	1, 026, 530
Illinois	5	82, 000		51		13				30, 000	25, 000	404	67	135	57	9½	9½	72, 195
Kansas	1	9, 500								1, 000	2, 500	2	1		1	10	10	250
Maine	1	30, 000					728	512		9, 000	3, 000	60	9	46	5	11	11	10, 190
Maryland	4	20, 900		39						10, 000	3, 500	82	12	56	14	9	9	11, 000
Massachusetts	22	1, 306, 900	62	91		88	13, 514	16, 936	11, 000	303, 950	194, 100	2, 068	353	1, 285	188	10	10	521, 725
Missouri	1	4, 000		2			736	680		1, 000	500	5	3	2		10	10	750
New Hampshire	1	8, 000					350	300		2, 000	1, 000	13	2	5	1	10	10	2, 500
New Jersey	106	6, 952, 325	1, 444	153	2, 017	939	76, 037	134, 746	33, 429	2, 290, 000	984, 100	13, 931	4, 696	5, 360	2, 493	10	10	4, 177, 745
New York	151	4, 696, 775	85	906	543	552	27, 707	39, 564	22, 784	966, 000	1, 433, 000	10, 484	2, 405	5, 459	1, 769	10	10	2, 590, 025
Ohio	6	24, 700		22						12, 000	4, 000	142	21	73	41	9½	9½	12, 550
Pennsylvania	49	1, 379, 900	36	226	95	471	9, 497	15, 744	6, 864	287, 000	422, 000	3, 360	1, 000	1, 870	319	10	10	678, 120
Rhode Island	1	7, 500							6, 776	5, 000	1, 000	15	1	7		10	10	1, 600
Vermont	1	2, 000					96	208		1, 000	500	4		2		10	10	125

States.	Value of raw silk and silk materials consumed.	Value of other textile materials consumed.	Value of dye-stuffs, chemicals, and oils consumed.	Value of fuel consumed.	Value of all other materials and supplies consumed.	Gross value of materials and supplies: total	Silk material twice included in foregoing column.	Net value of materials and supplies: total	Gross value of manufactured products.	Silk products twice included in foregoing column.	Net value of manufactured products, *i. e.*, finished goods.
Total	$19, 208, 683	$1, 400, 480	$828, 314	$173, 283	$856, 941	$22, 467, 701	$3, 898, 535	$18, 569, 166	$41, 033, 045	$6, 513, 322	$34, 519, 723
California	66, 418	3, 500	3, 552	2, 355	5, 170	80, 995	14, 595	66, 400	159, 175	28, 470	130, 705
Connecticut	3, 025, 325	12, 000	115, 040	41, 693	117, 148	3, 311, 206	295, 190	3, 016, 016	5, 881, 000	442, 925	5, 438, 075
Illinois	73, 820	9, 500			42, 575	125, 895		125, 895	244, 150		244, 150
Kansas	150					150		150	540		540
Maine	59, 290		620	235	1, 250	61, 395	25, 000	36, 395	81, 585	50, 485	31, 100
Maryland	11, 630	2, 980	1, 150			15, 760		15, 760	35, 415		35, 415
Massachusetts	1, 730, 870	161, 815	64, 725	15, 775	17, 330	1, 990, 515	121, 000	1, 869, 515	3, 764, 260	273, 167	3, 491, 093
Missouri	580				50	630		630	2, 500		2, 500
New Hampshire	11, 000		300	225	100	11, 625	2, 750	8, 875	15, 000	6, 300	8, 700
New Jersey	8, 664, 835	83, 400	482, 472	78, 548	369, 281	9, 678, 536	2, 502, 400	7, 176, 136	17, 122, 230	4, 271, 185	12, 851, 045
New York	4, 333, 485	730, 530	109, 430	24, 167	134, 192	5, 331, 804	533, 600	4, 798, 204	10, 170, 140	802, 115	9, 368, 025
Ohio	14, 845	2, 075			2, 575	19, 495		19, 495	53, 110		53, 110
Pennsylvania	1, 207, 795	394, 680	50, 975	10, 265	167, 270	1, 830, 985	404, 000	1, 426, 985	3, 491, 840	638, 675	2, 853, 165
Rhode Island	7, 500					7, 500		7, 500	10, 000		10, 000
Vermont	1, 140		50	20		1, 210		1, 210	2, 100		2, 100

Quantities of silk, in products, in 1880.

States.	Sewings and twist.	Broad goods and handkerchiefs.	Ribbons and laces.	Trimmings and small goods.	States.	Sewings and twist.	Broad goods and handkerchiefs.	Ribbons and laces.	Trimmings and small goods.
	Pounds.	*Yards.*	*Yards.*	*Pounds.*		*Pounds.*	*Yards.*	*Yards.*	*Pounds.*
Total	821, 528	10, 856, 284	30, 129, 951	710, 149	Missouri				65
					New Hampshire	1, 300			300
California	9, 500			4, 650	New Jersey	25, 580	6, 975, 655	8, 794, 100	50, 405
Connecticut	394, 981	2, 253, 070	8, 541, 235	695	New York	88, 765	1, 427, 439	10, 302, 696	403, 330
Illinois				12, 220	Ohio				2, 187
Kansas			3, 600		Pennsylvania	23, 110	101, 000	1, 915, 000	192, 824
Maine	4, 225				Rhode Island				1, 900
Maryland				1, 784	Vermont	251			
Massachusetts	273, 816	99, 120	573, 320	39, 789					

Summary of silk production. Finished goods for the year ending June 30, 1880.

Sewing-silk	$776, 120
Machine twist	6, 007, 735
Floss silk	225, 025
Dress goods	4, 115, 205
Satins	1, 101, 875
Tie silks and scarfs	606, 675
Millinery silks	891, 955
Other broad goods	627, 595
Handkerchiefs	3, 881, 590
Ribbons	6, 023, 100
Laces	437, 000
Braids and bindings	999, 685
Fringes and dress trimmings	4, 950, 275
Cords, tassels, passementerie, and millinery trimmings	1, 866, 575
Upholstery and military trimmings	1, 392, 355
Coach laces and carriage trimmings	37, 510
Undertakers', hatters', and fur trimmings	59, 805
Mixed goods and silk values therein	519, 643
United States	34, 519, 723

Silk manufacture in counties producing goods to the value of $1,000,000 *annually.*

State and county.	Number of factories reported.	Capital (real and personal) invested in the business.	Number of looms.	Gross value of manufactured products.	Net value of manufactured products, *i. e.*, value of finished goods.	Total amount paid in wages during the year.
United States	288	$15, 371, 575	7, 452	$32, 966, 090	$27, 688, 170	$7, 531, 505
CONNECTICUT.						
Hartford county	3	3, 215, 000	549	2, 709, 590	2, 571, 820	638, 760
Tolland county	9	560, 000	37	1, 627, 145	1, 443, 060	168, 360
MASSACHUSETTS.						
Hampshire county	4	437, 400		1, 457, 300	1, 416, 600	203, 625
NEW JERSEY.						
Hudson county	17	753, 300	1, 060	2, 045, 000	2, 028, 400	485, 560
Passaic county	82	5, 660, 525	3, 238	14, 164, 465	10, 003, 905	3, 335, 045
NEW YORK.						
New York county	126	3, 431, 450	1, 799	7, 800, 250	7, 596, 720	2, 079, 535
PENNSYLVANIA.						
Philadelphia county	47	1, 313, 900	769	3, 162, 340	2, 627, 665	620, 620

In the present census the returns show a total of "capital" amounting to $19,125,300. If the assumption be made that the money used in carrying on the business, apart from plant and fixtures, is turned over three times in the year, the following estimate may be offered:

One-third of $9,146,705, the year's expenditure for wages	$3, 048, 902
One-third of $22,467,701, the year's cost of materials and supplies	7, 489, 234
Fixed capital in machinery	5, 227, 500
Fixed capital in buildings	3, 836, 600
Estimate for total fixed and floating capital	19, 602, 236

Giving a result within 2½ per cent. of the returns.

The number of hands reported as the "average" employed, is usually taken from the pay-roll, and no allowance is made for irregularities and absences. The actual number constantly employed is fully ten per cent. below the reported average. A careful study of the returns on this point has justified this conclusion. The rates of wages paid to different classes of operatives during the year ending June 30, 1881, are given in the following table:

Rates of wages per week to specified operatives.

Designation of operatives.	Sex.	Average rate.	Usual rates.	Designation of operatives.	Sex.	Average rate.	Usual rates.
Raw silk winder	F.	$5 25	$5 00 and 6 00	Hand-loom weaver	F.	$8 44	
Raw silk cleaner	F.	3 37	3 00	Power-loom weaver (*a*)	M.	11 43	$12 00
Raw silk doubler	F.	5 18	5 00 and 5 50	Do	F.	7 94	
Raw silk spinner	M.	5 57	6 00	Lace-machine operator	M.	14 75	
Do	F.	4 87		Braid-machine operator	M.	16 00	
Raw silk twister	M.	5 98	6 00	Braider	F.	5 41	
Do	F.	5 67	6 00	Passementerie spinner	M.	17 73	
Raw silk reeler	F.	4 50		Do	F.	12 00	
Soft silk doubler	F.	4 00		Fringe-knotter	F.	5 30	
Soft silk winder	F.	6 35	6 00	Tassel-maker	F.	5 29	
Soft silk spooler	F.	4 96		Finisher	M.	13 50	
Soft silk warper	M.	10 71		Designer (*b*)	M.	24 71	
Do	F.	7 62	8 00	Card-cutter (*c*)	M.	11 68	
Quiller and quill winder	F.	4 00		Dyer (*d*)	M.	12 77	12 00 and 15 00
Soft silk beamer	M.	12 11	12 00 and 15 00	Engineer	M.	12 33	
Do	F.	7 72	7 00 and 9 00	Machinist	M.	12 40	
Soft silk warp twister	M.	13 96	12 00 and 15 00	Loom-fixer	M.	15 87	
Hand-loom weaver (*a*)	M.	14 15	12 00, 15 00, 18 00	Laborer	M.	8 73	6 00 and 9 00

a There is a very great difference in the size of looms for different kinds of goods. The highest rates to power-loom weavers are paid to those employed on the large looms used in fringe and trimming manufacture.

b The designer is sometimes also the superintendent.

c The card-cutter is sometimes also the designer.

d The chief dyer receives from $20 to $30.

The net value of raw silk and silk materials consumed in manufacture is $15,310,148. The gross value, as given in the returns, consists of the following items:

2,690,482 pounds raw silk, valued at	$13,497,203
Silk material twice included in returns	3,898,535
Waste silk, pierced cocoons, and imported organzine, tram, French twist, etc.	1,812,945
Total	19,208,683

Silk material is "twice included" when, for instance, it appears first as "raw silk", in the returns of a throwster, and secondly as "thrown silk" or "fringe silk", being again reported as raw material in the return of a weaver or fringe-maker. The number of pounds of raw silk accounted for in the returns is 2,690,482, which agrees very fairly with the import of the fiscal year, 2,562,236, the stock on hand being somewhat lighter at the close than at the beginning of the year.

Silk products twice included are deducted from the gross production, leaving a result which it will be noticed exactly agrees with the value of finished goods as given by the returns. The reasons for this deduction are similar to those which apply to the values of raw materials. While the total production, as represented by reports amounting to $41,033,045, covers only a real value of product amounting to $34,519,723, it should be noted that the products of partial manufacture go for the most part to be finished in counties and often in states other than those where they originate. Hence in many cases the gross production of a county or state more nearly represents its industry than would the value of its finished goods. For instance, the gross production of Passaic county, New Jersey, $14,164,465, is much nearer the total value of its industry than $10,003,905, the value of its completed goods, because the greater part of the thrown and fringe silk produced in Paterson, New Jersey, is not made into goods there, but goes elsewhere, chiefly to New York city; and the same is true, to a great extent, of the added value from spooling, winding, dyeing, and refinishing; those processes being largely applied in New Jersey to goods belonging in other states.

The values of the finished goods are given at the selling prices in their chief markets, and without deduction for expenses of selling. No questions were asked or answered in the returns as to such expenses, nor as to profit and loss, freight to market, taxes, interest on capital, and depreciation of materials, goods, buildings, or machinery.

Mr. John E. Atwood, of Stonington, Connecticut, has, by request, contributed a letter on the history of silk machinery, which is herewith subjoined:

STONINGTON, CONNECTICUT, *September* 27, 1881.

About fifty years ago nearly all the silk produced and manufactured in the United States was reeled by hand in a rude manner and spun on hand-wheels, each attendant operating a single spindle only. The substitution of machinery near that time, driven by water or steam power, soon superseded the old methods. Like nearly everything of the kind at that period the earlier appliances for the manufacture of silk were primitive in character. This industry has been affected by a series of advances of more or less importance, among which may be mentioned the application of the friction-roll for a take-up motion in spinning, the use of the railroad machine for doubling and twisting, the three-cord matcher for doubling and matching; also a matcher and evener combined for doubling, and finally an improved process for stretching the twisted silk, that has superseded most of the previous steps by cheapening and improving the product.

In the meantime many minor advantages have been introduced, while steady progress has been made in style and workmanship, insomuch that the modern plant for silk manufacture would hardly seem to be related to the earlier specimens.

These observations apply more particularly to the silk industry up to a very recent period. Within the last two or three years, however, there has been a marked advance at least in the machinery and appliances for throwing silk. These changes are of a radical type and of such superior merits as to work a complete revolution in their sphere of operations. These last steps in the line of improvement apply to both departments of silk throwing, commencing with a most superior guide system, and include important features in winding, redrawing, doubling, reeling, soft silk winding, spinning, etc. While the machinery is far superior to the former styles, at the same time it costs much less for a plant to turn out a given production.

A brief statement as regards the spinning frame, the most important of the series, may not be out of place here.

This machine, unlike its rivals, is adapted for both the sewing and the weaving departments. It contains the new guide system; it has practical self-balancing spindles that will bear a maximum velocity of 10,000 revolutions per minute, and run much better than the common spindles will at 5,000. The spindles are self-oiling, neat, and waste no oil, and require to be oiled but once in from three to six months. The bands will last much longer on this frame. The machine is a model of neatness and convenience. It can be operated with less expensive labor, has several minor advantages, and has a radically new method for driving the spindles. It is very economical of space, the last edition being only 10 inches from the center of the spindles on opposite sides, while it costs less for spindles than any other.

If we stop to survey the progress made at this point we find that one operative will spin more silk and do it much better than 2,000 could a half century ago; the room occupied would be only about one-four-hundreth part as much, and the cost of the machinery about one-twentieth.

In addition to the foregoing statements concerning the progress in machinery it may be desirable to notice the increased use of power-looms. The following statistics have been compiled from the census returns, and show the numbers in use in the years 1875 to 1880, respectively:

Number of power-looms in use in 1875, 1,605; in 1876, 1,941; in 1877, 2,340; in 1878, 2,862; in 1879, 3,690; in 1880, 5,321.

The number of Jacquard attachments reported in returns was 3,189. A great variety of other machinery is in use in the manufacture; 4,117 "other machines"—that is, other than looms or Jacquards—were reported in the returns, and this probably falls short of the full number.

Since the period of the *Morus multicaulis* speculation the raw silk raised in this country has at no time been an observable element in the material used by manufacturers. Trustworthy statements of the annual amount obtained in that era of excitement were not then published; the accounts of what might be done or what was expected taking the place of statistics. A writer who seems to have been more conservative than the majority estimated the annual production in 1841 at 30,000 pounds.(*a*) After the blight of the mulberry in 1844, a long period elapsed in which there is no record of anything more than trifling experiments in producing silk, except an indefinite account of a considerable quantity of cocoons obtained at and near New Orleans and shipped to Europe about the year 1860. The cultivation of the mulberry was begun in California in 1854; silkworm eggs were received there in 1860; in 1865 about 259 pounds of cocoons were obtained, and the product reached 1,900 pounds in 1868. The enterprise arrived at its highest point in 1870, when more than a million mulberry trees were growing in the state. The production of silkworm eggs for export to Europe was attempted on a large scale, and one company raised from 7,000 to 8,000 ounces.(*b*)

This industry was encouraged by an act of the California legislature in 1865-'66, giving a bounty of $250 for planting 5,000 mulberry trees and $300 per 100,000 cocoons. The operation of the law proved unsatisfactory and it was soon repealed. An attempt to pass a new act "to encourage silk culture and manufacture" was defeated in the California senate in 1872. The speculation in silk-raising "raged with unabated fury for several years, inflicting severe losses. It is at present almost extinct in California in consequence of the reaction against this mania."(*c*)

An inquiry was attempted by the writer to ascertain the amount of raw silk raised in the United States during the census year ending June 30, 1880. It was soon determined that the expense of making such an investigation thoroughly would be more than the result could be worth. The only instances of the use of native silk in manufacture were at Williamsburgh, Kansas, and at Salt Lake City, Utah. The latter experiment proved financially a failure, the raw silk costing much more than the Asiatic product. It may, however, be stated in a general way, without pretension to accuracy, that the amount of reeled silk produced in Utah territory during the year was less than 1,000 pounds; the amount in Kansas was less than 500 pounds, and the product in no other state was more than half as much. Missouri and North Carolina probably came next in amount of cocoons raised, and after those states Pennsylvania and New Jersey, the quantities produced there and in scattered localities throughout the country being inconsiderable.

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a The Silk Record: Edmund Morris, Burlington, New Jersey, December, 1841.

b Le Cocon de Soie: by E. Duseigneur-Kléber; Paris, 1875, p. 84.

c Report of the United States Commissioner of Agriculture for 1878, p. 495.

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"A small iron pot, capable of containing about one quart," was the first article cast at the furnace. In 1844 it was in the possession of Mr. Lewis's mother, who was a lineal descendant of Thomas Hudson, the first owner of the lands on Saugus river on which the iron works were built, and who obtained possession of the pot immediately after it was cast, "which he preserved as a curiosity." "It has been handed down in the family ever since," wrote Mr. Lewis in 1844.

Joseph Jenks, who became the founder of an eminent New England family, purchased from Richard Leader on the 20th of January, 1647, the privilege of building a forge at the Lynn iron works for the manufacture of scythes and other edge tools. This enterprise was successful. In 1652 he made at the Lynn iron works, for the mint which was that year established at Boston, the dies for the first silver pieces coined in New England. On one side of these coins was the impression of a pine tree. In 1654 he made for the city of Boston the first fire engine made in America. In 1655 the general court granted him a patent for an improved scythe. He died in 1683.

Henry and James Leonard were also skilled workmen at the Lynn iron works. They and their descendants were afterwards connected with other colonial iron enterprises. They had a brother Philip, who does not appear to have lived at Lynn. Rev. Dr. Fobes, in referring to the Leonard family in his *Topographical Description of the Town of Raynham*, written in 1793, says that "the circumstance of a family attachment to the iron manufacture is so well known as to render it a common observation in this part of the country, 'Where you can find iron works there you will find a Leonard.'" Henry and James Leonard are said to have learned their trade at Pontypool in Monmouthshire.

The second iron enterprise that was undertaken in New England embraced a furnace and forge at Braintree, about ten miles south of Boston. The works at Lynn and Braintree belonged to the same company. Bishop says that, on the 19th of November, 1643, a grant of 3,000 acres of the common land at Braintree was made to Mr. Winthrop and his partners, the Lynn company, "for the encouragement of an iron work to be set up about Monotcot river." But this grant, according to Lewis, was not surveyed until January 11, 1648. On the 29th of September, 1645, as stated by Lewis, the first purchase of land, consisting of twenty acres, "for a forge at Braintree," was made from George Ruggles by Richard Leader, who was the general agent for the company of undertakers. The furnace was probably built in 1646. Robert Child, writing from Boston on the 15th of March, 1647, to John Winthrop, Jr., "at Pequot river," says of the Lynn and Braintree enterprises: "We have cast this winter some tuns of pots, likewise mortars, stoves, skillets. Our potter is moulding more at Brayntree as yet, which place after another blowing we shall quit, not finding mine there." We find, however, that iron ore was mined at Braintree in the early part of 1652, and that, on the 28th of September of that year, it was proposed at London, on behalf of the undertakers, to employ William Osborne at "Brantry furnas & fordges." Lewis states that in 1691 "iron ore, called 'rock mine,' was taken from the ledges at Nahant for the forge at Braintree." Henry Leonard is supposed to have superintended the erection of the Braintree works. John Gifford was the manager of the works, according to Newhall, and in 1651 he succeeded Richard Leader as agent for the works at Lynn.

The next iron enterprise in New England was located in the town, or township, of Taunton, now Raynham, two miles from the city of Taunton, in Bristol county. This enterprise was undertaken in 1652 by Henry and James Leonard and Ralph Russell. At a town meeting at Taunton, held October 21, 1652, "it was agreed and granted by the town to the said Henry Leonard and James Leonard, his brother, and Ralph Russell, free consent to come hither and join with certain of our inhabitants to set up a bloomery work on the Two-mile river." The Taunton works, sometimes called the Raynham works, are referred to by Lewis as "Leonards' celebrated iron works." They were well managed, and long continued in a prosperous condition. At these works bar iron was made directly from the ore. As Henry Leonard was at Lynn in 1655, and as James Leonard does not appear to have been there after 1652, it is probable that the latter and his sons became the sole owners of the Raynham works. Dr. Fobes gives an account of the intimacy which existed between the Leonards at Raynham and King Philip, through which they were protected against Indian outrages. Sanford, in his *History of Raynham*, says: "Philip had a summer hunting-seat near the Fowling pond. The Leonards had supplied him with beef, repaired his muskets, and furnished him with such simple tools as the Indians could use." Philip's head, says Dr. Fobes, was deposited in the cellar of James Leonard's house for a considerable time after his death in 1676. At the date of Dr. Fobes's book, 1793, this house was occupied by Leonards of the sixth generation. The forge, says this writer, was situated on "the great road, and, having been repaired from generation to generation, it is to this day still in employ." In William Read Deane's *Genealogical Record of the Leonard Family*, published in 1851, it is stated that "the old forge, though it has been several times remodeled, has been in constant use for nearly two hundred years, and is now in the full tide of successful operation. It is owned by Theodore Dean, Esq., who is descended from the Leonards." The forge was at that time employed in the manufacture of anchors. In 1865 it was still so employed, with six forge fires, two hammers, and four water-wheels, but about that time it ceased to be active and has not since been in operation. The works are now in a dilapidated condition. Theodore Dean was recently the owner. This forge is the oldest iron establishment in the country that is now in existence. Fowling pond, which was originally nearly two miles long and three-quarters of a mile wide, was close to the forge, and supplied it with ore. A blast furnace, for the manufacture of hollow-ware, was built on a branch of Two-mile river before the Revolution, and has long been abandoned.

In Ricketson's *History of New Bedford* it is stated that "one of the earliest settlers of Dartmouth was Ralph Russell, who came from Pontypool, England, and had been engaged in the iron business with Henry and James Leonard, of Taunton. He set up an iron forge at 'Russell's Mills,' which place received its name from him."

In 1657 the general court of Massachusetts, owing to the failure of the undertakers at Lynn and Braintree to furnish the colony with a constant supply of iron, "whereby unsufferable damage may accrew," granted to the inhabitants of Concord and Lancaster, and such as they should associate with them, "liberty to erect one or more iron workes within the limitts of theire oune toune bounds, or in any common place neere thereunto." That this grant resulted in the establishment of an iron work at Concord—since become famous through its association with the outbreak of hostilities between the mother country and the colonies in 1775—appears probable from the grant by the court in 1660, to "y^{e} company in partnership in the iron worke at Concord," of "free liberty to digg mine without molestation in any lands now in the court's possession."

About 1668 Henry Leonard went to Rowley Village, about 25 miles northeast of Lynn, as stated by Newhall, "and there established iron works." Lewis says that in 1674 Henry Leonard's sons, Nathaniel, Samuel, and Thomas, contracted to carry on these works for the owners, whose names are given by Bishop as "John Ruck and others of Salem." The works did not prove to be profitable. After establishing the Rowley works Henry Leonard went to New Jersey, "and there again engaged in the iron manufacture." At some time previous to his removal to New Jersey he appears to have been connected with the establishment of iron works at Canton, about 14 miles south of Boston.

Other iron enterprises in Massachusetts speedily followed in the same century those that have been mentioned. In 1677 one of these works, the name of which has not come down to us, was destroyed by the Indians. About the same year iron was made at Topsfield, near Ipswich, and in 1680 its manufacture was commenced at Boxford. Hubbard, writing about 1677, says that at that time there were in the colonies "many convenient places, where very good iron, not much inferior to that of Bilbao, may be produced, as at this day is seen in a village near Topsfield, seven or eight miles west from Ipswich." About 1696 George Leonard is said to have erected "an iron-working establishment" at Norton, about 27 miles southwest of Boston.

For a hundred years after its settlement in 1620 Massachusetts was the chief seat of the iron manufacture on this continent. Most of its iron enterprises during this hundred years were bloomaries, but there were blast furnaces also, although the latter as a rule produced only hollow-ware and other castings, and not pig iron. During the period mentioned the iron industry of Massachusetts was confined to the eastern counties of the colony, where bog and pond ores formed almost the only kinds of ore that were obtainable.

The English settlement at New Haven closely followed Massachusetts in the manufacture of iron. John Winthrop, Jr., who removed from Lynn to Pequod, (New London,) Connecticut, in 1645, had obtained from the general court in the preceding year permission to set up an iron work, and in 1651 he obtained a grant of certain privileges to enable him to "adventure" in the manufacture of iron; but he does not seem to have embarked in the iron business until subsequently. On the 30th of May, 1655, according to Bishop, it was ordered by the assembly of New Haven "that if an iron worke goe on within any part of this jurisdiction the persons and estates constantly and onely imployed in that worke shall be free from paying rates." In 1658 Captain Thomas Clarke, in connection with John Winthrop and others, put in operation an "iron worke" at New Haven, and in 1669 he seems to have been still engaged in the same enterprise, for in that year the general court of Connecticut continued the exemption already noted for another seven years, "for encouragement of the said worke in supplying the country with good iron and well wrought according to art." This enterprise embraced a blast furnace and refinery forge. On the 22d of June, 1663, John Davenporte wrote from New Haven to John Winthrop, Jr., as follows: "The freshest newes here, & that which is *e re vestra*, is, that they have bene blowing, at the iron worke, and have runne, from the last 6th day to this 2d day, 5 sowes of iron, which are commended for very good; & this night it's thought they will run another, & begin to-morrow to make pots. The worke is hopeful, but the workemen are thought to be very chargeable and froward." This frowardness was due apparently to the influence of an old enemy of iron works and ironworkers, John Barleycorn. Bishop records "a proposition made in May, 1662, 'in y^{e} behalfe of Capt. Clarke, that wine and liquors drawn at the iron workes might be custome free,' which was allowed to the extent of one butt of wine and one barrel of liquors, and no more."

Rhode Island made iron soon after its settlement in 1636—certainly at Pawtucket and elsewhere as early as 1675, when the forge at Pawtucket, erected by Joseph Jenks, Jr., son of Joseph Jenks, the machinist at Lynn, was destroyed by the Indians in the Wampanoag war, together with other iron works and infant enterprises. A third Joseph Jenks was governor of Rhode Island from 1727 to 1732. The few forges and furnaces which were erected in this colony in the seventeenth and eighteenth centuries used bog or pond ore, and all or nearly all of them were located on the border of Bristol county, Massachusetts.

Iron does not appear to have been made within the limits of Maine, New Hampshire, or Vermont until the eighteenth century.

progress in the eastern counties. Charlotte furnace at Middleborough was built in 1758, and was in operation for many years. During our two wars with the mother country it was employed in casting shot and shells. The shot which the *Constitution* carried in her conflict with the *Guerrière* were cast at this furnace. In 1784 there were seventy-six iron works in Massachusetts, "many of them small." At Amesbury, in Essex county, a furnace was erected about 1790, and at Boxborough, in Middlesex county, a bloomary forge was built about the same time. In 1795 Dr. Morse reported eleven slitting mills in Bristol, Norfolk, and Plymouth counties, which rolled and cut in that year 1,732 tons of iron into hoops and nail rods. Bishop says that "the two counties of Plymouth and Bristol had in operation in 1798 fourteen blast and six air furnaces, twenty forges, and seven rolling and slitting mills, in addition to a number of trip-hammers and a great number of nail and smith shops. Cut and hammered nails, spades and shovels, card teeth, saws, scythes, metal buttons, cannon balls, bells, fire arms, sheet iron for tin ware, wire, etc., were made in large quantities." Steel was made from crude iron at Canton about 1797 "by the German process." In 1804 there were ten blast furnaces in Plymouth county, all producing castings exclusively. In 1830 only three of these were left—Charlotte, Federal, and Pope's Point, all in Carver township, and all in operation. There were also in 1804 ten forges in the same county, which were principally employed in working "old iron scraps," broken pots, kettles, etc., and produced in all about 200 tons of bar iron per annum.

Dr. James Thacher, who was a part owner of Federal furnace, wrote in 1804 a description of this furnace, which was built in 1794, and is said by him to have been the most valuable furnace with which he was acquainted, the manufacture of castings being "there prosecuted to great extent and advantage." The furnace was built of stone, as were all other Plymouth furnaces. It was 20 feet high and 24 feet square, its walls being 7 feet thick and its interior 10 feet in diameter. Charcoal was the only fuel used, and marine shells formed the only fluxing material. The furnace was lined with "fire stone" composed of "soft slate." A brick funnel at the top of the stack served "to convey off the blaze and smoke." The Doctor continues his description as follows:

> At the bottom of an arch in the front of the furnace is an aperture, from which the workmen remove the scoria and dip out the metal. And in another arch on one side there is a small aperture for the insertion of the pipes of two large bellows 22 feet long and 4 feet wide, which being kept in constant alternate motion by the agency of a water-wheel 25 feet diameter, a powerful current of air is excited; and being impelled upon the surface of the fuel the fusion of the metal is greatly accelerated. The whole of this machinery is included in a large wooden building, affording accommodation to the workmen with their apparatus for moulding and casting.
>
> The specific articles manufactured at the Federal furnace are, besides hollow-ware of every description, Seymour's patent rolls for slitting mills, of a superior quality, cast in iron cylinders, potash kettles, stoves, fire-backs and jambs, plates, gudgeons, anvils, large hammers, cannon shot of every kind, with a vast variety of machinery for mills, &c.

The ores used in the furnaces and bloomaries of eastern Massachusetts were chiefly bog and pond ores. Dr. Thacher says, however, that in 1804 "a very considerable proportion of ore smelted in our furnaces is procured from the very productive mines at Egg Harbor, in the state of New Jersey, of a reddish brown color, producing from 30 to 40 per cent. of excellent iron. The usual price is $6.50 per ton." He also says that "reddish brown" ore in large lumps was obtained from a mine on Martha's Vineyard, "affording about 25 per cent. and worth $6 per ton." The pond ores contained from 20 to 30 per cent. of iron, and the average price was about $6 per ton at the furnace. Bog ore, found in swamps and other low places, was of a "rusty brown color, yielding about 18 per cent. and worth $4 per ton at the furnace." The following letter from the Rev. Isaac Backus, of Middleborough, dated July 25, 1794, gives a description of the manner in which pond ores were obtained.

> Vast quantities of iron, both cast and wrought, have been made in this part of the country for more than a hundred years past; but it was chiefly out of bog ore, until that kind was much exhausted in these parts, and then a rich treasure was opened in Middleborough, which had been long hid from the inhabitants. About the year 1747 it was discovered that there was iron mine in the bottom of our great pond at Assowamset; and after some years it became the main ore that was used in the town, both at furnaces and forges, and much of it has been carried into the neighboring places for the same purpose. Men go out with boats, and make use of instruments much like those with which oysters are taken, to get up the ore from the bottom of the pond. I am told that, for a number of years, a man would take up and bring to shore two tons of it in a day; but now it is so much exhausted that half a ton is reckoned a good day's work for one man. But in an adjacent pond is now plenty, where the water is twenty feet deep, and much is taken up from that depth, as well as from shoaler water. It has also been plenty in a pond in the town of Carver, where they have a furnace upon the stream which runs from it. Much of the iron which is made from this ore is better than they could make out of bog ore, and some of it is as good as almost any refined iron. The quantity of this treasure, which hath been taken out of the bottom of clear ponds, is said to have been sometimes as much as five hundred tons in a year.

In 1735 Samuel Waldo erected a furnace and foundry on the Pawtuxet river, in Rhode Island, which were afterwards known as Hope furnace. They are said to have been the most important iron works in the state during the eighteenth century. Cannon and other castings were made here. During the Revolution they were active in producing cannon, cannon balls, and other munitions of war. About the year 1735 three other furnaces were erected in Cumberland township, in the northeastern part of the state, but they seem to have been abandoned before the Revolution. They made "cannon, bombs, and bullets" during the French war of 1755. Before 1800 a slitting mill had been erected on one of the branches of Providence river; a slitting and rolling mill at Pawtucket falls; and other iron-manufacturing establishments in various parts of the state. Bishop says that "manufactures of iron, including bar and sheet iron, steel, nail rods and nails, farming implements, stoves, pots, and other castings and household utensils, iron works for shipbuilders, anchors, and bells formed the largest branch of productive industry in the state toward the close of the eighteenth century."

Litchfield county, in northwestern Connecticut, contains iron-ore mines of great value, from which the ore for the celebrated "Salisbury iron" has been taken for a hundred and fifty years. This ore is of a similar quality to that found in Berkshire county, Massachusetts, already referred to. As early as 1734 a bloomary forge was erected at Lime Rock, in Litchfield county, by Thomas Lamb, which produced from 500 to 700 pounds of iron per day. About 1748 a forge was erected at the village of Lakeville, in the same county, and in 1762 John Haseltine, Samuel Forbes, and Colonel Ethan Allen purchased the property and built a blast furnace, but soon afterwards sold it to Charles and George Caldwell, of Hartford. It made two and a half tons of iron in twenty-four hours, and three tons of ore and 250 bushels of charcoal were used per ton of iron. Its blowing apparatus consisted of a pair of leather bellows driven by a water-wheel. In 1768 the furnace was sold to Richard Smith, of Hartford. Smith was a royalist, and fled to England during the Revolution, but his furnace was made to produce large quantities of cannon, cannon balls, shells, etc., for the Continental army. After the Revolution it made cannon for the navy, potash kettles weighing nearly half a ton each, and pig iron for forges and foundries. Many bloomary forges were erected in this county about the close of the last century. One of these was built on Mount Riga, about five miles north of Lakeville, in 1781, by Abner or Peter Woodin. It was afterwards owned by Daniel Ball, and was called Ball's forge. About 1806 Seth King and John Kelsey commenced to build a furnace on Mount Riga, but were not able to finish it, and in 1810 it fell into the hands of Holley & Coffing, who completed it in that year and operated it for many years. Twenty-seven furnaces have been built and operated within a radius of thirty miles of Lakeville, a few of which were in New York and Massachusetts, but the majority were in Connecticut. At the close of the eighteenth century Litchfield county contained fifty bloomary forges, making iron directly from the ore, and three slitting mills. At the same time the county was so prominent in the manufacture of nails that only Plymouth and Bristol counties in Massachusetts, of all the nail-making districts in the country, exceeded its production. The iron of Litchfield county is now entirely used for foundry purposes, and most of it in the manufacture of car wheels.

Bishop says that Oldmixon mentions "a small iron mill" at Branford, in New Haven county, in 1741, on a small stream, running into Long Island sound, and adds that on many of the small streams and branches of the rivers which fall into the sound "bloomaries and small works for a variety of manufactures in iron were established, some of them quite early." The bloomaries were in part supplied with bog ore, "dug near them," and in part with better ores obtained elsewhere. Bishop also says that in 1794 a slitting mill and other iron works had been erected in East Hartford, a forge at Glastonbury, and two furnaces at Stafford "which made sufficient hollow and cast-iron wares for the whole state." Lesley says that there were at one time, about the beginning of the present century, three blast furnaces in northern Connecticut, near the Massachusetts line, on a branch of the Willimantic river, a mile or two apart. Three forges near them converted their pig iron into bar iron. Hebron furnace was south of the above-mentioned furnaces, and Enfield forge stood a few miles east of Windsor Locks. All these furnaces and forges were stopped about 1837, when Scotch pig iron began to come into the country.

Connecticut was among the first of the colonies to make steel. Bishop relates that in 1728 Joseph Higby, "an ingenious blacksmith," of Simsbury, Hartford county, represented to the legislature that he had, "with great pains and cost, found out and obtained a curious art, by which to convert, change, or transmit common iron into good steel, sufficient for any use, and was the very first that ever performed such an operation in America." The certificates of several smiths, who had made a trial of the steel and pronounced it good, were produced. He and Joseph Dewey were granted the exclusive right for ten years "of practicing the business or trade of steel-making." A "steel furnace" was owned by George Eliot, of Killingworth, in Middlesex county, previous to 1750, and in 1761 the Rev. Jared Eliot, of the same place, father of the above-mentioned George Eliot, succeeded in producing in a common bloomary forge a bar of excellent iron, weighing 50 pounds, from 83 pounds of black magnetic sand, and in his son's steel furnace a portion of the bar was converted into good steel. For this discovery he was awarded a gold medal in 1764 by the London Society of Arts. But this sand, which is found in the southern parts of Connecticut, as well as in other states, never received much further attention for conversion into iron or steel.

Iron ore was discovered near Portsmouth, in New Hampshire, as early as 1634, some of which was shipped to England, but there is no evidence that its discovery led to the establishment of any iron works in that century. The manufacture of iron in this state dates from about 1750, when several bloomaries, using bog ore, were in existence on Lamper Eel river, but were soon discontinued. About the period of the Revolution there were a few bloomaries in operation in the state. In 1791 mention is made of iron works at Exeter. At Furnace Village the magnetic ore of Winchester was first smelted in 1795 by a Rhode Island company. Franconia furnace, in Franconia county, was built in 1811 by a company which was organized in 1805.

Maine had a few bloomary forges in York county during the Revolution and for some years afterwards, but she has had but few blast furnaces. A small furnace, capable of yielding a ton and a half of iron daily, was erected at Shapleigh, in York county, about 1838. It was used to produce castings, and cost but $13,000. A larger furnace in Piscataquis county, called Katahdin, was built in 1845, and is now active. This is the only furnace now in the state. At an early period in its history it was successfully operated for several years by Hon. John L. Hayes, now of Cambridge, Massachusetts. A forge was erected near the furnace soon after 1845. In 1853 it made 700 tons of blooms. There were in 1880 two rolling mills in Maine—one at Portland and one at Pembroke.

The manufacture of iron was commenced in Vermont about 1750. Large deposits of iron ores similar to those of western Massachusetts and western Connecticut had previously been found in the southern and western parts of the state. In Rutland county a mine was opened in 1785, and in 1794 there were fourteen forges, three furnaces, and a slitting mill in the county. In other counties there were seven forges in 1794—one in Bennington, four in Addison, and two in Chittenden counties, and before 1800 other forges and a slitting mill were added; possibly some furnaces. The township of Randolph, in Orange county, had two forges and a slitting mill at the same period. About the beginning of the nineteenth century there were twenty bloomaries in the neighborhood of Vergennes, in Addison county, all built with Boston capital.

The manufacture of nails was one of the household industries of New England during the eighteenth century. In a speech in Congress in 1789 Fisher Ames said: "It has become common for the country people in Massachusetts to erect small forges in their chimney corners; and in winter, and in evenings, when little other work can be done, great quantities of nails are made even by children. These people take the rod iron of the merchant and return him the nails, and in consequence of this easy mode of barter the manufacture is prodigiously great." In a description of the town of Middleborough, in Plymouth county, Massachusetts, written in 1793 by Nehemiah Bennet, it is mentioned that "the most common and general employment of the inhabitants of said town is agriculture, which seems to be increasing; though there are a number of mechanicks. Nailing, or the business of making nails, is carried on largely in the winters, by the farmers and young men, who have but little other business at that season of the year." When Jacob Perkins, of Newburyport, Massachusetts, invented his machine for making cut nails, which was patented in 1795 and speedily followed by other inventions for the same purpose, the occupation of making wrought nails in the chimney corner virtually came to an end. The manufacture of tacks by hand was also a New England household industry during the last century, and down to about fifty years ago. A writer in the *Furniture Trade Journal* thus describes this industry: "In the queer-shaped, homely farm-houses, or the little contracted shops of certain New England villages, the industrious and frugal descendants of the Pilgrims toiled providently through the long winter months at beating into shape the little nails which play so useful a part in modern industry. A small anvil served to beat the wire or strip of iron into shape and point it; a vice, worked by the foot, clutched it between jaws furnished with a gauge to regulate the length, leaving a certain portion projecting, which, when beaten flat by a hammer, formed the head. By this process a man might make, toilsomely, perhaps 2,000 tacks per day."

Nearly all the bloomary and refinery forges and blast furnaces of New England have long disappeared, and in their stead have grown up reproductive iron industries of almost endless variety and vast extent, employing large numbers of skilled mechanics and adding greatly to the productive wealth of the country. The rolling mills, machine shops, hardware establishments, nail and tack factories, foundries, and other iron enterprises of New England, together with a few steel works and modern blast furnaces, form to-day a striking contrast to the ore bloomaries, not much larger than a blacksmith's fire, and the small charcoal furnaces and chimney-corner nail factories of the last century. "All that," says Lesley, "has given way and disappeared before the inventive spirit of New England, sustained and incited by the wealth of its commercial cities."

EARLY IRON ENTERPRISES IN NEW YORK.

During the rule of the Dutch in New York, from their first settlement on Manhattan Island in 1614 to their surrender to the English in 1664, iron ore was sought for and found in various places, but no effort to manufacture iron is known to have been undertaken. Nor do the English appear to have established any iron works in the province until some time after the beginning of the succeeding century. A Parliamentary report, quoted by Pitkin, states that there were no iron manufactures in New York as late as 1731. Bishop quotes Governor Cosby as stating in 1734 that "as yet no iron work is set up in this province."

The first iron works in New York of which we have authentic information were "set up," according to Bishop, a short time prior to 1740 on Ancram creek, in Columbia county, and about fourteen miles east of the Hudson river, by Philip Livingston, the owner of the Livingston manor. The works when completed embraced a blast furnace and refinery forge. The supply of ore was obtained mainly from the "ore hill" in Salisbury township, Litchfield county, Connecticut, which had been developed a few years previously, and of which Mr. Livingston was a principal owner. The mines were about twelve miles distant from the Ancram works. Other sources of ore supply were found in the eastern part of the manor, near the Massachusetts and Connecticut lines. Notwithstanding the inconvenient location of the works, at a considerable distance from the mines and also from the nearest point of shipment on the Hudson river for the manufactured iron, they were prosperous until after the Revolution. In 1756 they are said to have been the only iron works in the province that were then in operation, although others had been undertaken. Of these silent or unfortunate enterprises Bishop mentions two furnaces in the manor of Cortland, and "several bloomaries which had not been worked for several years." At Marysburg, in the Livingston manor, were some forges which were worked about the time of the Revolution. Philip Livingston was a signer of the Declaration of Independence. He died in 1778, at York, Pennsylvania, while serving as a delegate to Congress, and is buried there.

Peter Kalm, the Swedish traveler, writing in 1748, says of the commerce of New York: "Of late years they have shipped a quantity of iron to England." Some of this iron was doubtless made in Connecticut and New Jersey. Douglass, in his *British Settlements*, written in 1750, speaking of New York, says: "The article of iron in pigs and bars is a growing affair."

Bishop says that iron works were established in Orange county prior to 1750, but by whom he does not state. In 1750 Governor Clinton reported that, at a place called Wawayanda, in Orange county, about twenty-six miles from the Hudson, there was a plating-forge with a tilt-hammer, which had been built four or five years before, but was not then in use. It was the property of Lawrence Scrawley, a blacksmith. "It was the only mill of that kind in the province. There was no rolling or slitting mill or steel furnace at that time in the province."

In 1750 a vein of magnetic iron ore was discovered on Sterling mountain, in Orange county, and in 1751 Ward & Colton built a furnace at the outlet of Sterling pond. In Eager's *History of Orange County* it is stated that "at the early establishment of this furnace the charcoal used was transported several miles on the backs of horses from the mountains where it was burned, there being no roads at the time." Bishop says that in 1752 "Abel Noble, from Bucks county, Pennsylvania, erected a forge in Monroe, near the furnace, at which anchors are said to have been made." Eager says that the first anchor made in New York was made at this forge in 1753. In 1765 William Hawkhurst published an advertisement stating that he had lately erected "a finery and great hammer for refining the Sterling pig iron into bars," but the location of this enterprise is not mentioned. The furnace of Ward & Colton and the forge of Abel Noble became the property of Peter Townsend before the Revolution. They had been named the Sterling iron works, presumably after Lord Stirling, the owner of the land, who became a general in the Continental army, and who was engaged in the manufacture of iron in New Jersey before the Revolution. He may have been a part owner of the Orange county enterprises. (The Sterling works have always been spelled as here given, but Lord Stirling's name was differently spelled.) In 1773 Mr. Townsend made anchors at Sterling. We are informed by Mr. A. W. Humphreys that the anchors of the United States frigate *Constitution* were made here, as well as the anchors for the first ships of war that carried the stars and stripes. In 1777 "the Townsends" had two forges with eight forge fires. In 1776 Mr. Townsend, according to Bishop, "produced the first steel in the province, at first from pig and afterwards from bar iron, in the German manner." Bishop also says that "the first blister steel made in the state was made by Peter Townsend, Jr., in 1810, from ore of the Long mine on the Sterling estate." This mine was discovered in 1761 by David Jones. Other valuable mines than those mentioned were discovered and opened on the Sterling estate in the last century. In 1777 a second Sterling furnace was erected by the Townsends, and in 1806 Southfield furnace was built, about six miles distant from the Sterling mines, and it is still standing. The two early Sterling furnaces have been replaced by one modern stack.

Other mines of rich ore were discovered in Orange county during the last century, and many furnaces and forges were built in connection with them which have long been abandoned. In 1756 there was a Forest of Dean furnace five miles west of Fort Montgomery, which was supplied with ore from the Forest of Dean mine, near which it stood. The furnace was abandoned twenty-one years later. Eager says that "Captain Solomon Townsend, a cousin of Peter Townsend, and who married his daughter Anne in 1783, purchased the mountain estate adjoining that of his father-in-law, which he named Augusta, and established the iron works, anchory, forges, etc., at the place." These works were on the Ramapo, three miles above the Orange county line, in Orange county. There was a forge and anchory on Murderer's creek during the Revolution, owned by Samuel Brewster; after the war they passed into the hands of his son-in-law, Jonas Williams. Queensborough furnace, which went out of blast about 1800, and which was built to make pig iron, was located about two and a half miles southwest of Fort Montgomery. On the stream issuing from Hazzard's pond there was a furnace named Woodbury about the beginning of this century.

During the last century Orange county was the chief seat of the iron manufacture in New York. Greenwood furnace, in this county, was erected in 1811 by the Messrs. Cunningham. In 1871 it was the only charcoal furnace in southern New York that remained in blast; since that year it also has been silent.

The following account of the great iron chain which was suspended across the Hudson river in 1778 to prevent the passage of the British vessels is compiled from Lossing's *Field Book of the Revolution*.

> At the close of 1779 West Point was the strongest military post in America. In addition to the batteries that stood menacingly upon the hill tops, the river was obstructed by an enormous iron chain. The iron of which this chain was constructed was wrought from ore of equal parts from the Sterling and Long mines, in Orange county. The chain was manufactured by Peter Townsend, of Chester, at the Sterling iron works, in the same county, which were situated about twenty-five miles back of West Point. The general superintendent of the work, as engineer, was Captain Thomas Machin, who afterwards assisted in the engineering operations at Yorktown, when Cornwallis was captured. The chain was completed about the middle of April, 1778, and on the 1st of May it was stretched across the river and secured.
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> Colonel Timothy Pickering, accompanied by Captain Machin, arrived at the house of Mr. Townsend late on a Saturday night in March of that year, to engage him to make the chain. Townsend readily agreed to construct it, and in a violent snow-storm, amid the darkness of the night, the parties set out for the Sterling iron works. At daylight on Sunday morning the forges were in operation. New England teamsters carried the links, as fast as they were finished, to West Point, and in the space of six weeks the whole chain was completed. It weighed 180 tons.
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> The chain was stretched across the river at the narrowest point between the rocks just below the steamboat landing and Constitution Island opposite. It was fixed to huge blocks on each shore, and under the cover of batteries on both sides of the river. The remains of

these are still visible. "It is buoyed up," says Dr. Thacher, writing in 1780, "by very large logs of about sixteen feet long, pointed at the ends, to lessen their opposition to the force of the current at flood and ebb tide. The logs are placed at short distances from each other, the chain carried over them, and made fast to each by staples. There are also a number of anchors dropped at proper distances, with cables made fast to the chain, to give it greater stability."

Mr. Lossing describes a visit made by him in October, 1848, to West Point, where he saw a portion of the famous chain. He says: "There are twelve links, two clevises, and a portion of a link of the great chain remaining. The links are made of iron bars, two and a half inches square, average in length a little over two feet, and weigh about one hundred pounds each." The British vessels did not pass West Point. The manufacture of this chain was a great achievement. The Sterling iron works, at which the chain was made, are in operation to-day, and are the oldest active iron works in New York. Two other iron chains were stretched across the Hudson during the war to obstruct its passage. One of these was at the mouth of Murderer's creek, the iron for which was made at the forge of Jonas Williams. The other chain was at Fort Montgomery. This chain was broken by the British in 1777.

The following description of the Sterling works, which were the most extensive in New York until after the beginning of the present century, is translated from a book published at Paris in 1801, and lately discovered in that city by Mr. O. H. Marshall, a gentleman of antiquarian tastes, of Buffalo, New York. It was written by the Marquis de Creve-Cœur, who was in the French service in the French and Indian war, and afterwards traveled extensively in this country.

> Hardly had we put our horses in the stable than Mr. Townsend, the proprietor, came to meet us with the politeness of a man of the world. Having learned that the object of our journey was to examine attentively his different works, he offered to show us all the details, and at once led us to his large furnace where the ore was melted and converted into pigs of 60 to 100 pounds' weight. The blast was supplied by two immense wooden blowers, neither iron nor leather being used in their construction. This furnace, he said, produced from 2,000 to 2,400 tons annually, three-fourths of which are converted into bars, the rest melted into cannon and cannon balls, &c. From there we went to see the forge. Six large hammers were occupied in forging bar iron and anchors and various pieces used on vessels.
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> Lower down the stream (which afforded power to the works) was the foundry, with its reverberatory furnace (air furnace). Here he called our attention to several ingenious machines destined for different uses. The models had been sent him, and the machines he had cast from iron of a recently discovered ore, which after two fusions acquired great fineness. With it he could do the lightest and most delicate work. "What a pity," he said, "that you did not come ten days sooner. I would have shown you, first, three new styles of plows, of which I have cast the largest pieces, and which, however, are no heavier than the old-fashioned. Each one of them is provided with a kind of steel yard, so graduated that one can tell the power of the team and the resistance of the soil. Second, I would have shown you a portable mill for separating the grain from the chaff, followed by another machine by which all the ears in the field can be easily gathered without being obliged to cut the stalk at the foot, according to the old method."
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> From the foundry we went to see the furnaces where the iron is converted into steel. "It is not yet as good as the Swedes," said Mr. T., "but we approach it—a few years more of experience and we will arrive at perfection. The iron which comes from under my hammers has had for a long time a high reputation and sells for £25 to £30 per ton." After having passed two days in examining these divers works and admiring the skill with which they were supplied with water, as well as the arrangements for furnishing the charcoal for the different furnaces, we parted from Mr. Townsend.

In 1765 there were iron works in Duchess county. A furnace and foundry at Amenia in this county were in operation during the Revolution, "at which steel and castings were made for the use of the army." A bloomary was in operation about the period of the Revolution at Patchogue, in Brookhaven township, Suffolk county, Long Island. At Riverhead, in Suffolk county, Captain Solomon Townsend established "a manufactory of bar iron" before the close of the last century. Iron ore was mined in Putnam county in the last century, some of which was taken to iron works on Long Island sound. In the manor of Philipsburg, in Westchester county, iron ore was mined and furnaces were erected before the close of the same century. About the time of the Revolution a furnace named Haverstraw and several bloomaries were in existence in Rockland county, on the western side of the Tappan Zee.

About the year 1800 the celebrated Champlain iron district was developed, and in 1801 the first iron works in the district were built at Willsborough falls, on the Boquet river, in Essex county, to manufacture anchors. George Throop, Levi Highly, and Charles Kane were the owners. Among other early iron enterprises in this district were the New Russia, Jay, and Elba forges in Essex county, and the Eagle rolling mill at Keeseville, in Clinton county. This district is now and for a long time has been the most important iron district in the state. It now contains six rolling mills, six blast furnaces, and twenty-two forges. The forges are all true bloomaries, manufacturing blooms, chiefly for conversion into steel, directly from the rich magnetic and specular ores of the neighborhood. The district comprises the counties of Essex, Clinton, and Franklin. A forge was built at West Fort Ann, in Washington county, south of Lake George, about 1802.

West of the Champlain district, in the counties of Saint Lawrence, Jefferson, Lewis, Oswego, and Oneida, many charcoal furnaces were built after the beginning of the present century, among the earliest of which were Rossie furnace in Saint Lawrence county, Taberg furnace in Oneida county, and Constantia furnace in Oswego county. In the extreme western and southwestern parts of the state the few iron enterprises that have had an existence during the present century have all been of yet more modern origin.

Nails were extensively manufactured by hand at Albany in 1787. Twenty years later, in 1807, John

Brinkerhoff, of Albany, lighted the fires in his newly-erected rolling mill on the Wynantskill. The Troy *Daily Times* says that "the operations of the little wooden rolling mill built by him were confined to converting Russian and Swedish bar iron into plates, which were slit into narrow strips, and these cut to the required length and made into nails by hand." In 1826 the nail factory of John Brinkerhoff was sold at auction, and was purchased for $5,280 by Erastus Corning, who was then engaged at Albany in the hardware business. It now forms part of the works of the Albany and Rensselaer Iron and Steel Company, the most extensive and important iron and steel works in the state.

Between 1790 and 1800 there are said to have been twenty-three patents granted in the United States for nail-making machinery, and down to 1825 the whole number granted is said to have been one hundred and twenty. Among these patents was one issued to Josiah G. Pierson, of New York, on the 23d of March, 1795, and the machine covered by this patent is said to have been the first nail-cutting machine that produced satisfactory results and was generally used. The inventor was at the time a member of the firm of J. G. Pierson & Brothers, which in the same year established works at the village of Ramapo, in Rockland county, New York, for the manufacture of iron and nails, and had previously, in 1787 or 1788, been engaged in the manufacture of cut nails, with an imperfect machine, in Whitehall street, in the city of New York. While the works were in New York the strips for the nails were rolled at a mill in Delaware, near Wilmington, to which Swedish and Russian iron were sent, no other mill being available at the time. This inconvenience was avoided after the establishment of the works at Ramapo, which embraced a rolling and slitting mill. The manufacture of nails by Mr. Pierson's machine was here actively prosecuted until about 1830, when the same firm, which had been making blister steel at Hoboken for twenty years, removed its steel furnaces to Ramapo, and substituted the manufacture of spring steel for that of nails. The works of the Messrs. Pierson at Ramapo have been succeeded by those of the celebrated Ramapo Wheel and Foundry Company.

The iron industry of New York was not so prominent during the eighteenth century as that of some other states, but soon after the beginning of the present century the development of the Champlain district gave to the industry more prominence, which was still further increased after 1840, when anthracite coal was applied to the manufacture of pig iron on the Hudson river and elsewhere in the state. In 1870, and again in 1880, it ranked third in the list of iron and steel producing states.

EARLY IRON ENTERPRISES IN NEW JERSEY.

In William Reed Deane's *Genealogical Memoirs of the Leonard Family*, already referred to, it is stated that Henry Leonard left Rowley Village, Massachusetts, early in 1674, "and at that time, or soon after, went to New Jersey, establishing the iron manufacture in that state." His sons Samuel, Nathaniel, and Thomas probably left Rowley Village soon after their father's departure, and followed him to New Jersey. Bishop says that Shrewsbury, a township lying northwest of Long Branch, in Monmouth county, was settled by Connecticut people soon after New Jersey was surrendered to the English by the Dutch in 1664, and that it was "to this part of Jersey" that Henry Leonard removed. About the time of the Connecticut settlement, James Grover, who had been a resident of Long Island, also settled in Shrewsbury, and is said to have established iron works in that township, which he afterwards sold to Colonel Lewis Morris, then a merchant of Barbadoes, but born in England. On October 26, 1676, a grant of land was made to Colonel Morris, with full liberty to him and his heirs "to dig, delve, and carry away all such mines for iron as they shall find or see fit to dig and carry away to the iron work," which establishes the fact that the iron works in Shrewsbury were built prior to 1676, and that they were then owned by Colonel Morris. They were probably undertaken about 1674, in which year Henry Leonard is said to have emigrated from Massachusetts to New Jersey. They were the first iron works in New Jersey.

In a brief account of the province of East Jersey, published by the proprietors in 1682, it is stated that "there is already a smelting furnace and forge set up in this colony, where is made good iron, which is of great benefit to the country." Smith. in his *History of New Jersey*, says that in 1682 "Shrewsbury, near Sandy Hook, adjoining the river or creek of that name, was already a township, consisting of several thousand acres, with large plantations contiguous; the inhabitants were computed to be about 400. Lewis Morris, of Barbadoes, had iron works and other considerable improvements here." In 1685 it was stated in *The Model of the Government of East New Jersey* that "there is an iron work already set up, where there is good iron made." In the same year Thomas Budd, in his *Good Order in Pennsylvania and New Jersey*, wrote that there was but one iron work in New Jersey, and that this was located in Monmouth county. All of these statements refer to the Shrewsbury works, which do not seem to have had a long life. According to Oldmixon, they were located between the towns of Shrewsbury and Middletown. They used bog ore.

The rich deposits of magnetic iron ore in northern New Jersey were discovered at an early day, and about 1710, as we are informed by the Rev. Dr. Joseph F. Tuttle, in his *Early History of Morris County*, written in 1869, settlements were made on the Whippany river, in Hanover township, in Morris county; and at a place now called Whippany, four miles northeast of Morristown, a forge was erected. Bishop says that the first settlers of Hanover located there "for the purpose of smelting the iron ores in the neighborhood." They "early erected several forges and engaged extensively in the iron manufacture." Whippany is about fifteen miles east of the celebrated Succasunna iron-ore mine, in the present township of Roxbury, and it was here that the settlers obtained their supply of ore. The ore was carried to the works in leather bags on pack-horses, and the iron was carried in the same way over the Orange mountains to Newark. Bishop says that "forges at Morristown, and some in Essex county, were long supplied in the same way from the rich ore of the mine. The ore was for some time free to all." Dr. Tuttle says: "The Succasunna mine lot was located in 1716 by John Reading, and sold the same year to Joseph Kirkbride, containing 558 acres, and after his death the tract was divided between his three sons, Joseph, John, and Mahlon Kirkbride, except the mine lot, which was held by them in common until such time as the same should be sold." This celebrated iron-ore deposit has long been known as the "Dickerson mine."

Dr. Tuttle says that in 1722 Joseph Latham sold a tract of land in the present township of Mendham, in Morris county, to "one John Jackson, who built a forge on the little stream which puts into the Rockaway near the residence of Mr. Jacob Hurd. The forge was nearly in front of Mr. Hurd's house," a mile west of Dover. Wood for charcoal was abundant, and the mine on the hill was not far distant. For some reason Jackson did not succeed in his iron enterprise, and was sold out by the sheriff in 1753. Dr. Tuttle says that Rockaway was settled about 1725, or possibly as late as 1730, "at which time a small iron forge was built near where the upper forge now stands in Rockaway." This statement fixes the date and location of the first forge at Rockaway. The Doctor says that subsequently "forges were built on different streams, at Rockaway, Denmark, Middle Forge, Ninkee, Shaungum, Franklin, and other places from the year 1725 to 1770." At Troy, in Morris county, as we learn from another source, a forge was built in 1743, which was in operation as late as 1860. All these forges were bloomaries, manufacturing bar iron from the ore.

At the close of the seventeenth century and for some years after the beginning of the eighteenth century New Jersey was the only colony outside of New England that was engaged in the manufacture of iron, and this manufacture was almost wholly confined to its bloomaries. The rich magnetic ores, the well-wooded hillsides, and the restless mountain streams of Northern New Jersey afforded every facility for the manufacture of iron of a superior quality by this primitive method, while the nearness of good markets furnished a sufficient inducement to engage in the business. The bloomaries of New Jersey were Catalan forges of the German type.

Not much progress was made, however, in the establishment of the iron industry in New Jersey until the middle of the eighteenth century. From about 1740 down to the Revolution many furnaces and other iron works were built in New Jersey. Its iron industry during the greater part of this period was exceedingly active, although greatly hampered by restrictions imposed by the mother country. To the iron enterprises which were then built up within its borders the patriotic cause was afterwards greatly indebted for much of the iron and steel that were needed to secure its ascendency.

Peter Hasenclever, a Prussian gentleman of distinction, who is usually referred to as Baron Hasenclever, emigrated to New Jersey in 1764, as the head of an iron company which he had organized in London, and brought with him a large number of German miners and ironworkers. His career in this country is very fully described by Dr. Tuttle in his history, and by Edmund D. Halsey, Esq., of Rockaway, in a letter which we have received from him. Dr. Tuttle first gives an account of the Ringwood Company, which was organized in 1740 and was principally composed of several persons named Ogden. In the year named and in 1764 the company purchased about thirty acres of land at Ringwood, near Greenwood lake, in Bergen, now Passaic, county. By one of the purchases of 1764 Joseph Board conveys to the company a tract of land at Ringwood "near the old forge and dwelling house of Walter Erwin." On July 5, 1764, the Ringwood Company sell to "Peter Hasenclever, late of London, merchant," for £5,000, all of the company's lands at Ringwood. The deed states that on the property there are "erected and standing a furnace, two forges, and several dwelling houses." It speaks of "Timothy Ward's forge;" also of the "old forge at Ringwood." Hasenclever also bought from various persons other tracts of land in 1764 at Ringwood and in its vicinity, and in 1765 he bought several tracts of land from Lord Stirling. These various purchases were located at Ringwood, Pompton, Long Pond, and Charlottenburg, all in Bergen county. Hasenclever also probably purchased an interest in the iron-ore mines at Hibernia. Dr. Tuttle says that "Hasenclever at once began to enlarge the old works and build new ones at each of the places just named," that is, Ringwood, Pompton, Long Pond, and Charlottenburg. It is probable that he built a furnace and one or more forges at each place. Three furnaces and six forges he certainly erected. The furnaces were erected, respectively, as follows: Charlottenburg, on the west branch of the Pequannock; Ringwood, on the Ringwood branch of the Pequannock; Long Pond, on the Winockie, and about two miles from Greenwood lake. Charlottenburg was built in 1767, and was capable of producing from 20 to 25 tons of pig iron weekly. Long Pond was in blast in 1768.

Hasenclever undoubtedly succeeded in making good iron, some of which was shipped to England. He also made steel of good quality directly from the ore. In 1768 he became financially embarrassed, and in 1770 was formally declared a bankrupt. He was succeeded in the management of the company's works by John Jacob Faesch, who had come to New Jersey with him, under an engagement as manager of the iron works for seven years. Faesch was a native of Hesse Cassel. He is said to have mismanaged the affairs of the company, and in 1771 or

1772 was succeeded by Robert Erskine, a Scotchman, who appears to have met with success until 1776, when all the works were stopped by the opening of hostilities, and Charlottenburg furnace was accidentally burned.

Robert Erskine was thoroughly loyal to the Revolutionary cause, and held a commission as captain in the New Jersey militia. He died at Ringwood in 1780, "and his grave occupies a retired spot about a quarter of a mile from the ruins of the old Ringwood furnace, near the road leading from Ringwood to West Milford."

The Adventure furnace, at Hibernia, in Morris county, was a famous furnace during the Revolution, casting ordnance and other iron supplies for the army. It was built about 1765. Mr. Halsey says that a tract of land was located November 23, 1765, "about three-quarters of a mile above the new furnace called the Adventure." The name usually given to this furnace is Hibernia. Dr. Tuttle says that "the names of Lord Stirling, Benjamin Cooper, and Samuel Ford are connected with the original building and ownership of the Hibernia works." He also says that "Benjamin Cooper & Co." held "pew No. 6" in the old Rockaway meeting-house in 1768. A grant of certain privileges to encourage the enterprise was made by the legislature in 1769. In 1765 Ford sold his interest in the furnace to Anderson and Cooper, after which sale he was actively engaged for a number of years in the business of counterfeiting "Jersey bills of credit," which he afterwards pleasantly referred to as "a piece of engenuity." In 1768 he participated in the robbery of the treasury of the province at Amboy, his former partner, Cooper, being one of his associates. Ford was arrested in 1773, but escaped to Virginia; Cooper and others were also arrested and convicted, but all except one escaped punishment, and he was hanged. Previous to the time of his arrest, in 1773, Cooper appears to have sold his interest in Hibernia furnace to Lord Stirling, who became its sole owner about this time.

Mount Hope furnace, about four miles northwest of Rockaway, was built in 1772 by John Jacob Faesch. It was active until about 1825. It also was a noted furnace during the Revolution, casting shot and shells and cannon for the Continental army. In September, 1776, Joseph Hoff, who was at this time the manager of Hibernia furnace, wrote to its owner that Faesch had spoken to him "to inform you that he wanted 200 tons of pig metal, and wanted to know your price and terms of payment. Iron will undoubtedly be in great demand, as few works on the continent are doing anything this season." This letter indicates that at the time it was written Faesch owned or controlled a forge for converting pig iron into bar iron. On the 14th of November, 1776, Hoff wrote to General Knox that there were then 35 tons of shot at Hibernia furnace, and on the 21st of November he wrote that it was the only furnace in New Jersey which he knew to be then in blast. The Hibernia and the Mount Hope furnaces were both in blast in 1777. Mr. Halsey informs us that among the laws of New Jersey for 1777 is an act, passed October 7, exempting men to be employed at Mount Hope and Hibernia furnaces from military service, and reciting the necessity of providing the army and navy of the United States with cannon, cannon shot, etc., and that the works "have been for some time past employed" in providing such articles, and "are now under contract for a large quantity." Faesch is said by Dr. Tuttle to have become the lessee of Hibernia furnace at some time during the war. He says "this must have been subsequent to July 10, 1778, at which date I find a letter to Lord Stirling, from Charles Hoff, his manager at Hibernia, reporting to him what he was doing."

Faesch died at Old Boonton in 1799, and was buried at Morristown. Dr. Tuttle says that "in his day John Jacob Faesch was one of the great men of Morris county, regarded as its greatest ironmaster, one of its richest men, and one of its most loyal citizens." General Washington and his staff once visited him at Mount Hope.

Lord Stirling, whose proper name was William Alexander, was born in New York in 1726 and died in 1783. As has been shown in the chapter relating to New York, his name has been given to one of the oldest and most successful iron enterprises in the country.

Colonel Jacob Ford, Sr., was a large landholder in Morris county about the middle of the last century. In 1756 he was the owner of "iron works" at Mount Pleasant, three miles west of Rockaway. There was a forge at this place as late as 1856, but almost in ruins. In 1764 John Harriman owned a forge called Burnt Meadow forge, at Denmark, about five miles north of Rockaway, of which Colonel Jacob Ford, Jr., afterwards became the owner. Colonel Ford also about the same time became the owner of the forge below Denmark and above Mount Pleasant, called ever since Middle forge, which was built on land located by Jonathan Osborne in 1749. The United States Government now owns the site of the forge last mentioned. John Johnson had "iron works" at Horse Pound, now Beach Glen, a mile and a half below Hibernia, from 1753 to 1765, as appears from references to them in the title papers of adjoining lands.

In Andover township, in Sussex county, a furnace and forge were erected by a strong company before the Revolution, probably about 1760, and the works were operated on an extensive scale. About the beginning of hostilities the works were stopped, the company being principally composed of royalists. The excellent quality of the iron made from the ore of the Andover mine led, however, to such legislation by Congress in January, 1778, as resulted in again putting them in operation. Mr. Whitehead Humphreys, of Philadelphia, was directed by Congress to make steel for the use of the army from Andover iron, as the iron made at the Andover works was the only iron which would "with certainty answer the purpose of making steel." The action of Congress is given in detail by the Hon. Jacob W. Miller, in his address before the New Jersey Historical Society in 1854, who also records the interesting fact that William Penn was an early owner of the Andover mine. He says that, "on the

10th of March, 1714, by a warrant from the council of proprietors, he acquired title to a large tract of land, situated among the mountains, then of Hunterton, now of Sussex, county, and William Penn became the owner of one of the richest mines of iron ore in New Jersey. This mine, since called Andover, was opened and worked to a considerable extent as early as 1760. Tradition reveals to us that the products of these works were carried upon pack-horses and carts down the valley of the Mosconetcong to a place on the Delaware called Durham, and were thence transported to Philadelphia in boats, which were remarkable for their beauty and model, and are known as Durham boats to this day."

Franklin furnace, near Hamburg, in Sussex county, which was built in 1770 and abandoned about 1860, has been succeeded by one of the largest anthracite furnaces in the country—67 feet high and 23 feet wide at the boshes.

Israel Acrelius, the historian of New Sweden, who resided in this country from 1750 to 1756, mentions five iron enterprises then existing in New Jersey—the Union iron works, and Oxford, Sterling, Ogden's, and Mount Holly furnaces. Oxford furnace, on a branch of the Pequest river, at Oxford, in Warren county, was built by Jonathan Robeson in 1742. Tradition says that it was first blown by a water-blast. A pig of Oxford iron, bearing the date "1755," is now in possession of the Historical Society at Trenton. Oxford cannon balls, cast during the French war, have also been preserved. Cannon balls were cast at this furnace for the Continental army. The furnace is still standing and was in operation in 1880, using anthracite coal. It is the second furnace in New Jersey of which there is any exact record, the Shrewsbury furnace being the first. It divides with Cornwall furnace, in Pennsylvania, the honor of being the oldest furnace in the United States that is now in operation. The Union iron works were situated near Clinton, in Hunterton county, and embraced at the time of Acrelius's visit two furnaces and two forges, "each with two stacks;" also a trip-hammer and a "flatting-hammer." These works were then owned by William Allen and Thomas Turner, of Philadelphia. William Allen was chief justice of Pennsylvania from 1751 to 1774. Allentown, in Pennsylvania, was named after him. He was largely interested in the manufacture of iron in Pennsylvania and New Jersey. In October, 1775, he gave his "half of a quantity of cannon shot belonging to him and to Turner for the use of the Board of the Council of Safety;" but he remained loyal to the British crown, nevertheless, dying in London in 1780. The Union iron works appear to have been entirely abandoned in 1778. Judge Allen informed Acrelius that at the Union iron works, and also at Durham, (hereafter to be mentioned,) one and a half tons of ore yielded one ton of pig iron, and that a good furnace yielded from twenty to twenty-five tons of pig iron weekly. Ogden's furnace was situated near Newton, in Sussex county. Mount Holly furnace was situated at the town of that name, in Burlington county. It was built between 1730 and 1747, and is probably as old as Oxford furnace. A forge was connected with the furnace. The works stood where the saw-mill at the south end of Pine street, on Rancocas creek, now stands. All of the furnaces named, except Mount Holly, used magnetic ore; Mount Holly, according to Acrelius, used "brittle bog ore in gravel," which was "only serviceable for castings." But the existence of the forge, and the further fact that pig iron has been found in the ruins of the works, show that the ore was used for something else than castings. The furnace was in operation before and partly through the Revolution. It was destroyed by the British during that period. Acrelius mentions, but does not name, four bloomaries in New Jersey, all "in full blast" during his visit. The Sterling furnace referred to by Acrelius was Sterling furnace in New York, but then probably embraced within the boundaries of New Jersey, particulars of which have already been given.

On the 10th of November, 1750, Governor Belcher certified that there were in New Jersey "one mill or engine for slitting and rolling of iron, situate in the township of Bethlehem, in the county of Hunterton, on the south branch of the river Raritan, the property of Messrs. William Allen and Joseph Turner, of Philadelphia, which is not now in use; one plating-forge, which works with a tilt-hammer, situate on a small brook at the west end of Trenton, the property of Benjamin Yard, of Hunterton, which is now used; one furnace for the making of steel, situate in Trenton, the property of Benjamin Yard, which is not now used." Steel was, however, made at Trenton during the Revolution. A rolling and slitting mill was built at Old Boonton, in Morris county, before the Revolution, and a similar enterprise was established at Dover, in the same county, in 1792, by Israel Caufield and Jacob Losey. In 1800 there were in this county three rolling and slitting mills, two furnaces, "and about forty forges with two to four fires each."

Mr. Halsey furnishes us with the following interesting episode in the history of Old Boonton slitting mill: "A slitting mill was erected at Old Boonton, on the Rockaway river, about a mile below the present town of Boonton, in defiance of the law, by Samuel Ogden, of Newark, with the aid of his father. The entrance was from the hillside, and in the upper room first entered there were stones for grinding grain, the slitting mill being below and out of sight. It is said that Governor William Franklin visited the place suddenly, having heard a rumor of its existence, but was so hospitably entertained by Mr. Ogden, and the iron works were so effectually concealed, that the Governor came away saying he was glad to find that it was a groundless report, as he had always supposed."

In the southern part of New Jersey several furnaces were built at an early day to smelt the bog ores of that section. Of these the furnace at Mount Holly, already mentioned, was probably the oldest. Batsto furnace, also in Burlington county, was built about 1766 by Charles Reed, and cast shot and shells for the Continental army. Many bloomaries were also built in this section in the last century, to work bog ores. The "Jersey pines" furnished the fuel for both the furnaces and bloomaries. It was stated in the chapter relating to New England iron enterprises in the last century that ore was taken from Egg Harbor, in New Jersey, to supply some Massachusetts furnaces. This was bog ore. Batsto furnace was situated on Little Egg Harbor river, and ran until after the middle of the present century. Sheet iron was made at a forge at Mount Holly in 1775, by Thomas Mayburry, some of which was used to make camp-kettles for the Continental army. A nail factory was in operation at Burlington in 1797. In 1814 or 1815 Benjamin and David Reeves, brothers, established the Cumberland nail and iron works at Bridgeton, in Cumberland county, and for many years successfully manufactured nails, with which they largely supplied the eastern markets. These works are still in operation.

In 1784 New Jersey had eight furnaces and seventy-nine forges and bloomaries, but principally bloomaries. In 1802 there were in New Jersey, according to a memorial to Congress adopted in that year, 150 forges, "which, at a moderate calculation, would produce twenty tons of bar iron each annually, amounting to 3,000 tons." At the same time there were in the state seven blast furnaces in operation and six that were out of blast; also four rolling and slitting mills, "which rolled and slit on an average 200 tons, one-half of which was manufactured into nails." Of the forges mentioned, about 120 were in Morris, Sussex, and Bergen counties. Of the numerous charcoal furnaces which once dotted New Jersey not one now remains which uses charcoal, the introduction of anthracite coal in the smelting of iron ores, which took place about 1840, rendering the further production of charcoal pig iron in New Jersey undesirable. The last charcoal furnace erected in the state was built at Split Rock, in Morris county, by the late Andrew B. Cobb, just prior to the civil war, but it was soon abandoned. Only two or three of the old bloomaries of New Jersey now remain, although there are in the state a few bloomaries and forges of modern origin, as well as a number of large rolling mills, steel works, wire works, pipe works, and anthracite furnaces.

Peter Cooper, now living in New York at the age of 90 years, embarked in the iron business at Trenton, in New Jersey, in 1845, where, as is stated by the *American Cyclopædia*, "he erected the largest rolling mill at that time in the United States for the manufacture of railroad iron, and at which subsequently he was the first to roll wrought-iron beams for fire-proof buildings." He had previously, however, been prominently engaged in the manufacture of iron at Baltimore and New York. In connection with members of his family he also embarked in many other important iron enterprises in New Jersey. His name has been the most prominent and the most honored in the iron history of the state during the present century.

In 1870 New Jersey was fourth in rank among the iron-producing states of the Union, but in 1880 it had fallen to the fifth place.

THE MANUFACTURE OF IRON IN PENNSYLVANIA BEFORE THE REVOLUTION.

The settlers on the Delaware, under the successive administrations of the Swedes and Dutch and the Duke of York, down to 1682, appear to have made no effort to manufacture iron in any form. In the *Journal of a Voyage to New York* in 1679 and 1680, by Jasper Dankers and Peter Sluyter, who then visited the Swedish and other settlements on the Delaware, it is expressly declared that iron ore had not been seen by them on Tinicum Island or elsewhere in the neighborhood. Jasper Dankers says: "As to there being a mine of iron ore upon it, I have not seen any upon that island, or elsewhere; and if it were so, it is of no great importance, for such mines are so common in this country that little account is made of them."

Under the more energetic rule of William Penn, who sailed up the Delaware in the ship *Welcome* in 1682, the manufacture of iron in Pennsylvania had its beginning. In a letter written by Penn to Lord Keeper North, in July, 1683, he mentions the existence of "mineral of copper and iron in divers places" in Pennsylvania. In his *Further Account of the Province of Pennsylvania*, written in 1685, speaking of "things that we have in prospect for staples of trade," he says: "I might add iron, (perhaps copper, too,) for there is much mine, and it will be granted us that we want no wood." In a letter to James Logan, the secretary of the province, dated London, April 21, 1702, he says, under the heading of "*Iron Works:*" "Call on those people for an answer to the heads I gave them from Ambrose Crawley. Divers would engage here in it as soon as they receive an account, which, in a time of war, would serve the country. Things as to America will come under another regulation after a while." To this letter Logan replied from Philadelphia, under date of October 1, 1702, as follows: "I have spoke to the chief of those concerned in the iron mines, but they seem careless, having never had a meeting since thy departure; their answer is that they have not yet found any considerable vein." Samuel Smiles, in his *Industrial Biography*, says: "William Penn, the courtier Quaker, had iron furnaces at Hawkhurst and other places in Sussex." It was, therefore, but natural that he should encourage the manufacture of iron in his province, and it was certainly through no indifference or neglect of his that it was not established at an early day.

In 1692 we find the first mention of iron having been made in Pennsylvania. It is contained in a metrical composition entitled *A Short Description of Pennsylvania*, by Richard Frame: printed and sold by William Bradford, in Philadelphia, in 1692. He says that at "a certain place about some forty pound" of iron had then been made. The entire reference is as follows:

A certain place here is, where some begun
To try some Mettle, and have made it run,
Wherein was Iron absolutely found,
At once was known about some Forty Pound.

It is to be regretted that Frame was not more explicit in describing the place where this iron was made. It was possibly made in a bloomary fire—probably in a blacksmith's fire.

In 1698 Gabriel Thomas published at London *An Historical and Geographical Account of the Province and Country of Pennsylvania and of West New Jersey in America*, in which mention is made of the mineral productions of these colonies. Alluding to Pennsylvania, he says: "There is likewise ironstone or ore, lately found, which far exceeds that in England, being richer and less drossy. Some preparations have been made to carry on an iron work." But neither these preparations nor the enterprise alluded to by Richard Frame led to satisfactory results.

Mrs. James, in her *Memorial of Thomas Potts, Junior*, gives an account of the first successful attempt that was made to establish iron works in Pennsylvania. The event, which occurred in 1716, is briefly described in one of Jonathan Dickinson's letters, written in 1717, and quoted by Mrs. James: "This last summer one Thomas Rutter, a smith, who lives not far from Germantown, hath removed further up in the country, and of his own strength hath set upon making iron. Such it proves to be, as is highly set by by all the smiths here, who say that the best of Sweed's iron doth not exceed it; and we have accounts of others that are going on with iron works." Rutter's enterprise was a bloomary forge, located on Manatawny creek, in Berks county, about three miles above Pottstown. The name of this first forge is uncertain. Mrs. James says that the name was Pool forge. There was certainly a Pool forge on the Manatawny as early as 1728, in which year it is mentioned in Thomas Rutter's will. The name of Rutter's pioneer enterprise may, however, have been Manatawny. In the Philadelphia *Weekly Mercury* for November 1, 1720, Thomas Fare, a Welshman, is said to have run away from "the forge at Manatawny." Bishop says: "A forge is mentioned in March, 1719–'20, at Manatawny, then in Philadelphia, but now in Berks or Montgomery county. It was attacked by the Indians in 1728, but they were repulsed with great loss by the workmen."

Mrs. James says that Rutter was an English Quaker, who was a resident of Philadelphia in 1685, and who removed in 1714 from Germantown "forty miles up the Schuylkill, in order to work the iron mines of the Manatawny region." She gives a *verbatim* copy of the original patent of William Penn to Thomas Rutter for 300 acres of land "on Manahatawny creek," dated February 12, 1714–'15.

The following obituary notice in the *Pennsylvania Gazette*, published at Philadelphia, dated March 5 to March 13, 1729–'30, ought to be conclusive proof of the priority of Thomas Rutter's enterprise: "Philadelphia, March 13. On Sunday night last died here Thomas Rutter, Senior, of a short illness. He was the first that erected an iron work in Pennsylvania." In his will he is styled a blacksmith. Many of his descendants have been prominent Pennsylvania ironmasters. Mrs. James says that Dr. Benjamin Rush, a signer of the Declaration of Independence, was a great-grandson of Thomas Rutter.

The next iron enterprise in Pennsylvania was Coventry forge, on French creek, in the northern part of Chester county, which was built by Samuel Nutt, also an English Quaker. Egle's *History of Pennsylvania* says that Nutt arrived in the province in 1714, and that "he took up land, on French creek, in 1717, and about that time built a forge there. A letter written by him in 1720 mentions an intention of erecting another forge that fall." We have seen this letter, which is dated July 2, 1720. It is written in Friends' language. Nutt proposed to build the new forge on French creek. Mrs. James states that Nutt purchased 800 acres of land at Coventry in October, 1718. This was in addition to his earlier purchases. He probably made iron at Coventry forge in that year. Bishop refers to a letter written by Dickinson, in July, 1718, stating that "the expectations from the iron works forty miles up Schuylkill are very great." In April, 1719, Dickinson again wrote: "Our iron promises well. What hath been sent over to England hath been greatly approved. Our smiths work up all they make, and it is as good as the best Swedish iron." Dickinson probably referred to Nutt's forge as well as to Rutter's.

Coventry forge was in operation in 1756, and in 1770 it is noted on William Scull's map of Pennsylvania. It was in operation after the Revolution, and in 1856 a forge of the same name, which is now abandoned, was in operation at or near the original site.

The next iron enterprise in Pennsylvania was undoubtedly Colebrookdale furnace, which was erected about 1720 by a company of which Thomas Rutter was the principal member. It was located on Ironstone creek, in Colebrookdale township, in Berks county, about eight miles north of Pottstown, three-fourths of a mile west of Boyertown, and about two hundred yards from the Colebrookdale railroad. Plenty of cinder marks the exact site to-day. A large grist and saw mill stands about one hundred feet distant. This furnace supplied Pool forge with pig iron, and in course of time other forges. Both Pool and Coventry forges were at first probably operated as bloomaries. The company which built Colebrookdale furnace appears to have been composed of Thomas Rutter, James Lewis, Anthony Morris, and others—Rutter owning a two-thirds interest, as is shown by his will, dated November 27, 1728, on file in the office of the register of wills in Philadelphia.

In 1731, according to Mrs. James, Colebrookdale furnace and Pool forge were both owned by companies. In the list of owners of both establishments appears the name of Thomas Potts, the founder of a family of the same name which has ever since been prominent in the manufacture of iron in Pennsylvania and in other states. He died at Colebrookdale in January, 1752. He was in his day the most successful iron manufacturer in Pennsylvania. In his will, dated 1747, he leaves his "two-thirds of Colebrookdale furnace and iron mines" to his son Thomas, and his "one-third of Pine forge" to his son John. He was of English or Welsh extraction. In 1733 the furnace was torn down and rebuilt by the company, Thomas Potts being the manager. A second Pool forge appears to have been built prior to this time, higher up the stream than the first venture. Mrs. James writes us as follows: "I have a large calf-bound folio ledger of nearly 200 folios of Colebrookdale furnace, marked 'B.' The first date is August, 1728, but there are several pages referring to the first ledger, one of them in 1726. Mention is constantly made of sending 'piggs' to Pool forge, proving that Pool was then in full blast. 'A' would seem to be a large volume from reference to the folios," and therefore to have covered the operations of a number of years. Mrs. James thinks that it is lost. She adds that on the title-page of ledger "B" the name of Thomas Potts is written in connection with the year 1728, probably as the manager or lessee of the furnace. He was a resident of Manatawny in 1725.

On Nicholas Scull's map of Pennsylvania, published in 1759, Colebrookdale furnace is noted, and in a list of iron works existing in Pennsylvania in 1793, and published by Mrs. James, it is again mentioned, although it was not then active. We have not found it mentioned at any later period. A stove-plate cast at this furnace in 1763 was exhibited at the Philadelphia Exhibition of 1876. In 1731 pig iron sold at Colebrookdale furnace "in large quantities" at £5 10*s*. per ton, Pennsylvania currency, a pound being equal to \$2 66⅔. It would seem that friendly Indians were employed at Colebrookdale furnace, as "Indian John" and "Margalitha" are found in the list of workmen about 1728. The furnace was located in the heart of one of the richest deposits of magnetic iron ore in the United States. After being neglected for a long time this deposit is now the center of great mining activity.

Durham furnace, on the Delaware river, in the extreme northern part of Bucks county, was built in 1727 by a company of fourteen persons, of which Anthony Morris, William Allen, Joseph Turner, and James Logan (Penn's secretary) were members. Its first blast took place in the spring of 1728, and in November of that year James Logan shipped three tons of Durham pig iron to England. At the Philadelphia Exhibition of 1876 the keystone of the Durham furnace, bearing date "1727," was an object of interest.

It is probable that about 1750 there were two Durham furnaces. On Nicholas Scull's map of Pennsylvania (1759) an old and a new furnace and a forge at Durham are distinctly marked. In 1770 there were two furnaces and two forges at Durham. There were at one time three forges on Durham creek. As late as 1780 negro slaves were employed at Durham, twelve of whom in that year escaped to the British lines. Much of the iron made at Durham was taken to Philadelphia in boats fashioned somewhat like an Indian canoe, and first built at Durham; hence the term afterwards in common use, "Durham boats."

Redmond Conyngham, quoted by Day, says that iron works are supposed to have been established in Lancaster county in 1726 by a person named Kurtz, who is said by another authority to have been an Amish Mennonite. In Egle's *History of Pennsylvania* it is stated that Kurtz's works were on Octorara creek, and that it is possible they were in Maryland, and not in Lancaster county. Conyngham also says that the enterprising family of Grubbs "commenced operations in 1728," also in Lancaster county. Both history and tradition are silent concerning the nature of these alleged "operations" at that time.

In 1728 James Logan wrote that "there are four furnaces in blast in the colony." Colebrookdale and Durham were certainly two of these, but the names of the others are in doubt.

The iron industry of Pennsylvania may be fairly said to have been established on a firm foundation at this period. In 1728–'29 the colony exported 274 tons of pig iron to the mother country. The production of a Pennsylvania furnace at this time was about two tons of iron in twenty-four hours.

The manufacture of nails in Pennsylvania commenced at a very early day. In 1731 George Megee, nailer, at the corner of Front and Arch streets, Philadelphia, advertised for sale, wholesale and retail, all sorts of nails of his own manufacture.

The erection of other forges and furnaces proceeded with great rapidity in the Schuylkill valley and in other eastern portions of Pennsylvania after Rutter and other pioneers had shown the way. McCall's forge, afterwards called Glasgow forge, on Manatawny creek, in Berks county, a short distance above Pottstown and below Pool forge, was built by George McCall about 1725. Spring forge, on the Manatawny, in Berks county, west of Colebrookdale furnace and about five miles north of Douglassville, was built in 1729, probably by Anthony Morris. These forges, as well as Pool forge, were supplied with pig iron from Colebrookdale furnace. Green Lane forge, on Perkiomen creek, in Montgomery county, twenty miles north of Norristown, was built in 1733 by Thomas Mayburry. The workmen employed here were at one time chiefly negro slaves. This forge was supplied with pig iron from Durham furnace before 1747. Mount Pleasant furnace, on Perkiomen creek, in Berks county, thirteen miles above Pottstown, was built by Thomas Potts, Jr., in 1738. A forge of the same name was added before 1743. Pine forge, on the Manatawny, in Berks county, about five miles above Pottstown, was built about 1740 by Thomas Potts, Jr. Spring, Glasgow, Mount Pleasant, and Green Lane forges were in operation down to the middle of the present century. Pine forge was converted into Pine rolling mill in 1845, and upon the site of Glasgow forge there was erected in 1874 and 1876 a rolling mill which is known as the Glasgow iron works.

It is supposed that Nutt built a furnace called Reading soon after he built Coventry forge, but this is uncertain. Mrs. James says that two furnaces bearing that name were erected, about a mile from each other, the second after the first was abandoned. It is certain that a furnace of this name was built by Samuel Nutt and William Branson, on French creek, about 1736. We think that this was the second Reading furnace, and that both were built by Nutt and Branson. In the inventory of the estate of Samuel Nutt, which Gilbert Cope, of West Chester, has kindly placed in our hands, mention is made of "a ring round the shaft at the old furnace," and of "one tonn of sow mettle at new furnace." Acrelius, in speaking of the iron ore on French creek, says: "Its discoverer is Mr. Nutt, who afterwards took Mr. Branz into partnership." The reference is to William Branson. This event occurred as early as March 29, 1728, as their names then appear in the Philadelphia *Weekly Mercury* as partners. Acrelius further says: "They both went to England, brought workmen back with them, and continued together." Mrs. James says: "The 15th day of March, 1736, Samuel Nutt and William Branson entered into an agreement with John Potts to carry on their furnace called Redding, recently built near Coventry, and of which they are styled 'joint owners.'" At a meeting of the Provincial Council on January 25, 1737, "a petition of sundry inhabitants of the county of Lancaster was presented to the board and read, setting forth the want of a road from the town of Lancaster to Coventry iron works, on French creek, in Chester county, and praying that proper persons of each of the counties may be appointed for laying out the same from Lancaster town to the said iron works, one branch of which road to goe to the new furnace, called Redding's furnace, now erecting on the said creek." On October 7th of the same year commissioners were appointed to lay out the road.

Samuel Nutt died late in 1737. In his will, dated September 25, 1737, he gave one-half of his "right" to Redding furnace and Coventry forge to his wife, and the other half to Samuel Nutt, Jr., and his wife. He also made provision for the erection of a new furnace by his wife. This furnace was commenced in the same year, and was built on the south branch of French creek. It was probably finished in 1738. In 1740 its management fell into the hands of Robert Grace, (a friend of Benjamin Franklin,) who then married the widow of Samuel Nutt, Jr. This lady was the grand-daughter of Thomas Rutter. The new furnace was called Warwick. The celebrated Franklin stove was invented by Benjamin Franklin in 1742, and in his autobiography he says: "I made a present of the model to Mr. Robert Grace, one of my early friends, who, having an iron furnace, found the casting of the plates for these stoves a profitable thing, as they were growing in demand." Mrs. James has seen one of these stoves with the words "Warwick Furnace" cast on the front in letters two inches long. Bishop says that Warwick furnace "was blown by long wooden bellows propelled by water wheels, and when in blast made 25 or 30 tons of iron per week." It continued in operation during a part of almost every year, from its erection in 1738 down to 1867, when its last blast came to an end and the furnace was abandoned. During the Revolution it was very active in casting cannon for the Continental army, some of which were buried upon the approach of the British in 1777.

After Samuel Nutt's death Reading furnace became the property of his partner, William Branson. It is noted on Nicholas Scull's map of 1759. Coventry forge finally fell to Samuel Nutt's heirs. The German traveler, Schoepf, writing in 1783 of some Pennsylvania furnaces and forges, makes the following mention of Warwick and Reading furnaces: "Warwick furnace, 19 miles from Reading, near Pottsgrove, makes the most iron, often 40 tons a week; the iron ore lies 10 feet under the surface. Reading furnace, not far from the former, is at present fallen into decay. Here the smelting would formerly often continue from 12 to 18 months at a stretch."

At an uncertain period before 1750 William Branson and others established on French creek the first steel works in Pennsylvania. They were called Vincent steel works. They are thus described by Acrelius: "At French creek, or Branz's works, there is a steel furnace, built with a draught hole, and called an 'air oven.' In this iron bars are set at the distance of an inch apart. Between them are scattered horn, coal-dust, ashes, etc. The iron bars are thus covered with blisters, and this is called 'blister steel.' It serves as the best steel to put upon edge-tools. These steel works are now said to be out of operation." Vincent forge, with four fires and two hammers, was connected with Vincent steel furnace, but the date of its erection is also uncertain. It is noted on William Scull's map of 1770. The furnace and forge were located about six miles from the mouth of French creek, and about five miles distant from Coventry forge, which was farther up the stream. Before February 15, 1797, a rolling and slitting mill had been added to the forge. We do not hear of the steel furnace after 1780, nor of the forge after 1800.

In 1742 William Branson, then owner of Reading furnace, bought from David Jenkins a tract of 400 acres of land on Conestoga creek, near Churchtown, in Caernarvon township, Lancaster county, on which in 1747 he erected a forge, which he called Windsor. This forge was speedily followed by another of the same name. In a short time afterwards, as we are informed by Mr. James McCaa, "Branson sold out to the English company, who were Lynford Lardner, Samuel Flower, and Richard Hockley, Esqs., who held it for thirty years, when, in 1773, David Jenkins, son of the original proprietor, bought the half interest of the company for the sum of £2,500, and in two years afterwards bought the other half for the sum of £2,400, including the negroes and stock used on the premises." Robert Jenkins inherited the Windsor property from his father David, and managed Windsor forges with great success for fifty years, dying in 1848. They have since been abandoned.

Acrelius, narrating events which occurred between 1750 and 1756, mentions the enterprises of Nutt and Branson as follows: "Each has his own furnace—Branz at Reading, Nutt at Warwick. Each also has his own forges—Branz in Windsor. Nutt supplies four forges besides his own in Chester county." Nutt was not living at the time this was written, but Acrelius's confounding of ownership is easily understood. Nor is it probable that Branson operated Windsor forges in 1750. In that year he is reported as having then owned a furnace for making steel in Philadelphia, and soon after 1743 it is known that he sold Windsor forges to the "English company," which was composed of his sons-in-law. William Branson was himself an Englishman, who emigrated to Pennsylvania about 1708 and became a Philadelphia merchant. He died in 1760.

There was a forge on Crum creek, about two miles above the town of Chester, in Delaware county, which was built by John Crosby and Peter Dicks about 1742. Peter Kalm, the Swede, in his *Travels into North America*, written in 1748 and 1749, thus describes it: "About two English miles behind Chester I passed by an iron forge, which was to the right hand by the road side. It belonged to two brothers, as I was told. The ore, however, is not dug here, but thirty or forty miles from hence, where it is first melted in the oven, and then carried to this place. The bellows were made of leather, and both they and the hammers, and even the hearth, [were] but small in proportion to ours. All the machines were worked by water. The iron was wrought into bars." The "oven" here referred to was a blast furnace, which was probably located in the Schuylkill valley, the pigs for the forge being boated from it down the Schuylkill and Delaware and up Crum creek. Acrelius says that the forge was owned at the time of his visit by Peter Dicks, had two stacks, was worked sluggishly, and had "ruined Crosby's family."

As early as 1742 John Taylor built a forge on Chester creek, in Thornbury township, Delaware county, where Glen Mills now stand, which he called Sarum iron works. In 1746 he added a rolling and slitting mill. These works are said to have been carried on with energy by Mr. Taylor until his death in 1756. Acrelius, writing about the time of Mr. Taylor's death, says: "Sarum belongs to Taylor's heirs; has three stacks, and is in full blast." Peter Kalm states that at Chichester (Marcus Hook) "they build here every year a number of small ships for sale, and from an iron work which lies higher up in the country they carry iron bars to this place and ship them." This "iron work" was certainly Sarum. Taylor was the descendant of an English settler in the province. His rolling and slitting mill was the first in Pennsylvania.

In 1750 there was a "plating forge with a tilt-hammer" in Byberry township, in the northeastern part of Philadelphia county, the only one in the province, owned by John Hall, but not in use in that year. In the same year there were two steel furnaces in Philadelphia, one of which, Stephen Paschall's, was built in 1747, and stood on a lot on the northwest corner of Eighth and Walnut streets; the other was owned by William Branson, and was located near where Thomas Penn "first lived at the upper end of Chestnut street." These furnaces were for the production of blister steel. There appear to have been no other steel furnaces in the province in 1750. Whitehead Humphreys was in 1770 the proprietor of a steel furnace on Seventh street, between Market and Chestnut, in Philadelphia, where he also made edge tools. In February, 1775, Uriah Woolman and B. Shoemaker, "in Market street, Philadelphia," advertised in Dunlap's *Pennsylvania Packet* "Pennsylvania steel manufactured by W. Humphreys, of an excellent quality, and warranted equal to English, to be sold in blister, faggot, or flat bar, suitable for carriage springs."

Returning to the Schuylkill valley, we find in 1751 a forge called Mount Joy at the mouth of East Valley creek, on the Chester county side of the creek, the one-third of which was advertised for sale on the 4th of April of that year by Daniel Walker, and the remaining two-thirds on the 26th of September of the same year by Stephen Evans and Joseph Williams. In Daniel Walker's advertisement it was stated that the forge was "not so far distant from three furnaces." Pennypacker, in his *Annals of Phœnixville and its Vicinity*, says that "the ancestor of the Walker family" had come from England with William Penn, and "at a very early date had erected the small forge on the Valley creek." It is clear, however, that in 1751 Daniel Walker owned only the one-third of the forge, Evans and Williams owning the remainder. In 1757, as we learn from Mrs. James, the forge was sold to John Potts by the executors of Stephen Evans. In 1773 it was owned by Joseph Potts, at which time it continued to be legally designated as Mount Joy forge, although for some time previously it had been popularly known as Valley forge. In that year Joseph Potts sold the half of the forge to Colonel William Dewees. The pig iron used at Valley forge was hauled from Warwick furnace. In September, 1777, the forge was burned by the British, and in December of the same year the American army under Washington was intrenched on the Montgomery county side of Valley creek, opposite Valley forge. General Washington's headquarters were established at the substantial stone house of Isaac Potts, also on the Montgomery county side of Valley creek. This house is still standing. Isaac Potts was not, however, at this time an owner of Valley forge. After the close of the Revolutionary war Isaac and David Potts, brothers, erected another forge on the Montgomery county side of Valley creek and about three-eighths of a mile below the old Mount Joy forge. A new dam was built, which raised the water partly over the site of the old forge. About the same time, and as early as 1786, a slitting mill was built on the Chester county side of the stream by the same persons. The new forge was called Valley forge. It was in ruins in 1816. About 1824 all the iron works at the town of Valley Forge were discontinued. Mrs. James says that "nothing now remains but an immortal name."

Charming forge, on Tulpehocken creek, two miles from Womelsdorf, in Berks county, was built in 1749, probably by Pennsylvania Germans, as we find that in 1754 it was styled *Tulpehocken Eisen Hammer.* This forge is still in operation. Another early forge in the Schuylkill valley was Amity forge, on the Manatawny or one of its branches. Helmstead, Union, and Pottsgrove were the names of other forges existing in 1750. Mary Ann furnace, in Long Swamp township, Berks county, was in existence as early as 1762, when it was owned by George Ross and George Ege. This furnace was in blast until 1869. Oley furnace, on Manatawny creek, about eleven miles northeast of Reading, was built in 1770, by Daniel Udree, a Pennsylvania German, and is still in operation. In 1780 a forge of the same name was built on the same stream by Mr. Udree. It has been abandoned since 1856. Green Tree forge, near Reading, was built in 1770. On William Scull's map of 1770 Moselem forge, on Maiden creek, Berks county, and Gulf forge, on Gulf creek, in Upper Merion township, Montgomery county, are noted.

William Bird was an enterprising Englishman who established several iron enterprises in Berks county before the Revolution. A person of this name was a witness of Thomas Rutter's will, on November 27, 1728, when he appears to have been a resident of Amity township, Berks county. In 1740 or 1741 William Bird built a forge on Hay creek, near its entrance into the Schuylkill, where the town of Birdsboro now stands. In 1759 he built Hopewell furnace, on French creek, in Union township, Berks county, which is still in operation and still using charcoal. In the same year he built New Pine forge, near Hopewell furnace, in the same township. As early as 1760 he built Roxborough furnace in Heidelburg township, Berks county, the name of which was subsequently changed to Berkshire. Dying in 1762, his estate was divided between his six children and his widow. Berkshire furnace fell to a son, Mark Bird, who in 1764 sold it to John Patton and his wife Bridget, who had been the wife of William Bird. In 1789 Bridget Patton, again a widow, sold the furnace to George Ege. Mark Bird built a rolling and slitting mill and a nail factory at Birdsboro about the time of the Revolution. He also built Spring forge in Oley township, and Gibraltar forges in Robeson township. At Trenton, New Jersey, he manufactured wire. He failed in business about 1788.

Elizabeth furnace, near Brickersville, in Lancaster county, on Middle creek, a branch of Conestoga creek, was built about 1750 by John Huber, a Pennsylvania German. It was a small furnace, and did not prove to be profitable. In 1757 Huber sold it to Henry William Stiegel and his partners, who built a new and larger furnace, which was operated until 1775, when, through Stiegel's embarrassments, it passed into the hands of Daniel Benezet, who leased it to Robert Coleman, who subsequently bought it and eventually became the most prominent ironmaster in Pennsylvania at the close of the last century and far into the present century. Bishop states that "some of the first stoves cast in this country were made by Baron Stiegel, relics of which still remain in the old families of Lancaster and Lebanon counties." Rev. Joseph Henry Dubbs, of Lancaster, says that Stiegel's stoves bore the inscription:

Baron Stiegel ist der mann
Der die Ofen machen kann.

That is, "Baron Stiegel is the man who knows how to make stoves." On the furnace erected by Huber the following legend was inscribed:

John Huber, der erste Deutsche man
Der das Eisenwerk vollfuren kann.

Freely translated this inscription reads: "John Huber is the first German who knows how to make iron."

Henry William Stiegel was a man of great enterprise and business capacity, but of a too sanguine temperament; hence his failure where others succeeded. On the 5th of February, 1763, he was associated with Charles and Alexander Stedman as a lessee of Charming forge. In 1772 the forge was leased by him and Paul Zantzinger to George Zantzinger and George Ege. Between 1760 and 1770 he established a glass factory at Manheim, in Lancaster county, called the American flint glass factory, which was in operation as late as 1774. He was a native of Germany, arriving in this country on August 31, 1750, (old style,) in the ship *Nancy* from Rotterdam. He is buried in the Lutheran graveyard in Heidelberg township, Berks county, a few miles from Womelsdorf. In his last days he taught school in this township.

After Elizabeth furnace came into the possession of Robert Coleman he cast shot and shells and cannon for the Continental army, and some of the transactions which occurred between him and the Government in settlement of his accounts for these supplies are very interesting. On November 16, 1782, appears the following entry: "By cash, being the value of 42 German prisoners of war, at £30 each, £1,260;" and on June 14, 1783, the following: "By cash, being the value of 28 German prisoners of war, at £30 each, £840." In a foot note to these credits Robert Coleman certifies "on honour" that the above 70 prisoners were all that were ever secured by him, one of whom being returned is to be deducted when he produces the proper voucher. Rupp, in his history of Lancaster county, mentions that in 1843 he visited one of the Hessian mercenaries who was disposed of in this manner at the close of the war for the sum of £80, for the term of three years, to Captain Jacob Zimmerman of that county.

Elizabeth furnace continued in operation until 1856, when it was abandoned by its owner, Hon. G. Dawson Coleman, the grandson of Robert Coleman, for want of wood.

Among the persons who were employed at Windsor forges under the "English company" was James Old, a forgeman. He was shrewd and energetic. About 1765 he built Pool forge on Conestoga creek, about a mile below

Windsor forges. Early records mention his ownership of Quitapahilla forge, near Lebanon, and of Speedwell forge, on Hammer creek, in Lancaster county. Tradition also associates his name with the ownership of other forges in Chester, Lancaster, and Berks counties. In 1774 he was a lessee of Reading furnace, on French creek. In 1795 he conveyed Pool forge and about 700 acres of land attached to it to his son, Davies Old.

James Old was born in Wales in 1730. He emigrated to Pennsylvania previous to September 7, 1754, when his name for the first time appears in the register of Bangor church, at Churchtown, Lancaster county, as the contributor of £5 toward the erection of the church building. Soon after his settlement at Windsor he married Margaretta Davies, a daughter of Gabriel Davies, of Lancaster county. Gabriel Davies is supposed to have been the owner of the site on which Pool forge was built. James Old died on May 1, 1809, in his 79th year, and is buried in the graveyard of Bangor church. He was one of the most enterprising and successful of early Pennsylvania ironmasters. He had a brother William, also a forgeman, who had been employed at Windsor forges, and who afterwards embarked in the manufacture of bar iron on his own account.

William Old, a son of James Old, married Elizabeth Stiegel, the daughter of Baron Stiegel. She is buried in the same graveyard which holds the remains of her father. Mrs. Henry Morris, of Philadelphia, is her grand-daughter.

Robert Coleman was in his younger days in the service of James Old, and while with him at Reading furnace in 1773 he married his daughter Ann. Soon after his marriage he rented Salford forge, above Norristown, in Montgomery county, where he remained three years. While at this forge he manufactured chain bars, which were designed to span the Delaware river for the defense of Philadelphia against the approach of the British fleet. From Salford forge he went to Elizabeth furnace. He was born near Castle Fin, in Donegal county, and not far from the city of Londonderry, in Ireland, on the 4th of November, 1748. In 1764, when 16 years old, he left Ireland for America. He died at Lancaster in 1825, at which place he is buried.

Cyrus Jacobs married Margaretta, another daughter of James Old, about 1782. At that time he was living at Churchtown, in the employment of James Old as a clerk at Pool forge. He was at Gibraltar forge, in Berks county, in 1787, and at Hopewell forge, in Lancaster county, from 1789 to 1792. Tradition says that he was a lessee of both these forges from James Old. In 1793 he built Spring Grove forge, on Conestoga creek, about three miles west of Pool forge, and in 1799 he purchased Pool forge from Davies Old. Both these forges were active until 1856, after which they were abandoned. The Jacobs family came to Pennsylvania from Wales about 1693, and settled on Perkiomen creek. Cyrus Jacobs was born in 1761, and died in 1830 at Whitehall, near Churchtown.

Cornwall furnace, located within the limits of the now celebrated Cornwall ore hills, on Furnace creek, in Lebanon county, a few miles south of Lebanon, was built in 1742 by Peter Grubb, whose descendants to this day have been prominent Pennsylvania ironmasters. He was the son of John Grubb, a native of Cornwall, in England, who emigrated to this country in the preceding century, landing at Grubb's Landing, on the Delaware, near Wilmington, at which latter place he is buried. There is record evidence that Peter Grubb was already an ironmaster before he built Cornwall furnace, and a tradition in his family says that in 1735 he built a furnace or bloomary, most likely the latter, about five-eighths of a mile from the site of Cornwall furnace. He died intestate about 1754, and his estate, including the Cornwall ore hills, descended to his two sons, Curtis and Peter Grubb—both afterwards colonels in the Revolution.

In 1756, just after the death of Peter Grubb, Acrelius wrote of Cornwall furnace as follows: "Cornwall, or Grubb's iron works, in Lancaster county. The mine is rich and abundant, forty feet deep, commencing two feet under the earth's surface. The ore is somewhat mixed with sulphur and copper. Peter Grubb was its discoverer. Here there is a furnace which makes twenty-four tons of iron a week, and keeps six forges regularly at work—two of his own, two belonging to Germans in the neighborhood, and two in Maryland. The pig iron is carried to the Susquehanna river, thence to Maryland, and finally to England. The bar iron is sold mostly in the country and in the interior towns; the remainder in Philadelphia. It belongs to the heirs of the Grubb estate, but is now rented to Gurrit & Co." The firm was doubtless Garret & Co.

During the Revolution Cornwall furnace cast cannon and shot and shells for the Continental army. It is still in operation, and is the oldest active charcoal furnace in the United States. It has always used charcoal.

In 1785 Robert Coleman purchased a one-sixth interest in Cornwall furnace and the ore hills. After that year, through successive purchases from the Grubbs, he obtained four additional sixths of the Cornwall property. His total purchases of this valuable property remain in the hands of his descendants to-day.

Martic forge, on Pequea creek, near the present village of Colemanville, Lancaster county, was built in 1755, and is still in operation. Early in this century cemented or blister steel was made here. Mr. R. S. Potts, one of the present owners of Martic forge, writes us as follows: "There used to be a small rolling mill near the forge that stopped running some fifty years ago. There was also a charcoal furnace called Martic some six miles east of the forge, but I have been unable to ascertain its history beyond the fact that it was owned and operated by the Martic Forge Company; when that was, however, or how long it was in blast, I cannot learn. The old cinder bank is still visible. During the Revolution round iron was drawn under the hammer at the forge and bored out for musket barrels at a boring mill, in a very retired spot, on a small stream far off from any public road, doubtless with a view to prevent discovery by the enemy. The site is still visible."

In 1769 Martic furnace and forge were advertised for sale by the sheriff, together with 3,400 acres of land and other property—"all late the property of Thomas Smith, James Wallace, and James Fulton." The furnace was in existence in 1793, but it was not then active.

Hopewell forge, on Hammer creek, in Lancaster county, about ten miles south of Lebanon, was built by Peter Grubb soon after he built Cornwall furnace. Speedwell forge, on the same stream, near Brickersville, in Lancaster county, was built in 1750, also by Peter Grubb.

The iron industry of Pennsylvania crossed the Susquehanna at a very early period. Acrelius says that there was a bloomary in York county in 1756, owned by Peter Dicks, who had but recently discovered "the mine." Spring forge, in the same county, was built in 1770, was still in operation in 1849, and was abandoned about 1850. About the year 1760 a forge was built at Boiling Springs, in Cumberland county, forming the nucleus of the Carlisle iron works, which afterwards included a blast furnace, a rolling and slitting mill, and a steel furnace. The furnace was built soon after 1762 by a company. Michael Ege was the proprietor after 1782. On a tax list at Carlisle Robert Thornburg & Co. appear in 1767 as the owners of a forge to which 1,200 acres of land were attached. We cannot locate this forge. A forge is supposed to have been built at Mount Holly in 1765. Pine Grove furnace, in the same county, was built about 1770 by Thornburg & Arthur. In 1782 Michael Ege became part owner and subsequently sole owner. A forge was attached to this furnace. Both the furnace and forge are still in operation. No other iron works west of the Susquehanna are known to have been established previous to the Revolution. About 1777 William Denning, an artificer of the Revolutionary army, had a forge in active operation at Middlesex, in Cumberland county, at which he manufactured wrought-iron cannon.

Although all of the iron enterprises which were established in Pennsylvania prior to the Revolution have not been mentioned in the preceding pages, those which have been mentioned indicate remarkable activity in the development of the iron resources of the province. Pennsylvania was one of the last of the thirteen colonies to be occupied by permanent English settlements, and even after these settlements were made a long time elapsed before the erection of iron works was successfully undertaken. Very strangely, the business of manufacturing iron was not fairly commenced in Pennsylvania until 1716, but after this time it grew rapidly, and in the sixty years which intervened before the commencement of hostilities with the mother country probably sixty blast furnaces and forges were built—a rate of progress which was not attained by any other colony in the same period. Acrelius said in 1756: "Pennsylvania, in regard to its iron works, is the most advanced of all the American colonies." Many of these enterprises were upon a scale that would have done credit to a much later period of the American iron industry. Cornwall and Warwick furnaces were each 32 feet high, 21½ feet square at the base, and 11 feet square at the top. Warwick was at first 9 feet wide at the boshes, but was afterwards reduced to 7½ feet. The forges were usually those in which pig iron was refined into bar iron "in the Walloon style," as stated by Acrelius. There were few ore bloomaries, and nearly all of these were built at an early day. Acrelius mentions only one of this class—Peter Dicks' bloomary, in York county. The smaller furnaces yielded only from 1½ to 2 tons of pig iron daily, but the larger ones yielded from 3 to 4 tons. The Reading and Warwick furnaces, when in blast, each made from 25 to 30 tons of iron per week. The furnaces were used to produce both pig iron and castings, the latter consisting of stoves, pots, kettles, andirons, and similar articles. Of the product of the forges Acrelius says that "one forge, with three hearths in good condition, and well attended to, is expected to give 2 tons a week." The same author says that "for four months in summer, when the heat is most oppressive, all labor is suspended at the furnaces and forges." The scarcity of water at this season would also have much to do with this suspension, all of the works being operated by water-power. It was not until about the close of the first third of the present century that blowing engines were used to produce the blast at either furnaces or forges in Pennsylvania, or in any other state. At first large leather bellows were used to blow both the furnaces and the forges, but afterwards, about the time of the Revolution, wooden cylinders, or "tubs," were substituted. Reading, Warwick, and Cornwall furnaces—three of the best furnaces of the last century—retained their long leather bellows until a late day. The Cornwall bellows was 20 feet 7 inches long, 5 feet 10 inches across the breech, and 14 inches at the insertion of the nozzle. Only one tuyere was used at the furnaces. The fuel used was exclusively charcoal, and the blast was always cold. About 400 bushels of charcoal were required to produce from the ore a ton of hammered bar iron.

THE MANUFACTURE OF CHARCOAL IRON IN EASTERN PENNSYLVANIA AFTER THE REVOLUTION.

After the Revolution the business of manufacturing iron received a fresh impulse in the eastern part of Pennsylvania, and was further extended into the interior. Chester, Lancaster, and Berks counties shared conspicuously in the development at this period of the leading manufacturing industry of the state. Many blast furnaces and forges and a few rolling and slitting mills were built in these counties before 1800, and after the beginning of the present century this activity was continued. A few of the more important enterprises in each of these counties and in other eastern counties may be mentioned.

In 1790 Benjamin Longstreth erected a rolling and slitting mill at Phœnixville, where the foundry now stands, to roll bars into plates to be slit into nail rods. This was the beginning of the present extensive works of the Phœnix Iron Company.

Federal slitting mill, on Buck run, about four miles south of Coatesville, in East Fallowfield township, Chester county, was built in 1795 by Isaac Pennock. The name of this mill was afterwards changed to Rokeby rolling mill. It was used to roll sheet iron and nail plates and to slit the latter into nail rods. It continued in operation until 1864, when it was burned down and abandoned. During the latter part of its history it rolled boiler plates. A paper mill now occupies its site. About 1810 Mr. Pennock built the Brandywine rolling mill at Coatesville, which was afterwards operated for him by Dr. Charles Lukens, who had been employed at the Federal slitting mill. At this mill it is claimed that the first boiler plates in the United States were rolled by Dr. Lukens in 1816. The puddling mill of the Lukens rolling mill at Coatesville occupies to-day the site of the Brandywine mill. Upon the death, in 1825, of Dr. Lukens, who had become the owner of the Brandywine mill, the management of the mill devolved upon his wife, by whom the business was greatly extended and profitably conducted for twenty years. As a tribute to her memory the name of the works was, after her death, changed to Lukens rolling mill.

Mount Hope furnace, located on the Big Chiquisalunga creek, in Lancaster county, about ten miles south of Lebanon, was built in 1785 by Peter Grubb, Jr., and is still operated by members of the Grubb family. Colebrook furnace, on the Conewago, in Lebanon county, seven miles southwest of Cornwall furnace, was built by Robert Coleman in 1791 and abandoned about 1860. Mount Vernon furnace, on the same stream, about twenty-three miles west of Lancaster, and in Lancaster county, was built in 1808 by Henry Bates Grubb. A second furnace of the same name was built near the first in 1831. Both have been abandoned. Conowingo furnace, on the creek of the same name, and about sixteen miles southeast of Lancaster, was built in 1809. About 1840 steam-power for driving the blast was successfully introduced by its owner, James M. Hopkins, the boilers being placed at the tunnel-head. Soon after the introduction of steam at Conowingo furnace it was successfully applied to Cornwall furnace by the manager, Samuel M. Reynolds.

In 1786 there were seventeen furnaces, forges, and slitting mills within thirty-nine miles of Lancaster. In 1838 there were 102 furnaces, forges, and rolling mills within a radius of fifty-two miles of Lancaster. At this time Lancaster was the great iron center of eastern Pennsylvania.

In 1805 there were seven forges and one slitting mill in Delaware county. Franklin rolling mill, at Chester, in Delaware county, was built in 1808. In 1828 there were in this county five rolling and slitting mills and some manufactories of finished iron products.

The Cheltenham rolling mill, on Tacony creek, in Montgomery county, one mile below Shoemakertown, was built in 1790. In 1856 it was owned and operated by Rowland & Hunt; it has since been abandoned.

Joanna furnace, on Hay creek, in Berks county, was built as early as March, 1793. It is still in operation, and still uses charcoal. A neighboring furnace called Rebecca was situated in Chester county, and was in existence in 1793. Reading furnace, two miles east of Womelsdorf, in Berks county, was built in 1793 by George Ege, on the site now occupied by the Robesonia furnaces. It was a near neighbor of Berkshire furnace. Sally Ann furnace, in Rockland township, about five miles south of Kutztown, was built in 1791. After having been idle for many years it was refitted in 1879 and is now in operation under the name of Rockland furnace. In 1798 there were six furnaces and six forges in Berks county. In 1832 there were eleven furnaces and twenty-one forges.

The first iron enterprises in the Lehigh valley are said to have been established in the last century, in Carbon county. These were Maria forge and furnace, on Pocopoco creek, near Weissport. The forge is said to have been built in 1753. It was abandoned in 1858, and the furnace in 1861. Several charcoal iron enterprises were established in this valley during the early part of the present century, including a few bloomaries. All of the forges and bloomaries in the Lehigh valley have been abandoned. Nearly all of the bloomaries were supplied with ore from northern New Jersey. Of the charcoal furnaces only one is now in operation which uses charcoal—East Penn, formerly Pennsville, in Carbon county, built in 1837. In 1836 a rolling mill and wire factory were built at South Easton, in Northampton county, by Stewart & Co. This was probably the first rolling mill in the valley.

In 1805 there were two forges in York county, one of which was Spring forge, which stood on Codorus creek. Castle Fin forge, formerly called Palmyra forge, on Muddy creek, in York county, was built in 1810, by a person named Withers, and rebuilt in 1827 by Thomas Burd Coleman, who also erected a steel furnace about 1832. Both have been abandoned. In its day Castle Fin forge was a very prominent enterprise. In 1850 there were five furnaces and three forges in this county. Since then its iron industry has sensibly declined.

Chestnut Grove furnace, at Whitestown, in Adams county, was built in 1830, and is still active. About 1830 Maria furnace was built in Hamiltonban township, in this county, by Stevens & Paxton (Thaddeus Stevens), but was abandoned about 1837.

The first furnace in Franklin county was Mount Pleasant, in Path valley, five miles northwest of Loudon, which was erected soon after the peace of 1783 by three brothers, William, Benjamin, and George Chambers. A forge was also erected by them as early as 1783. This furnace and forge were destroyed in 1843. A furnace called Richmond, built in 1865, now occupies the site of Mount Pleasant furnace. Soundwell forge, at Roxbury, sixteen miles north of Chambersburg, on Conodoguinet creek, was built in 1798, by Leephar, Crotzer & Co., and was active until 1857. Roxbury furnace, at or near the same place, was built in 1815 by Samuel Cole, and is now abandoned. In the old "pack-horse" days there was an active iron trade carried on at Roxbury. Carrick forge, four miles from Fannettsburg, in Franklin county, was built in 1800, and was in operation in 1856. A furnace of the same name was built in 1828 by General Samuel Dunn, which is still active. Loudon forge and furnace were built about 1790 by Colonel James Chambers, and destroyed about 1840. Valley forge, near Loudon, in Franklin county, was built in 1804, and abandoned after 1856. Other old forges in Franklin county were abandoned before 1850. Mont Alto furnace, in the same county, was built in 1807 by Daniel and Samuel Hughes, and is still active. Two forges of the same name, which are yet in operation, were built in 1809 and 1810 about four miles from the furnace. A foundry was built in 1815, a rolling mill in 1832, and a nail factory in 1835. About 1850 the nail factory was burned down, and soon after 1857 the mill was abandoned.

Caledonia forge, in Franklin county, on Conococheague creek, ten miles southeast of Chambersburg, was built in 1830 by Stevens & Paxton. Caledonia furnace, at the same place, was built in 1837 by the same firm, after the abandonment of Maria furnace, in Adams county. For many years previous to 1863 this furnace and forge were owned by Hon. Thaddeus Stevens, in which year they were burned by the Confederates, under General Lee, when on the march to Gettysburg. Franklin furnace, in St. Thomas township, was built by Peter and George Housum in 1828, and is still running on charcoal. There were a few other charcoal furnaces in this county which have left scarcely their names by which to be remembered. Early in the present century nails and edge tools were made in large quantities at several establishments at Chambersburg and in its vicinity. One of these, the Conococheague rolling mill and nail factory, was established by Brown & Watson in 1814.

Liberty forge, at Lisburn, on Yellow Breeches creek, in Cumberland county, was built in 1790, and is still active. An older forge, long abandoned, is said to have been built at Lisburn in 1783. A few other forges in Cumberland county were built prior to 1800. Cumberland furnace, ten miles southwest of Carlisle, on Yellow Breeches creek, is said to have been built in 1794 by Michael Ege. It blew out permanently in December, 1854. Holly furnace, at Papertown, in the same county, is said to have been built about 1785 by Stephen Foulk and William Cox, Jr. A forge was in existence here in 1848. Holly furnace was torn down in 1855 to give place to a paper mill. It was once owned by Michael Ege. Two furnaces, now abandoned, once stood near Shippensburg in this county—Augusta, built in 1824, and Mary Ann, built in 1826. Big Pond furnace, built in 1836, between Augusta and Mary Ann furnaces, was burned down in 1880. Jacob M. Haldeman removed from Lancaster county to New Cumberland, at the mouth of Yellow Breeches creek, on the Susquehanna, about 1806. He purchased a forge at this place and added a rolling and slitting mill, which were operated until about 1826, when they were allowed to decay. Fairview rolling mill, about a mile from the mouth of Conodoguinet creek, in Cumberland county, and two miles above Harrisburg, was built in 1833 by Gabriel Heister and Norman Callender, of Harrisburg, to roll bar iron. Jared Pratt, of Massachusetts, leased the mill in 1836, and added a nail factory.

Michael Ege was for nearly fifty years a prominent ironmaster of Cumberland county, owning, a short time before his death, Pine Grove furnace, the Carlisle iron works, Holly furnace, and Cumberland furnace. He and his brother George Ege, already mentioned, were natives of Holland. He died on August 31, 1815.

In 1840 there were 8 furnaces and 11 forges, bloomaries, and rolling mills in Franklin county, and 6 furnaces and 5 forges and rolling mills in Cumberland county.

Schuylkill county has had several forges, mainly at or near Port Clinton, the first of which at that place appears to have been built in 1801. Between 1800 and 1804 a small charcoal furnace was built by Reese & Thomas at Pottsville. In 1807 Greenwood furnace and forge were erected at Pottsville by John Pott, the founder of the town, which was laid out in 1816. In 1832 there were in operation in Schuylkill county Greenwood furnace and forge, and Schuylkill, Brunswick, Pine Grove, Mahanoy, and Swatara forges. A furnace called Swatara, six miles from Pine Grove, was built in 1830, which was followed by Stanhope furnace, still nearer to Pine Grove, in 1835. All of these were charcoal enterprises.

In 1785 Henry Fulton established a "nailery" in Dauphin county, probably at Harrisburg. It is said to have been "only a little remote from a smithy." In 1805 there were two furnaces and two forges in the county. Oakdale forge, at Elizabethville, appears to have been built in 1830. Victoria furnace, on Clark's creek, was built in that year. In 1832 there were three forges and two furnaces in the county. Emeline furnace, at Dauphin, was built about 1835. The first furnace at Middletown, in this county, was built in 1833, and a second furnace was built in 1849—both cold-blast charcoal furnaces. Manada furnace, at West Hanover, was built in 1837 by E. B. & C. B. Grubb. The first rolling mill in the county was the old Harrisburg mill, at Harrisburg, built in 1836. The first anthracite furnace in the county was built at Harrisburg, in 1845, by Governor David R. Porter. Hon. Simon Cameron has been prominently identified with the iron interests of this county.

A furnace and forge, probably Paxinas, were in operation in Shamokin township, Northumberland county, as early as 1830. Berlin furnace and forge were built near Hartleytown, in Union county, in 1827. Forest furnace, near Milton, in Northumberland county, was built in 1846, and Beaver furnace, near Middleburg, in Snyder county, in 1848—both charcoal furnaces.

Esther furnace, about three miles south of Catawissa, on East Roaring creek, in Columbia county, was built in 1802 by Michael Bitter & Son, who cast many stoves. In 1836 the furnace was rebuilt by Trago & Thomas. Catawissa furnace, near Mainville, in Columbia county, was built in 1815, and a forge was built in 1824, near the same place. In 1832 there were two furnaces and two forges in Catawissa township. In 1837 Briar Creek furnace, two miles from Berwick, in Columbia county, was built. In 1845 Fincher & Thomas built Penn charcoal furnace, on Catawissa creek, one mile east of Catawissa. All of these furnaces have been abandoned, but the forge at Mainville is still active.

A charcoal furnace called Liberty was built at Mooresburg, in Montour county, in 1838. A furnace at Danville, in Montour county, was built in 1838 to use charcoal, but was altered in the following year to use anthracite. Danville rolling mill was built in 1845, Montour in 1845, and Rough-and-Ready in 1847—all at Danville.

About 1778 a bloomary forge was built on Nanticoke creek, near the lower end of Wyoming valley, in Luzerne county, by John and Mason F. Alden. Another bloomary forge was erected in 1789 on Lackawanna river, about two miles above its mouth, by Dr. William Hooker Smith and James Sutton. Still another bloomary forge was erected in 1799 or 1800, on Roaring brook, at Scranton, then called Slocum's Hollow, by two brothers, Ebenezer and Benjamin Slocum. The product of these bloomaries was taken down the Susquehanna river in Durham boats. They all continued in operation until about 1828. Nescopeck forge, in Luzerne county, was built in 1824, and abandoned about 1854. Shickshinny charcoal furnace was built in 1846, and abandoned about 1860. In 1811 Francis McShane established a small cut-nail factory at Wilkesbarre, "and used anthracite coal in smelting the iron." Wyoming rolling mill, at Wilkesbarre, was built in 1842, and abandoned about 1850. It was followed by Lackawanna, at Scranton, in 1844. Lackawanna county owes its present prominence in the iron industry to the courage, energy, and business sagacity of two brothers, George W. and Selden T. Scranton, and their cousin, Joseph H. Scranton, the two brothers commencing operations in 1840 at Scranton, and their cousin joining them soon afterwards.

A furnace was built in Lycoming county in 1820, four miles from Jersey Shore, and named Pine creek. In 1832 it was owned by Kirk, Kelton & Co. A forge was added at the same place in 1831. Heshbon forge, furnace, and rolling mill, on Lycoming creek, five miles above its mouth, were built, respectively, in 1828, 1838, and 1842. Hepburn forge, on the same creek, twelve miles north of Williamsport, was built in 1830, and Crescent rolling mill, one mile lower down the stream, was built in 1842. About 1835 Astonville furnace, near Ralston, was built to use coke, but charcoal was soon substituted. At Ralston a charcoal furnace, rolling mill, nail factory, etc., were erected by the Lycoming Valley Iron Company in 1837.

Washington furnace, on Fishing creek, at Lamar, in Clinton county, was built in 1811. It was last in blast in 1875. A forge was added in 1837, and it also is silent. A furnace at Farrandsville, near the mouth of Lick run, in this county, which was built about 1836, to use coke, is said to have sunk, in connection with a nail mill, foundry, and other enterprises, over half a million dollars, contributed by Boston capitalists. Mill Hall, Sugar Valley, and Lamar are the names of other charcoal furnaces in the same county. Of the enterprises above named, Washington furnace and forge and Mill Hall furnace are the only ones that have not been abandoned.

In 1814 Peter Karthaus, a native of Hamburg, in Germany, but afterwards a merchant of Baltimore, and Rev. Frederick W. Geissenhainer, a native of Muhlberg, in Germany, established a furnace at the mouth of the Little Moshannon, or Mosquito creek, in the lower end of Clearfield county. The firm of Karthaus & Geissenhainer was dissolved on the 18th day of December, 1818. It had been organized in 1811, partly to mine and ship to eastern markets the bituminous coal of Clearfield county. The furnace was operated with partial success for several years.

A furnace was built about 1840 at Blossburg, in Tioga county, to use charcoal, but in 1841 it was altered by J. G. Boyd and another person to use coke. It soon chilled, however, and was abandoned.

THE MANUFACTURE OF CHARCOAL IRON IN THE JUNIATA VALLEY.

As early as 1767 a company called The Juniata Iron Company was organized, apparently by capitalists of eastern Pennsylvania, to search for iron ore in the Juniata valley, and probably with the ulterior object of manufacturing iron. It was in existence from 1767 to 1771, during which period its agent, Benjamin Jacobs, made for it some surveys and explorations and dug a few tons of iron ore, but where these operations were conducted and who were the members of this pioneer company some future antiquarian must discover.

The first iron enterprise in the Juniata valley was Bedford furnace, built in 1785, on Black Log creek, below its junction with Shade creek at Orbisonia, in Huntingdon county, by the Bedford Company, composed of Edward Ridgley, Thomas Cromwell, and George Ashman. It made from eight to ten tons of pig iron weekly. It was constructed in part of wood, and was five feet wide at the bosh, and either fifteen or seventeen feet high. A forge was built on the Little Aughwick creek by the same company, a short distance from the furnace, about 1785, which made horseshoe iron, wagon tire, harrow teeth, etc. Large stoves and other utensils were cast at the furnace. At the Philadelphia Exhibition was a stove-plate cast at this furnace in 1792. Bar iron made at Bedford forge was bent into the shape of the letter U, turned over the backs of horses, and in this manner taken by bridle-paths to Pittsburgh. Bar iron and castings from Bedford furnace and later iron works in the Juniata valley were also taken down the Juniata river in arks, many of them descending to as low a point as Middletown on the Susquehanna, whence the iron was hauled to Philadelphia, or sent to Baltimore in arks down the Susquehanna river. The furnace and forge have long been abandoned.

Three other charcoal furnaces have been built at or near the site of Bedford furnace during the present century. One of these was Rockhill, on Black Log creek, three-quarters of a mile southeast of Orbisonia, built in 1830. It was in operation in 1872, but in 1873 it gave place to the two new coke furnaces of the Rockhill Iron and Coal Company.

Centre furnace, on Spring creek, in Centre county, was the second furnace in the Juniata valley. It was built in the summer of 1792 by Colonel John Patton and Colonel Samuel Miles, both Revolutionary officers. The latter afterwards founded the iron works at Milesburg, in this county. The first forge in Centre county was Rock forge, on Spring creek, built in 1793 by General Philip Benner, of Chester county, who subsequently became an extensive manufacturer of Juniata iron. He died in 1832, aged 70 years, long before which time his Rock forge enterprise had expanded into a rolling and slitting mill, nail factory, blast furnace, etc. The furnace was built in 1816. General Benner had made iron at Nutt's forge at Coventry after the Revolution. In 1795 Daniel Turner built Spring creek forge, and in 1796 Miles, Dunlop & Co. built Harmony forge, on Spring creek. Logan furnace, near Bellefonte, was built in 1800 by John Dunlop, who afterwards originated other iron enterprises in Centre county, including a forge at Bellefonte. Tussey furnace, in Ferguson township, fourteen miles south of Bellefonte, was built about 1805 by General William Patton. In 1807 Roland Curtin, a native of Ireland, and father of Governor Andrew G. Curtin, in company with Moses Boggs erected Eagle forge on Bald Eagle creek, about five miles from Bellefonte, Boggs remaining a partner only a short time. Pig iron for this forge was obtained from Tussey furnace. In 1817 Mr. Curtin built a furnace called Eagle near his forge. In 1828 a small rolling mill was added, for the manufacture of bar iron and nails. About 1832 he built Martha furnace, on Bald Eagle creek, about eleven miles west of Bellefonte. He died in 1850, aged 84 years. About 1820 Hardman Philips, an enterprising Englishman, erected at Philipsburg a forge, foundry, and screw factory—the last named being one of the first of its kind in this country. Cold Stream forge was erected about 1832 by John Plumbe, Sr., in Rush township, Centre county. Hecla furnace, near Hublersburg, was built in 1820. Hannah furnace, about ten miles northeast of Tyrone, was built in 1828. Julian furnace, on Bald Eagle creek, was built in 1835. A rolling mill was built by Valentines & Thomas, near Bellefonte, in 1824. Abram S. Valentine, of this firm, was the inventor of an ore-washing machine.

Barree forge, on the Juniata, in Huntingdon county, was built about 1794 by Edward Bartholomew, of Philadelphia, and his son-in-law, Greenberry Dorsey, of Baltimore, to convert the pig iron of Centre furnace into bar iron. Huntingdon furnace, in Franklin township, was built in 1796, four miles from the mouth of Spruce creek, on Warrior's Mark run, but after one or two blasts a new stack was built a mile lower down the stream. The furnace was built for Mordecai Massey and Judge John Gloninger by George Anshutz, who in 1808 became the owner of one-fourth of the property. At the same time George Shoenberger purchased a one-fourth interest. Prior to 1808 Martin Dubbs had become part owner. A forge called Massey, on Spruce creek, was connected with Huntingdon furnace, and was built about 1800. The furnace has been silent since 1870. Tyrone forges, on the Juniata, were built by the owners of Huntingdon furnace, the first of the forges in 1804. In 1832 Gordon, in his *Gazetteer of the State of Pennsylvania*, stated that these forges, with a rolling and slitting mill and nail factory attached, formed "a very extensive establishment," owned by Messrs. Gloninger, Anshutz & Co. "The mill rolls about 150 tons, 75 of which are cut into nails at the works, 50 tons are slit into rods and sent to the West, and about 25 tons are sold in the adjoining counties."

Juniata forge was built at Petersburg about 1804 by Samuel Fahnestock and George Shoenberger, the latter becoming sole owner in 1805. Coleraine forges, on Spruce creek, were built in 1805 and 1809, by Samuel Marshall, an Irishman. There have been many forges on Spruce creek, none of which are now in operation. Union furnace, in Morris township, Huntingdon county, was built by Edward B. Dorsey and Caleb Evans in 1810 or 1811. Pennsylvania furnace, on the line dividing Huntingdon from Centre county, was built by John Lyon, Jacob Haldeman, and William Wallace in 1813. It is now in operation, using coke. About 1818 Reuben Trexler, of Berks county, built a bloomary called Mary Ann, in Trough Creek valley, and about 1821 he added Paradise furnace. In 1832 John Savage, of Philadelphia, built a forge near Paradise furnace, which is said to have been the first forge in this country "that used the big hammer and iron helve on the English plan."

George Shoenberger was born in Lancaster county, and during the closing years of the last century settled on Shaver's creek, in Huntingdon county, as did also his brother Peter. The town of Petersburg was laid out in 1795 by Peter Shoenberger. On September 27, 1800, Peter sold to his brother George the Petersburg tract of land. George Shoenberger died in 1814 or 1815. His only son, Dr. Peter Shoenberger, succeeded him in the ownership of his iron enterprises.

Etna furnace and forge, on the Juniata, in Catharine township, Blair county, were built in 1805 by Canan, Stewart & Moore. John Canan was an Irishman, from Donegal. The furnace was the first in Blair county. Cove forge, on the Frankstown branch of the Juniata, in Blair county, two miles northeast of Williamsburg, was built between 1808 and 1810 by John Royer, who was born in Franklin county in 1779 and died at Johnstown in 1850. Allegheny furnace was built in 1811 by Allison & Henderson, and was the second furnace in Blair county. In 1835 it was purchased by Elias Baker and Roland Diller, both of Lancaster county. The next furnace in Blair county was Springfield, built in 1815 by John Royer and his brother Daniel. Springfield furnace and Cove forge are now owned by John Royer, born in 1799, son of Daniel. The next furnace in this county was Rebecca, built in 1817. It was the first furnace erected by Dr. Peter Shoenberger, who afterwards became the most prominent ironmaster in the state. His other iron enterprises in the Juniata valley and elsewhere were numerous and extensive, and their beginning followed closely upon the building of Rebecca furnace. The Doctor was born at Manheim, Lancaster county, in 1781; died at Marietta, Lancaster county, on June 18, 1854, aged 73 years; and was buried at Laurel Hill cemetery, Philadelphia.

Elizabeth furnace, near Antestown, in Blair county, is said to have been the first in the country to use gas from the tunnel-head for the production of steam. The furnace was built in 1832, and the gas was first used in 1836. The improvement was patented about 1840 by the owner of the furnace, Martin Bell.

A furnace and forge were built at Hopewell, in Bedford county, about the year 1800, by William Lane, of Lancaster county. On Yellow creek, two miles from Hopewell, Mr. Lane built Lemnos forge and slitting mill in 1806. In 1841 Loy & Patterson built Lemnos furnace, on the same creek, two miles west of Hopewell, to use charcoal. The furnace is now abandoned. Bedford forge, also on Yellow creek, was built by Swope & King in 1812. Elizabeth furnace, now Bloomfield, was built at Woodbury, in Bedford county, in 1827, by King, Swope & Co., Dr. Shoenberger being a partner. In 1845 the furnace was removed to Bloomfield, in Bedford county. In 1840 Bedford county, which then embraced Fulton county and a part of Blair county, contained nine furnaces and two forges. Hanover furnace and forge, nine miles below McConnellsburg, in Fulton county, known as the Hanover iron works, were regarded in their day as an extensive enterprise. The forge was built in 1822 by John Doyle, and the furnace in 1827 by John Irvine. Both were abandoned about 1850. There are now no iron enterprises in Fulton county.

Cemented or blister steel was made at Caledonia, near Bedford, for several years before the beginning of this century by William McDermett, who was born near Glasgow, Scotland, and emigrated to this country at the close of the Revolutionary war. Mr. McDermett's works continued in successful operation for about ten years, when financial reverses caused their abandonment. A few years later he removed to Spruce creek, in Huntingdon county, and there ended his days about 1819. Josephine, one of his daughters, married, in 1820, David R. Porter, then a young ironmaster on Spruce creek, but afterwards governor of Pennsylvania. About 1818 David R. Porter and Edward B. Patton built Sligo forge, on Spruce creek. After Mr. McDermett's removal to Spruce creek a forge and steel works, called Claubaugh, were built on the creek by his nephew, Thomas McDermett, at which steel was made by the process that had been in use at Caledonia. These works became the property of Lloyd, Steel & Co. about 1819, by whom they were operated for a few years, when they were abandoned.

There was a very early forge in Juniata county. It was built in 1791 by Thomas Beale and William Sterrett on Licking creek, two miles west of Mifflintown. It had two hammers and was in operation about four years. The pig iron for this forge was mainly obtained from Centre furnace, but some was brought from Cornwall furnace and some from Bedford furnace.

Hope furnace, a few miles from Lewistown, and Freedom forge, three miles from the same place, were built in 1810, and were probably the first iron enterprises within the present limits of Mifflin county. General James Lewis was one of the proprietors of Hope furnace. In 1832 there were three furnaces and one forge in Mifflin county, and in 1850 there were five furnaces and two forges.

The first iron enterprise in Perry county was probably a forge on Cocalamus creek, built in 1807 or 1808 by General Lewis, and operated by him in connection with Hope furnace. It was abandoned about 1817. It had two fires and two hammers, and was called Mount Vernon. Juniata furnace, three miles from Newport, was built in 1808 by David Watts, Esq., an eminent lawyer of Carlisle. In 1832 it was owned by Captain William Power. A forge called Fio was built on Sherman's creek, about four miles from Duncannon, in Perry county, in 1829, by Lindley & Speek. A forge was also built at Duncannon in the same year by Stephen Duncan and John D. Mahon. Duncannon rolling mill was built in 1838 by Fisher, Morgan & Co. Montebello furnace, at Duncannon, was built in 1834; Perry furnace, four miles from Bloomfield, in 1840; Oak Grove, four miles from Landisburg, by Dr. Adam Hayes and his brother John, in 1830; and Caroline, at Bailysburg, in 1833. All of the charcoal furnaces of Perry county have been abandoned.

Many other charcoal furnaces and forges and a few rolling mills were built in the upper part of the Juniata valley before 1850. In 1832 there were in operation in Huntingdon county, which then embraced Blair county, eight furnaces, ten forges, and one rolling and slitting mill. Each of the furnaces yielded from 1,200 to 1,600 tons of iron annually. In the same year an incomplete list enumerated eight furnaces and as many forges in Centre county. In 1850 there were in Huntingdon and Centre counties and in Blair county (formed out of Huntingdon and Bedford in 1846) and in Mifflin county forty-eight furnaces, forty-two forges, and eight rolling mills, nearly all of which were in Huntingdon and Centre. Most of these charcoal furnaces and forges and rolling mills have been abandoned.

Among the persons who have been prominent in the iron manufacture in the Juniata valley special reference may be made, in addition to those who have been mentioned, to Henry S. Spang, of Montgomery county, John Lyon, of Cumberland county, and Anthony Shorb, of Lebanon county.

Most of the iron made in the Juniata valley during the palmy days of its iron industry was sold at Pittsburgh.

Before the completion of the state canal and railroads it was transported with great difficulty. Bar iron from Cent county was at first carried on the backs of horses to the Clarion river, where it was loaded on boats, upon which was floated to Pittsburgh. Pig iron from Huntingdon county was hauled to Johnstown, and thence floated t Pittsburgh in the same manner as the bar iron from Centre county.

THE MANUFACTURE OF CHARCOAL IRON IN WESTERN PENNSYLVANIA.

The first iron manufactured west of the Allegheny mountains is said to have been made in 1790, in Fayett county, Pennsylvania, "in a smith's fire," by John Hayden, of Haydenville, in that county. Taking a sample o horseback to Philadelphia, he enlisted his relative, John Nicholson, of that city, then state comptroller, in a schem for building Fairfield furnace, on George's creek, seven miles south of Uniontown, and the two "then went on t build the furnace," which they completed in 1792. A forge was built about the same time, and probably befor the furnace. In the mean time William Turnbull and Peter Marmie, of Philadelphia, built a furnace and forge o Jacob's creek, a mile or two above its entrance into the Youghiogheny river. The furnace was first blown in o November 1, 1790, and the iron was tried the same day in the forge. The furnace and forge were on the Fayett county side of the creek, and were called the Alliance iron works. The furnace was successfully operated for man years, and the stack is still standing, but in ruins. An extract from a letter written by Major Craig, deput quartermaster-general and military storekeeper at Fort Pitt, to General Knox, dated January 12, 1792, says: "A there is no six-pound shot here, I have taken the liberty to engage four hundred at Turnbull & Marmie's furnace which is now in blast." The firm was dissolved August 22, 1793, Peter Marmie becoming sole owner of the works

John and Andrew Oliphant bought a half interest in Fairfield furnace in 1795, and in a few years they becam its sole owners. Fairchance furnace, on George's creek, six miles south of Uniontown, was built in 1794 by Joh Hayden, William Squire, and Thomas Wynn. J. & A. Oliphant bought it about 1805. It was rebuilt two or thre times, and kept in operation until 1873. A forge was built near the furnace about 1794. The Oliphants buil Sylvan forges, on George's creek, below Fairfield and Fairchance furnaces, to convert their pig-iron product int bar iron.

Union furnace, now Dunbar furnace, was built by Colonel Isaac Meason on Dunbar creek, four miles south o Connellsville, in 1791, and was put in blast in March, 1791. A forge was connected with this furnace. It wa succeeded in 1793 by a larger furnace of the same name, built near the same site by Colonel Meason, John Gibson and Moses Dillon. Another of Colonel Meason's enterprises was Mount Vernon furnace, on Mountz's creek, eigh miles east of its mouth, built before July, 1800. In 1801 it was rebuilt. It is still standing, but abandoned.

In 1805 there were five furnaces and six forges in Fayette county. In 1811 there were ten blast furnaces, on air furnace, eight forges, three rolling and slitting mills, one steel furnace, and five trip-hammers. At a subsequen date there were twenty furnaces in this county. Fayette county was a great iron center at the close of the last and far into the present century. For many years Pittsburgh and the Ohio and Mississippi valleys were almost entirel supplied by it with castings of all kinds, and with pig and bar iron. Long before 1850, however, the fires in mos of its furnaces and forges were suffered to die out. In 1849 only four of its furnaces were in blast. Other furnaces to use coke, have since been built within its boundaries, but its fame as a center of iron production has departed In its stead it now enjoys the reputation of being the center of production of the far-famed Connellsville coke.

The steel furnace above referred to was at Bridgeport, adjoining Brownsville, was owned by Morris Truma & Co., and made good steel. In that year Truman & Co. advertised that they had for sale "several tons of stee of their own converting, which they will sell at the factory for cash, at 12 dollars per cwt., and 20 dollars per fagg for Crowley." The first nail factory west of the Alleghenies was built at Brownsville, before 1800, by Jaco Bowman, at which wrought nails, made by hand, were produced in large quantities.

The rolling and slitting mills which were in existence in Pennsylvania prior to 1816 neither puddled pig iro nor rolled bar iron, but rolled only sheet iron and nail plates with plain rolls from blooms heated in a hollow fir and hammered under a tilt-hammer. Cramer's *Pittsburgh Almanac* for 1812 says that in 1811 there were thre such mills in Fayette county.

The first rolling mill erected in the United States to puddle iron and roll iron bars was built by Colonel Isaa Meason in 1816 and 1817, on Redstone creek, about midway between Connellsville and Brownsville, at a place calle Plumsock, in Fayette county. Colonel Meason had previously erected forges at Plumsock. Thomas C. Lewis wa the chief engineer in the erection of the mill, and George Lewis, his brother, was the turner and roller. They wer Welshmen. The project was conceived by Thomas C. Lewis, and by him presented to Colonel Meason. F. H Oliphant told us in his lifetime that it was built "for making bars of all sizes and hoops for cutting into nails. He said further that "the iron was refined by blast, and then puddled." Samuel C. Lewis, the son of Thomas C Lewis, assisted as a boy in rolling the first bar of iron. He is still living at Pittsburgh, at the age of 80 years. M Lewis informs us that his father and uncle, being skilled workmen, and therefore prohibited by an English statut from leaving their native land, were compelled to resort to artifice to secure their passage across the Atlantic. Th mill contained two puddling furnaces, one refinery, one heating furnace, and one tilt-hammer. Raw coal was use in the puddling and heating furnaces, and coke in the refinery. The rolls were cast at Dunbar furnace, and the lathe for turning the rolls was put up at the mill. The mill went into operation on September 15, 1817, and was kept in operation until 1824, the latter part of the time by a Mr. Palmer. A flood in the Redstone caused the partial destruction of the mill, the machinery of which was subsequently taken to Brownsville.

Colonel Meason, who did so much to develop the iron resources of Fayette county, was a native of Virginia. His wife was a Miss Harrison of that state. He died in 1819.

A furnace named Mary Ann was erected in Greene county at a very early day, about twenty miles from Uniontown, and on the opposite side of Ten-mile creek from Clarksville. It was abandoned long before 1820. An advertisement for its sale, by "Samuel Harper, agent for the proprietors," dated July 23, 1810, called it "The Iron Works," late the property of Captain James Robinson. It was probably built about 1800. Gordon, in his *Gazetteer*, (1832,) says that "there were formerly in operation on Ten-mile creek a forge and furnace, but they have been long idle and are falling to decay." This reference is to Robinson's works. Greene county has probably never had any other iron enterprises within its limits.

The beginning of the iron industry at Pittsburgh was made at a comparatively modern period. George Anshutz, the pioneer in the manufacture of iron at Pittsburgh, was an Alsacian by birth, Alsace at the time being under the control of France. He was born November 28, 1753. In 1789 he emigrated to the United States, and soon afterwards located at a suburb of Pittsburgh now known as Shady Side, where he built a small furnace on Two-mile run, probably completing it in 1792. In 1794 it was abandoned for want of ore. It had been expected that ore could be obtained in the vicinity, but the expectation was not realized, and the expense entailed in bringing ore from other localities was too great. In 1794 the fire of the furnace lighted up the camp of the participants in the whisky insurrection. The enterprise seems to have been largely devoted to the casting of stoves and grates. The ruins of the furnace were visible until about 1850. After the abandonment of his furnace Anshutz accepted the management of John Probst's Westmoreland furnace, near Laughlinstown, and remained there about one year, whence he removed to Huntingdon county, where, in connection with Judge John Gloninger and Mordecai Massey, he built Huntingdon furnace in 1796. He died at Pittsburgh, February 28, 1837, aged 83 years.

In 1807 there were three nail factories in existence at Pittsburgh—Porter's, Sturgeon's, and Stewart's, according to Cramer's *Pittsburgh Almanac*, one of which made 100 tons of cut and wrought nails annually. In 1810 about 200 tons of cut and wrought nails were made at Pittsburgh. In 1813 there were two iron foundries at Pittsburgh—McClurg's and Anthony Beelen's, and one steel furnace, owned by Tuper & McKowan.

The first rolling mill at Pittsburgh was built in 1811 and 1812 by Christopher Cowan, an Englishman. It was called the Pittsburgh rolling mill. This mill had no puddling furnaces, nor was it built to roll bar iron. It was built to manufacture sheet iron, nail and spike rods, shovels, spades, etc. Cramer's *Pittsburgh Almanac* for 1812 says of this enterprise: "Christopher Cowan is erecting a powerful steam-engine, 70-horse power, to run a rolling mill, slitting mill, and tilt-hammer; to make iron, nails, sheet iron, spike and nail rods, shovels and tongs, spades, scythes, sickles, hoes, axes, frying pans, cutting knives, chains, plough irons, hatchets, claw hammers, chizzels, augurs, spinning-wheel irons, and smiths' vises—capital $100,000." This rolling mill stood at the intersection of Penn street and Cecil's alley, where the fourth ward school-house now stands. In 1818 it was owned by Ruggles, Stackpole & Whiting, who failed in 1819. In 1826 it was owned by R. Bowen.

The second rolling mill at Pittsburgh was the Union, on the Monongahela river, built in 1819, and accidentally blown up and permanently dismantled in 1829, the machinery being taken to Covington, Kentucky. This mill had four puddling furnaces—the first in Pittsburgh. It was also the first mill in Pittsburgh to roll bar iron. It was built by Baldwin, Robinson, McNickle & Beltzhoover. It is claimed that the first angle iron rolled in the United States was rolled at this mill by Samuel Leonard, one of its proprietors, who also rolled ell iron for salt-pans. On Pine creek, on the site of the present works of Spang, Chalfant & Co., at Etna, Belknap, Bean & Butler manufactured scythes and sickles as early as 1820, but in 1824 their works were enlarged and steam-power introduced for the purpose of rolling blooms. In 1826 they were operated by M. B. Belknap. They afterwards passed into the hands of Cuddy & Ledlie, and were purchased by H. S. Spang in 1828, to roll bar iron from Juniata blooms. Sligo rolling mill was erected where it now stands by Robert T. Stewart and John Lyon in 1825, but was partly burned down that year. The Juniata iron works were built in 1824 by Dr. Peter Shoenberger. Grant's Hill works were erected in 1821 by William B. Hays and David Adams. They stood near where the court-house now stands. Water for the generation of steam had to be hauled from the Monongahela river. The Dowlais works, in Kensington, were built in 1825 by George Lewis and Reuben Leonard. In 1826 all of these mills did not make bar iron; some only manipulated rolled and hammered iron.

In 1829 Pittsburgh had eight rolling mills, using 6,000 tons of blooms, chiefly from the Juniata valley, and 1,500 tons of pig iron. In the same year there were nine foundries which consumed 3,500 tons of iron. In 1828 the iron rolled was 3,291 tons; in 1829 it was 6,217 tons; and in 1830 it was 9,282 tons. In 1831 there were two steel furnaces at Pittsburgh. Cast iron began to be used in this year for pillars, the caps and sills of windows, etc. In 1836 there were nine rolling mills in operation, and eighteen foundries, engine-factories, and machine-shops. In 1856 there were in Pittsburgh and Allegheny county twenty-five rolling mills.

Clinton furnace, built in 1859 by Graff, Bennett & Co., and blown in on the last Monday of October in th year, was the first furnace built in Allegheny county after the abandonment in 1794 of George Anshutz's furnace Shady Side—a surprisingly long interregnum.

Westmoreland county speedily followed Fayette county in the manufacture of iron. Westmoreland furnac near Laughlinstown, in Ligonier valley, on Four-mile run, was built about 1792 by John Probst, who also built small forge about the same time. Neither the furnace nor the forge was long in operation, both probably ceasin to make iron about 1810. On the 1st of August, 1795, George Anshutz, manager of Westmoreland furnac advertised stoves and castings for sale. General Arthur St. Clair built Hermitage furnace, on Mill creek, tw miles northeast of Ligonier, about 1802. It was managed for its owner by James Hamilton, and made stoves an other castings. It was in blast in 1806. In 1810 it passed out of the hands of General St. Clair, and was idle fo some time. In 1816 it was started again by O'Hara & Scully, under the management of John Henry Hopkins afterwards Protestant Episcopal bishop of Vermont. In October, 1817, Mr. Hopkins left the furnace, himself bankrupt, and it has never since been in operation. The stack is yet standing. General St. Clair died a very poo man in 1818, aged 84 years, and was buried at Greensburg. Mount Hope furnace was built about 1810, in Donega township, by Trevor & McClurg. Mount Pleasant furnace, on Jacob's creek, in Mount Pleasant townshi was built about 1810 by Mr. McClurg, and went out of blast in 1820 while under the control of Mr. Freema Washington furnace, near Laughlinstown, was built about 1809 by Johnston, McClurg & Co. It was abandone in 1826, and rebuilt in 1848 by John Bell & Co. It was in blast as late as 1854. Jonathan Maybury & Co. owne Fountain furnace before 1812. It stood on Camp run, in Donegal township, at the base of Laurel hill. The fir was dissolved on August 19, 1812. Kingston forge, erected in 1811 on Loyalhanna creek, ten miles east o Greensburg, by A. Johnston & Co., went into operation early in 1812. Ross furnace, on Tub-mill creek, i Fairfield township, was built in 1814 by Colonel Meason, and abandoned about 1850. It made pig iron, stoves sugar-kettles, pots, ovens, skillets, etc. Hannah furnace, in Fairfield township, was built about 1810, a shor distance below Ross furnace, on Tub-mill creek, by John Beninger. He also built a small forge on the sam stream, where the borough of Bolivar now stands. Both the furnace and forge ceased to make iron soon after the were built. Baldwin furnace, on Laurel run, near Ross furnace, is said to have been built by James Stewart abou 1810. It ran but a short time.

In 1832 there were in operation in Westmoreland county one furnace, Ross, operated by Colonel Mathiot, an one forge, Kingston, on Loyalhanna creek, operated by Alexander Johnston. The latter gentleman, whose nam appears above in connection with another iron enterprise, was the father of Governor William F. Johnston. H was born in Ireland in July, 1772, and died July 15, 1872, aged 100 years.

Seven other charcoal furnaces in Westmoreland county were built between 1844 and 1855. All of the charcoa furnaces of Westmoreland county have been abandoned. The early Westmoreland furnaces shipped pig iron an castings by boats or arks on the Conemaugh and Allegheny rivers to Pittsburgh, much of which found its way dow the Ohio river to Cincinnati and Louisville.

Shade furnace was built in 1807 or 1808, on Shade creek, in Somerset county, and was the first iron enterpris in the county. It was built by Gerehart & Reynolds upon land leased from Thomas Vickroy. In November, 181 Vickroy advertised the furnace for sale, at a great bargain. A sale was effected in 1819 to Mark Richards, Antho S. Earl, and Benjamin Johns, of New Jersey, constituting the firm of Richards, Earl & Co., who operated th furnace down to about 1830. In 1820 they built a forge called Shade, below the furnace, which was carried on b William Earl for four or five years, and afterwards by John Hammer and others. The furnace was continued, a intervals, by various proprietors to the close of 1858. About 1811 Joseph Vickroy and Conrad Piper built Mar Ann forge, on Stony creek, about five miles below Shade furnace, and a half mile below the mouth of Shade cree David Livingston was subsequently the owner of the forge, and operated it for several years. Richard Geary, th father of Governor John W. Geary, was the millwright who built the forge for the owners. Pig iron was sometime packed on horseback to this forge from Bedford county, the horses taking salt from the Conemaugh salt works, an bar iron, as a return load. In the year 1809 or 1810 Peter Kimmell and Matthias Scott built a forge for th manufacture of bar iron on Laurel Hill creek, now in Jefferson township, in the western part of Somerset count It ceased operations about 1815. Supplies of metal were obtained from Bedford and Fayette counties. About th year 1810 Robert Philson erected a forge and furnace on Casselman's river, in Turkeyfoot township, to use o mined in the immediate vicinity. The enterprise was a failure. Four other charcoal furnaces were afterward built in Somerset county. All of the furnaces and forges in this county have long been abandoned.

The first iron enterprise in Cambria county was a forge at Johnstown, built on Stony creek, about 1809, b John Buckwalter, and subsequently removed to the Conemaugh river, also at Johnstown, where it was operate with more or less regularity down to about 1825. It was used to hammer bars out of Juniata pig iron. In 181 Thomas Burrell, the proprietor, offered wood-cutters "fifty cents per cord for chopping two thousand cords of woo at Cambria forge, Johnstown." About 200 pounds of nails, valued at $30, were made at Johnstown by one esta lishment in the census year 1810. About this time an enterprise was established at Johnstown by Robert Pierso by which nails were cut with a machine worked by a treadle, but without heads, which were afterwards added hand. Cambria county has been noted as an iron center since its first furnace, Cambria, was built by George S. King, David Stewart, John K. Shryock, and William L. Shryock in 1841, on Laurel run. It was followed in the next six years by five other charcoal furnaces. All of these furnaces have been abandoned. The Cambria iron works, at Johnstown, were commenced in 1853 by a company of which Mr. King was the originator and of which Dr. Peter Shoenberger was a member.

The first iron enterprise in Indiana county was Indiana forge, on Finley's run, near the Conemaugh, built about 1837 by Henry and John Noble, who also built a small furnace as early as 1840. The forge was operated by water-power, but the furnace by steam-power. The furnace and forge were both running in the last-named year. Pig iron for the forge was at first obtained from Allegheny furnace, in Blair county. Iron ore for the furnace was obtained from the Allegheny furnace mines. Becoming embarrassed, the firm was succeeded about 1843 by William D. and Thomas McKernan. About 1846 the property passed into the hands of Elias Baker, who built a new furnace and forge. John Noble owned about 1837 a farm of about 200 acres in the heart of the present city of Altoona, which he sold to David Robinson, of Pleasant valley, for $4,500, taking in payment the contents of Mr. Robinson's country store, which he removed to Finley's run and added to the capital stock of the firm of Henry and John Noble. The Altoona farm is now worth many millions of dollars. Three other charcoal furnaces in Indiana county were built in 1846 and 1847. All of the Indiana furnaces and its solitary forge have long been abandoned.

A blast furnace was built at Beaver Falls, on the west side of Beaver river, in Beaver county, in 1802, by Hoopes, Townsend & Co., and was blown in in 1804. A forge was connected with it from the beginning, and was in operation in 1806. The furnace and forge were in operation in 1816. The whole enterprise was abandoned about 1826. The ore used was picked out of gravel banks in the neighborhood in very small lumps. There was another early furnace in this county, named Bassenheim, built in 1814 by Detmar Basse Muller, on Connoquenessing creek, about a mile west of the Butler county line. In February, 1818, $12 per ton was paid for hauling the pig metal made at this furnace to Pittsburgh, thirty miles distant, over a bad road. The furnace was abandoned at an early day. John Henry Hopkins, previously mentioned in connection with General St. Clair's furnace near Ligonier, was engaged about 1815 as a clerk at Bassenheim furnace.

Prior to 1846 there were only a few furnaces in the Shenango valley—all charcoal, one of the oldest of which was Springfield furnace, half a mile from Leesburg and seven miles southeast of Mercer, built in 1837 and active in 1849. Day, in 1843, says: "Two furnaces were wrought formerly, but have since been abandoned." The geographer Joseph Scott says in 1806 that "a forge and furnace are now nearly erected" at New Castle. About 1810 there was a forge on Neshannock creek, "midway between Pearson's flour mill and Harvey's paper mill," for the manufacture of bar iron from the ore. The first rolling mill in Lawrence county was built in 1839 at New Castle by James D. White, of that place, under the superintendence of S. Wilder, a native of Massachusetts. It made bar iron and cut nails, and was subsequently known as Cosalo rolling mill. Orizaba rolling mill, at the same place, was built in 1845 by Joseph H. Brown, Joseph Higgs, and Edward Thomas, who had been employed at the Cosalo mill. In 1846 and soon afterwards several furnaces were built in this valley to use its splint coal in the raw state.

The first furnace in the once important but now nearly neglected ironmaking district composed of Armstrong, Butler, Clarion, Venango, and other northwestern counties, was doubtless Bear Creek, in Armstrong county, commenced in 1818 by Ruggles, Stackpole & Whiting, who then owned the Pittsburgh rolling mill. In the following year, owing to the failure of this firm, it passed uncompleted into the hands of Baldwin, Robinson, McNickle & Beltzhoover, of Pittsburgh. The furnace went into operation in 1819. It was abandoned long before 1850, but was running in 1832, in which year Gordon says it was owned by Henry Baldwin, Esq., and was reputed to be the largest furnace in the United States, having made forty tons of iron in a week. This furnace had a tram-road, with wooden rails, in 1818.

Rock furnace, on Roaring run, a tributary of the Kiskiminetas, four miles east of Apollo, in Armstrong county, was built about 1825 by James W. Biddle, of Pittsburgh, and others. It has been abandoned since 1855. Slippery Rock furnace, in Butler county, and Clarion furnace, in Clarion county, were built in 1828—the latter by Hon. Christian Myers, a native of Lancaster county, who built another furnace about 1844, which he called Polk. Judge Myers was the pioneer in the manufacture of iron in Clarion county, and was a man of great enterprise. Allegheny furnace, at Kittanning, in Armstrong county, and Venango furnace, on Oil creek, in Venango county, were built in 1830. In 1832 the former was owned by A. McNickle, and made about fourteen tons of iron weekly. From 1830 to 1850 this section of the state produced large quantities of charcoal pig iron. In 1850 there were 11 furnaces standing in Armstrong county, 6 in Butler, 28 in Clarion, and 18 in Venango—63 in all. In 1858 there were 18 in Armstrong, 6 in Butler, 27 in Clarion, and 24 in Venango—75 in all. All of these were charcoal furnaces, except four coke furnaces at Brady's Bend. Many of these furnaces had, however, been abandoned at the latter date. Nearly every one has since then been abandoned.

The Great Western iron works at Brady's Bend, embracing a rolling mill, and four furnaces to use coke, were commenced by Philander Raymond in 1840. They have been abandoned for many years. The rolling mill was built in 1841 to roll bar iron, but it afterwards rolled iron rails.

The iron manufactured in the Allegheny valley was taken down the Allegheny river to Pittsburgh on keel-boats and arks, the business of transporting it being quite extensive.

Erie charcoal furnace, at Erie, was built in 1842, and abandoned in 1849. It used bog ore. It was owned by Charles M. Reed. Liberty furnace, on the north side of French creek, in Crawford county, was built in 1842 by Lowry & Co., of Meadville, and abandoned in 1849.

In 1791 there were 16 furnaces and 37 forges in Pennsylvania. In 1816 there were 44 furnaces, 78 forges, and 175 naileries. In 1849 there were 298 furnaces, 121 forges, 6 bloomaries, and 79 rolling mills. Of the furnaces existing in 1849 nearly all were charcoal furnaces, only 57 being anthracite and 11 bituminous coal and coke furnaces. The charcoal iron industry of Pennsylvania still exists in a healthy condition, but its glory has departed. About 1840 a revolution was created in the iron industry of the country, by the introduction of bituminous and anthracite coal in the blast furnace, and since about 1850 the manufacture of charcoal iron in Pennsylvania has declined.

Since about the middle of the last century Pennsylvania, whose early iron history has unavoidably occupied so much of our space, has been the foremost ironmaking state in the Union.

THE EARLY MANUFACTURE OF IRON IN DELAWARE.

In the *Colonial Records of Pennsylvania*, volume I, page 115, mention is made of one James Bowle, "living near iron hill, about eight miles distance from New Castle," in Delaware, in 1684. In Oldmixon's *British Empire in America*, edition of 1708, in referring to New Castle county, then in Pennsylvania, but now in Delaware, it is stated that there is a place in the county "called iron hill, from the iron ore found there," but the existence of an "iron mill," to use the ore, is expressly denied. This "iron hill" is undoubtedly the one referred to in the *Colonial Records* as having been discovered as early as 1684. Mrs. James says that on the 24th of September, 1717, Sir William Keith, governor of Pennsylvania, "wrote to the Board of Trade in London that he had found great plenty of iron ore in Pennsylvania," and Bishop says that "Sir William Keith had iron works in New Castle county, Delaware, erected previous to 1730, and probably during his administration from 1717 to 1726." This enterprise consisted of a furnace and forge, which were located on Christiana creek, and are said to have had a short life. Iron was, however, made in bloomaries on the Christiana and its branches after 1730, and there is a tradition that a furnace was in existence at the foot of "iron hill" after this date. In the gable of an old Baptist church near "iron hill" is a cast-iron plate, dated 1746, which is said to have been cast at this furnace. Among the bloomaries was one on White Clay creek, in New Castle county, owned by John Ball. In the edition of Oldmixon for 1741 the author says that "between Brandywine and Christiana is an iron mill." These references point out with all the exactness that is now possible the character and location and date of erection of the first iron enterprises in the state of Delaware.

Bishop says that in Sussex county, at the southern extremity of Delaware, "where bog ore in the shape of a very pure hydrate, yielding from 55 to 66 per cent. of iron, exists in large beds in the vicinity of Georgetown, and on the branches of the Nanticoke and Indian rivers, the manufacture of iron and castings was carried on before the Revolution to a considerable extent. The compact hydrated peroxide of some of these beds has, since the early part of this century, been raised in quantities for exportation, and the local production of iron is consequently less than it might have been." Tench Coxe, in his report on *The Arts and Manufactures of the United States* in 1810, mentions five forges in Sussex county, which produced in that year 215 tons of iron, but he makes no reference to a blast furnace in the whole state. Bog ore from near Milton, in Sussex county, was at one time taken to Millville, New Jersey, to be smelted in a furnace at that place which was built in 1815. The shipment of this ore ceased about 1853.

About 1820, as we are informed by Judge Caleb S. Layton, of Georgetown, in Sussex county, a blast furnace was established at Millsborough, on the Indian river, about eight miles south of Georgetown, by Colonel William D. Waples and others. In connection with this furnace was a foundry. An interest in the furnace was purchased in 1822 by Hon. Samuel G. Wright, of New Jersey, and in 1830 his son, Colonel Gardiner H. Wright, obtained an interest, and afterwards operated the furnace until 1836, when it went out of blast finally. The foundry continued in operation until 1879. In 1859 Lesley stated that "Millsborough charcoal furnace, owned by Gardiner H. Wright, of Millsborough, Sussex county, Delaware, is the only furnace in the state, and has not made iron for ten years. A cupola furnace is in activity beside it." Francis Vincent, of Wilmington, informs us that the castings for the eastern penitentiary of Pennsylvania, and for Moyamensing prison, and the iron railing which once surrounded Independence Square, in Philadelphia, were cast at Millsborough furnace—presumably at the "cupola furnace." He also informs us that ten or twelve years before the Revolution an English company, under the leadership of Colonel Joseph Vaughan, built a furnace near Concord, in Sussex county. The company had a stone wharf at the head of Nanticoke river, and shipped its iron direct to England. The iron was named "Old Meadow." "The stone wharf is there yet," says Mr. Vincent. Colonel Vaughan commanded one of the Delaware regiments during the Revolution. In 1828 and in the two subsequent years Millsborough furnace and foundry produced 450 tons of pig iron and 350 tons of castings.

A rolling and slitting mill near Wilmington, in Delaware, existing and in operation in 1787 or 1788, has already been referred to in the chapter relating to New York. This mill then rolled and slit Swedish and Russian iron for the use of a New York cut-nail factory. In 1810 there were three rolling and slitting mills in New Castle county

Lesley stated in 1859 that the Delaware iron works, located five miles northwest of Wilmington, owned by Alan Wood, of Philadelphia, and built in 1812, "began to manufacture sheet iron thirty years ago in what had been a nail-plate works. At that time only Townsend in New Jersey made sheet iron." Marshall's rolling mill, on Red Clay creek, two miles west of Newport, was built in 1836. The Wilmington rolling mill, near Wilmington, was built in 1846. The Diamond State rolling mill, at Wilmington, was built in 1854. These were the only rolling mills existing in Delaware in 1859. Others have since been built. The business of iron shipbuilding has been added to the iron industries of Delaware within the last few years.

The iron hill to which reference has been made is situated about twelve miles from Wilmington, and near the Pennsylvania line. Ore taken from this place has been used at Principio furnace, in Cecil county, Maryland, since 1847. This ore has also been used in some furnaces of Pennsylvania. Previous to 1847 the mines had been worked but little. Between 1832 and 1847 some ore was mined here and taken to a furnace in New Jersey.

EARLY IRON ENTERPRISES IN MARYLAND.

In his *Report on the Manufacture of Iron*, addressed to the governor of Maryland in 1840, Alexander gives 1715 as "the epoch of furnaces in Maryland, Virginia, and Pennsylvania." We have seen that this statement is true of Pennsylvania, and there is no reason to believe that it is not substantially true of Maryland. Scrivenor says that in 1718 Maryland and Virginia exported to England 3 tons and 7 cwt. of bar iron, upon which the mother country collected a duty of £6 19*s.* 1*d.* This indicates that iron was made in both of these colonies before that year. In 1719 the general assembly of Maryland passed an act "authorizing 100 acres of land to be laid off to any who would set up furnaces and forges in the province." Other inducements were offered in 1721 and subsequently to those who would engage in the manufacture of iron. The preamble to the act of the general assembly of 1719 recites that "there are very great conveniences of carrying on iron works within this province, which have not hitherto been embraced for want of proper encouragement to *some first undertakers*," which clearly implies that iron enterprises had already been undertaken in Maryland but were not then in operation. Who these "first undertakers" were will presently appear. As a result of the encouragement given by the general assembly, official reports show that in 1749 and again in 1756 there were eight furnaces and nine forges in Maryland, and that on the 21st of December, 1761, there were eight furnaces, making about 2,500 tons of pig iron annually, and ten forges, capable of making about 600 tons of bar iron annually. During the colonial period Maryland had no manufacturing industry worthy of the name except that of iron. Tobacco-growing and wheat-growing formed the principal employment of the people.

The first iron works in Maryland were erected in the northeastern part of the state, in Cecil county. A forge at North East, at the head of North East river, erected previous to 1716, is supposed to have been the pioneer iron enterprise. That iron works were built at North East previous to 1716 is proved by a deed, dated in that year, in which Robert Dutton conveyed a flour mill near the "bottom of the main falls of North East," together with fifty acres of land, to Richard Bennett for £100 in silver money. In this deed "iron works" are mentioned as among the appurtenances which were conveyed by it. They were probably not then active. In 1722 the iron works at North East appear to have been owned by Stephen Onion and Thomas and William Russell. These works embraced only a forge, which was at first probably used only to make iron direct from the ore.

In 1723 John England, acting for the Principio Company, of England, completed and put in blast a furnace at Principio, on Principio creek, which empties into the Chesapeake near the mouth of the Susquehanna, about six miles from North East, in Cecil county. A forge was afterwards erected at Principio. Stephen Onion, Joshua Gee, Joseph Farmer, William Russell, and John Ruston were the original members of the company. The North East and Principio companies appear to have been united about 1722. Stephen Onion and Thomas Russell were the leading spirits in both companies. Henry Whiteley has published an exceedingly full and valuable history of the Principio Company, from which we compile the following interesting details.

The most prominent members of the Principio Company, which existed for about sixty years, were Sir Nicholas Hackett Carew, Bart., of Beddington, Surrey; Thomas Russell, of Birmingham, and his sons, Thomas and William Russell; Stephen Onion; John England; Joshua, Samuel, and Osgood Gee; William Chetwynd, Esq.,—all of England; and Augustine and Lawrence Washington, of Virginia, father and brother of George Washington. In 1724 Stephen Onion and Thomas Russell left their works in charge of John England, a practical ironmaster, and sailed from New Castle for Great Britain, in the same ship with Benjamin Franklin, who says in his autobiography that they were "masters of an iron work in Maryland" and had engaged "the great cabin." Onion soon returned, and in 1726 was in active superintendence at Principio; but Russell remained in England.

Ore for the furnace was at first obtained in the immediate neighborhood, but as early as September 4, 1724, it was obtained from Gorsuch's point, below Canton, on the eastern shore of the Patapsco, about opposite to Fort McHenry. In 1727 the Principio Company, through John England, purchased all the iron ore, "opened and discovered, or shut and not yet discovered," on Whetstone point, at the extremity of which Fort McHenry now stands, for £300 sterling and £20 current money of Maryland. This was for many years one of its principal sources of ore supply.

The company did not confine its operations to Principio and North East. It was early in treaty with Captain Augustine Washington for land in Virginia, at Accokeek, on which to erect a furnace. In February, 1725, the furnace was ready for work, and John Barker, the founder at Principio, was sent there to start it. After Accokeek, Kingsbury furnace was the company's next venture. It was situated on Herring run, at the head of Back river, in Baltimore county. It was built in 1744 and went into blast in April, 1745, producing at the first blast, which lasted till December 18th of the same year, 480 tons of pig iron. The first four blasts embraced the period extending from April 1, 1745, to December 26, 1751, and produced 3,853 tons, or an average of 75 tons per working month. More than 3,300 tons of the iron were shipped to the company in England. In 1751 Lancashire furnace was purchased from Dr. Charles Carroll, of Annapolis. It was located near Kingsbury, on the west side of a branch of Back river, a few miles northeast of Baltimore. The deed embraced 8,200 acres of land, and was "signed" on behalf of the company by Lawrence Washington. Lancashire furnace was operated by the company from the time of its purchase until the Revolution. It was its last acquisition of property in America. At the time of its purchase the company outranked all competitors, being the sole proprietor of four furnaces and two forges, viz: Principio furnace, Cecil county, Maryland, built about 1715; Principio forge at the same place; North East forge, Cecil county, Maryland, built about 1715; Accokeek furnace, Virginia, built in 1725; Kingsbury furnace, Baltimore county, Maryland, built in 1744; Lancashire furnace, Baltimore county, Maryland, purchased in 1751. It owned slaves and live stock in abundance, and its landed estates were of great extent, amounting to nearly thirty thousand acres, exclusive of the Accokeek lands in Virginia. One-half of the pig iron exported to Great Britain from this country is said by Mr. Whiteley to have come from its works.

After 1776 the company had no actual control over any of its American property. Thomas Russell, who had been the company's general manager, continued to operate the furnaces and forges, and supplied bar iron and cannon balls in large quantities to the Continental army. In the Lancashire furnace ledger is an "account of shott made at Lancashire furnace in the year 1776."

In 1780 the general assembly of Maryland passed an act to seize and confiscate all British property within the state, and this was the end of the Principio Company, after an existence of more than sixty years. All the possessions of the company, with two exceptions, passed under the auctioneer's hammer and into new hands. The works at North East were retained by Thomas Russell, one of the company and a son of the first Thomas Russell, who had cast his fortunes with the patriotic cause. The Accokeek lands are supposed to have fallen to "a certain Mr. Washington," who owned a one-twelfth interest in the possessions of the company, and was also a patriot.

From George P. Whitaker we learn that Thomas Russell, at his death in 1786, left a son Thomas, the third of that name. On his arrival at the age of twenty-one, his mother meanwhile having married Daniel Sheredine, he revived the iron industry at North East, with the assistance of Sheredine, and built, in 1802, a furnace which was in operation only four years. Not proving as profitable as had been anticipated, it was blown out on the death of young Thomas Russell, which occurred in 1806.

In 1744 William Black, secretary of the commissioners appointed by Governor Gooch, of Virginia, to unite with those from Pennsylvania and Maryland to treat with the Iroquois, or Six Nations of Indians, in reference to the lands west of the Alleghenies, wrote in his journal, on May 25th, while at North East in Maryland: "I must not forget that in the forenoone the Com'rs and their company went to the Principio iron works, in order to view the curiosities of that place. They are under the management of Mr. Baxter, a Virginian, and was at work forming barr-iron when we came there. For my part I was no judge of the workmanship, but I thought everything appeared to be in very good order, and they are allowed to be as compleat works as any on the continent by those who are judges." This visit was made to North East forge, which, being owned by the Principio Company, formed a part of the "Principio iron works."

Iron works have been almost continuously in operation at Principio and North East since their first establishment, or about one hundred and sixty years. At Principio George P. Whitaker and his associates have had a charcoal furnace in operation since 1837, and at North East, on the very site of the old forge, are the present extensive iron works of the McCullough Iron Company.

Pig iron from Virginia furnaces was taken to the forge at North East, and perhaps to Principio forge, to be refined into bar iron.

About thirty years ago a whole pig of iron was found near the site of the first Principio furnace, which was plainly stamped "Principio, 1727." A few years ago two or three pigs of iron, marked "Principio* 1751," were discovered in the bed of the Patapsco river. All of these relics have been preserved.

A furnace at the mouth of Gwynn's falls, and a forge at Jones's falls, called Mount Royal, were built by the Baltimore Company soon after 1723 and before 1730—Messrs. Carroll, Tasker, and others forming the company.

Stephen Onion severed his connection with the Principio Company and built a furnace and two forges of his own at the head of Gunpowder river, about a mile from Joppa, then one of the principal towns of Maryland, but now wholly deserted. These works were advertised for sale in 1769, after Stephen Onion's death. The exact date of the erection of these extensive works has not been preserved.

Bush furnace, in Harford county, and Northampton furnace, in Baltimore county, were built about 1760—the latter by members of the Ridgely family. The proprietors of this furnace owned a forge on the Great Gunpowder river, called Long Cam forge, which was probably older than the furnace. Bush furnace, located on Bush creek, was owned about 1767 by John Lee Webster. On the Patapsco, near Elkridge Landing, were Elkridge furnace and forge, owned by Edward Dorsey; at a locality not now known was York furnace; in Anne Arundel county were the Patuxent furnace and forge, owned by Thomas, Richard, and Edward Snowden. There was once a furnace on Stemmer's run, about seven miles from Baltimore. There was also a furnace on Curtis creek, in Patapsco county, built by William Goodwin and Edward Dorsey, which remained in operation until 1851. Nottingham furnace, in Baltimore, was built before the Revolution.

In 1762 Robert Evans, Jonathan Morris, and Benjamin Jacobs built Unicorn forge at a place called Nasby, in Queen Ann county. The castings for the forge were procured at "Bush river furnace," which appears to have been then operated by Isaac Webster. The firm of Evans, Morris & Jacobs was not long in existence.

In Frederick county were several early iron enterprises, particulars of which have been preserved by Alexander. Old Hampton furnace, on Tom's creek, about two miles west of Emmetsburg, was built between 1760 and 1765 by persons whose names have not survived. Legh furnace was built about the same time by an Englishman named Legh Master, at the head of Little Pipe creek, two or three miles southwest of Westminster. Both of these furnaces were soon abandoned. Catoctin furnace, situated about twelve miles northwest of Frederick, was built in 1774 by James Johnson & Co. It was rebuilt in 1787 by the same company, "about three-fourths of a mile further up Little Hunting creek, and nearer the ore banks." It was again rebuilt about 1831. We may add that in 1856 a new furnace was built at the same place, called Catoctin No. 2, and in 1874 another furnace was added, called Catoctin No. 3. All of the Catoctin furnaces were in operation in 1880, and all used charcoal, although No. 3 usually uses anthracite and coke. The yield of the first Catoctin furnace was from twelve to eighteen tons of pig iron weekly. Shortly after the erection of the first Catoctin furnace the same owners erected on Bush creek, about two miles above its mouth, the Bush creek forge. The forge was in operation until 1810, when it was abandoned. About the time when Catoctin furnace and Bush creek forge were built the Johnsons built a rolling and slitting mill at a spot known in 1840 as Reel's mill. About 1787 they built Johnson furnace on a small stream one mile above the mouth of the Monocacy. In 1793 the various iron properties belonging to the Johnsons were divided, and Johnson furnace fell to Roger Johnson, who soon afterwards built a forge in connection with the furnace. It was situated on Big Bennett's creek, about five miles above its junction with the Monocacy, and was called Bloomsburg forge. Its weekly product was between four and five tons of finished iron. The furnace and forge were abandoned soon after 1800. Fielderea furnace, on the Harper's Ferry road, three miles south of Frederick, was built by Fielder Gantt shortly after the Revolution, but after making one blast it was abandoned. This event occurred before 1791.

In Washington county there were many iron enterprises at an early day, most of which have been noted by Alexander. In 1770 James Johnson superintended the erection of Green Spring furnace, on Green Spring run, one mile above its entrance into the Potomac. It was owned by a Mr. Jacques and Governor Johnson. The neighboring iron ore not being of good quality, the furnace was abandoned in a few years. James Johnson also built Licking creek forge, near the mouth of Licking creek, for the same firm. It was at first supplied with pig iron from Green Spring furnace, but was afterwards sold to "Mr. Chambers, of Chambersburg, who carried it on for several years with pig supplied from his furnace in Pennsylvania." Mount Etna furnace, on a branch of Antietam creek, five or six miles north of Hagerstown, was built by Samuel and Daniel Hughes about 1770, and was in successful operation for many years. During the Revolution it cast the first Maryland cannon. About a mile and a half from the furnace, and about four miles from Hagerstown, the same owners built Antietam forge, which was in operation after the furnace was abandoned. Bishop states that General Thomas Johnson and his brother were the owners in May, 1777, of a furnace at Frederick, but it was not then in blast. Between 1775 and 1780 Henderson & Ross built a furnace at the mouth of Antietam creek. A forge was built at the same place about the same time. There were at least three forges on Antietam creek during the last century. In 1845 a new furnace was built on the site of the original Antietam furnace, and it is still in operation. A small rolling mill, with a nail factory attached, was built at the same place about 1831 and abandoned about 1853.

Bishop says that a slitting mill was established at or near Baltimore in 1778 by William Whetcroft, and that about the same time two nail factories were established in the city—one by George Matthews and the other by Richardson Stewart. At Elkridge Landing Dr. Howard owned a tilting forge in 1783. On Deer creek, in Harford county, a forge and slitting mill were built during the last century. During the Revolution there were 17 or 18 forges in operation in Maryland, in addition to furnaces and other iron enterprises.

After the Revolution the iron manufacture of Maryland experienced a healthy development, which has continued without serious interruption to the present time. One of the first successful rolling mills in the state was the celebrated Avalon iron works, on the Baltimore and Ohio railroad, half a mile above the Relay House, built about 1796 and in use down to about 1860. It first made nails exclusively, but afterwards it also rolled rails. A rolling mill was built on the Big Elk river, five miles north of Elkton, in 1810, on the site of copper works which had existed before the Revolution. It was active until about 1860, making sheet iron chiefly. Octorara forge and rolling mill, on

Octorara creek, four miles above its mouth and eight miles north of Port Deposit, were built about 1810. These works are still active, and, together with two other Maryland rolling mills of modern origin, are owned by the McCullough Iron Company. The once numerous forges of Maryland have gradually given place to rolling mills. In 1840 several forges were in operation; in 1856 two forges were active, and in 1880 there was only one forge active—the one at North East.

The development of the iron ores belonging to the coal measures of the extreme western part of Maryland appears to have been undertaken about fifty years ago. Near the village of Friendsville, on Bear creek, a branch of the Youghiogheny river, there were erected, in 1828 and 1829, the Yohogany iron works, consisting of a furnace and two forges, to use charcoal. These works were abandoned about 1834. In 1837 a furnace 50 feet high and 14½ feet wide at the boshes was built at Lonaconing, eight miles southwest of Frostburg, by the George's Creek Coal and Iron Company, to use coke. In June, 1839, it was making about 70 tons per week of good foundry iron, with coke as fuel. Overman claims that this was the first successful coke furnace in the United States. Two large blast furnaces were built in 1840 by the Mount Savage Iron Company, nine miles northwest of Cumberland, also to use coke. This enterprise was also successful. In 1845 the same company built an additional furnace, but it was never lined. The Mount Savage rolling mill was built in 1843, especially to roll iron rails, and in 1844 it rolled the first rails rolled in this country. These rails were of the inverted U pattern, and weighed 42 pounds to the yard. Alleghany county, Maryland, is thus entitled to two of the highest honors in connection with the American iron trade. It built the first successful coke furnace and rolled the first heavy iron rails. The furnaces and rolling mill of the Mount Savage Iron Company have long been inactive and abandoned.

In 1846 a furnace called Lena was built at Cumberland, which at first used charcoal and afterwards used coke. It was not long in operation.

Alexander mentions a furnace on the Eastern Shore of Maryland, built in 1830 by Mark Richards, about five miles from Snow Hill, to use bog ore yielding only 28 per cent. of iron. Its annual production about 1834 was 700 tons. In 1840 the furnace was owned by T. A. Spence. It was called Naseongo, and it was the only furnace in the state that used bog ore exclusively or in large quantities. A bloomary which used bog ore once stood near Federalsburg, but it was abandoned long ago.

The prominence of Maryland as an iron-producing state was relatively much greater in 1870 than in 1880. In the former year it was fifth in rank, and in the latter year it was twelfth.

A furnace was built at Georgetown, in the District of Columbia, in 1849, and finally went out of blast about 1855. A second stack was built at the same place, but was never lined and consequently never put in blast. Before 1812 the United States Government built an anchor forge at the navy-yard at Washington, which was enlarged about 1830, and afterwards used to produce anchors, shafts, chains, etc. The District of Columbia never had any other iron enterprises until 1878, when the Government established a small rolling mill at the navy-yard. The forge is still in operation, as is also the rolling mill.

REVIVAL OF THE IRON INDUSTRY IN VIRGINIA.

After the failure to manufacture iron on Falling creek in 1622 no successful effort was made to revive the iron industry in Virginia until after the beginning of the succeeding century—a delay of almost a hundred years. To Colonel Alexander Spotswood, who was governor of Virginia from 1710 to 1723, the honor of having established the iron industry of the colony on a firm and permanent basis is fairly due, although the exact date of the commencement of the various iron enterprises is lost. We are indebted to the researches of R. A. Brock, Esq., of Richmond, for the following information concerning the inception of Governor Spotswood's schemes to effect a revival of the iron industry in Virginia.

In the collections of the Virginia Historical Society are two MS. volumes of the letters of Governor Spotswood to the lords commissioners the council of trade at London, covering the period from 1710 to 1721. On October 24, 1710, the Governor writes: "There is a project to be handed to the next assembly for improvement of the iron mines, lately discovered in this country, the ores of which upon tryall have been found to be extraordinary rich and good. It is proposed that the work be carried on at publick charge." This scheme appears not to have been acted upon by the assembly. On December 15, 1710, the Governor writes: "I humbly propose to your lordships' consideration whether it might not turn to good account if her majesty would be pleased to take that work [the iron] in her own hands, sending over workmen and materials for carrying it on." He states that the "iron mines lie at the falls of James river." On January 27, 1714, he asks that the German Protestants settled at the head of the Rappahannock river, who came over with Baron de Graffenreidt "in hopes to find out mines," be exempted from the payment of levies for the support of the government. In the latter part of 1716 lengthy charges for malfeasance in office were anonymously preferred against Governor Spotswood to the council of trade, the counts of which are numerous. In one of them Governor Spotswood is charged, under pretense of guarding the frontiers, with building, at the cost of the government, two forts, one at the head of James river and another at the head of Rappahannock river, only to support his two private interests, at least one of which, that on the Rappahannock, related to the manufacture of iron. Another account charges the maintenance at public cost, at these forts, of "rangers," for three years ending in December, 1716. The beginning of this period would be near that of the German settlement, the members of which were the operatives of Governor Spotswood. It may be assumed that some of his iron enterprises were in operation certainly in 1716, and most likely two years earlier.

In 1727 the general assembly of Virginia passed "an act for encouraging adventurers in iron works," which begins as follows: "Whereas, divers persons have of late expended great sums of money in erecting furnaces and other works for the making of iron in several parts of the country, . . . and forasmuch as it is absolutely necessary for roads to be laid out and cleaned from all such iron works to convenient landings," etc.

In *A Progress to the Mines*, by Colonel William Byrd, of Westover, Virginia, written in September, 1732, is given a full account of the iron enterprises of Virginia at that time. They embraced three blast furnaces and one air furnace, but no forge. One of the blast furnaces was at Fredericksville, a village which has disappeared from the maps, but which was located about twenty-five miles south of Fredericksburg, in Caroline county or Spottsylvania county. Mr. Chiswell, the manager, told Colonel Byrd that the pig iron produced at the furnace was carted twenty-four miles over an uneven road to the Rappahannock river, about a mile below Fredericksburg. This furnace was built of brick, but it had been idle "ever since May, for want of corn to support the cattle." Colonel Byrd says: "The fire in the furnace is blown by two mighty pair of bellows, that cost £100 each, and these bellows are moved by a great wheel of 26 foot diameter." The owners of the furnace had invested about £12,000 in land, negroes, cattle, etc., and had made 1,200 tons of iron. "When the furnace blows it runs about 20 tons a week." Colonel Byrd says the company was formed as follows: "Mr. Fitz Williams took up the mine tract, and had the address to draw in the Governor, [Spotswood,] Captain Pearse, Dr. Nicolas, and Mr. Chiswell to be jointly concerned with him, by which contrivance he first got a good price for the land, and then, when he had been very little out of pocket, sold his share to Mr. Nelson for £500, and of these gentlemen the company at present consists. And Mr. Chiswell is the only person amongst them that knows anything of the matter." One of the mines attached to the furnace was fifteen or twenty feet deep, and the ore was dislodged by blasting, after which it was carried away "in baskets up to the heap." It was calcined before being used, a layer of charcoal and ore alternating. The limestone used at the furnace was brought from Bristol as ballast, and carted from the Rappahannock to the furnace by the ox teams which brought down the iron. Colonel Byrd recommended the substitution of oyster shells for limestone, but without effect.

The next furnace visited by Colonel Byrd was directly controlled by Colonel Spotswood, and was situated in Spottsylvania county, about twenty miles southwest of Fredericksburg, and about thirteen miles from Germanna. This last place was situated in Orange county, on the south side of the Rapidan, and about fourteen miles distant from its junction with the Rappahannock. It had been settled by Germans and afterwards abandoned for another location on "land of their own, ten miles higher, in the Fork of Rappahannock." The furnace, according to Colonel Spotswood, was the first in Virginia. It was built of rough stone, "having been the first of that kind erected in the country." The iron made at this furnace was carted 15 miles to Massaponux, on the Rappahannock, five miles above Fredericksburg, where Colonel Spotswood had recently erected an air furnace, which he "had now brought to perfection, and should be thereby able to furnish the whole country with all sorts of cast iron, as cheap and as good as ever came from England." The blast furnace "had not blown for several moons, the Colonel having taken off great part of his people to carry on his air furnace at Massaponux." "Here the wheel that carried the bellows was no more than 20 feet diameter." The ore at this furnace was also blasted with gunpowder. "All the land hereabouts seems paved with iron ore, so that there seems to be enough to feed a furnace for many ages."

Colonel Byrd next mentions "England's iron mines, called so from the chief manager of them, tho' the land belongs to Mr. Washington." These mines he states were on the north side of the Rappahannock river, "not far from a spring of strong steel water," which was in King George county, twelve miles distant from Fredericksburg. Two miles distant from the mines was a furnace. "Mr. Washington raises the ore, and carts it thither for 20 shillings the ton of iron that it yields. The furnace is built on a run, which discharges its waters into Potomeck. And when the iron is cast they cart it about six miles to a landing on that river. Besides Mr. Washington and Mr. England there are several other persons in England concerned in these works. Matters are very well managed there, and no expense is spared to make them profitable, which is not the case in the works I have already mentioned." This was Accokeek furnace, already referred to in the Maryland chapter as forming one of the possessions of the Principio Company. It was situated in Stafford county. The "Mr. Washington" referred to was Augustine Washington, the father of George Washington.

Colonel Byrd did not visit Accokeek furnace. He visited Colonel Spotswood's air furnace at Massaponux, which he fully describes. It was a very ambitious and creditable enterprise, and appears to have been successfully managed. Colonel Spotswood used it "to melt his sow iron, in order to cast it into sundry utensils, such as backs for chimneys, andirons, fenders, plates for hearths, pots, mortars, rollers for gardeners, skillets, boxes for cart wheels, and many other things. And, being cast from the sow iron, are much better than those which come from England, which are cast immediately from the ore for the most part." "Here are two of these air furnaces in one room, that so in case one want repair the other may work, they being exactly of the same structure." Colonel Spotswood informed Colonel Byrd that Robert Cary, of England, was a silent partner of his in all his iron enterprises.

The connection of the Washington family with the iron industry of Virginia and Maryland justifies further reference to the Accokeek furnace. As has been stated in the chapter relating to Maryland, the furnace was ready for work in February, 1725. Custis, in his *Recollections*, relates that Augustine Washington, after the burning of his house in Westmoreland, removed with his family to a situation near Fredericksburg, on the Rappahannock, where he became connected with the Principio Company. Colonel Byrd has partly explained the nature of this connection. Mr. Whiteley tells us that Accokeek became a valuable property. In 1750 it sent to the company in England 410 tons of pig iron, about one-sixth of the entire quantity exported from Maryland and Virginia in that year. Augustine Washington, at his death in 1743, left the estate afterwards known as Mount Vernon, and his share, one-twelfth, in the Principio Company, to his son Lawrence, an elder half-brother of George Washington. Lawrence died in 1752.

We have examined the will of Lawrence Washington, of Fairfax county, Virginia, as it is recorded in Albert Welles's *History of the Washington Family*. It is dated June 20, 1752. We make the following literal extract: "I give and bequeath to my daughter Sarah, . . after my just debts are discharged, all my real and personal estate in Virginia and the Province of Maryland, not otherwise disposed of. But in case it should please God my said daughter should die without issue, it is then my will and desire that my estate, both real and personal, be disposed of in the following manner. First. I give and bequeath unto my loving brother Augustine Washington and his heirs forever all my stock, interest, and estate in the Principio, Accokeek, Kingsbury, Laconshire, & No. East iron works, in Virginia and Maryland, reserving one-third of the profits of the said works to be paid my wife as hereafter mentioned." George Washington was one of the executors of this will. Sarah did not long survive her father, and upon her death Augustine Washington succeeded to the ownership of his iron interests, and George Washington succeeded to the ownership of Mount Vernon. Mr. Whiteley tells us that it was at the solicitation of Augustine Washington, "in behalf of himself and other adventurers in iron works," that in 1757 the Virginia Council remitted the port duties and fees on pig and bar iron imported into that province from Maryland. He also states that Accokeek furnace was abandoned soon after Lawrence Washington's death, owing to the failure of a supply of ore within a reasonable distance. In 1753 the slaves, horses, cattle, and wagons were sold, and affairs were gradually closed up until nothing but the real estate was left, of which Augustine Washington doubtless afterwards became sole owner.

Mr. Brock writes us that, in *Hening's Statutes*, volume ix, pp. 303–4, in May, 1777, there is "an act for the encouragement of iron works," which recites that, "Whereas, the discovery and manufacturing of iron ore requisite for the fabricating the various implements of husbandry, small arms, intrenching tools, anchors, and other things necessary for the army and navy, is at this time essential to the welfare and existence of this state, as the usual supplies of pig and bar iron from foreign states is rendered difficult and uncertain, and James Hunter, near Fredericksburg, hath erected and is now carrying on, at considerable expense and labour, many extensive factories, slitting, plating, and wire mills, and is greatly retarded through the want of pig and bar iron; and whereas, there is a certain tract of land in the county of Stafford, called or known by the name of Accokeek furnace tract, on which a furnace for the making of pig iron was formerly erected and carried on, which has been since discontinued." The act goes on to authorize James Hunter to enter upon two hundred acres of the Accokeek tract, including the old furnace, if its owners or agents should fail in one month to begin and within six months to erect thereon a furnace equal to or larger than the former one, and prosecute the same for the making of pig iron and other castings.

Mr. Chisholm told Colonel Byrd that "we had as yet no forge erected in Virginia, tho' we had four furnaces. But there was a very good one set up at the head of the bay in Maryland, that made exceeding good work." The forge referred to was probably the one at North East. Colonel Spotswood told Colonel Byrd that "he was not only the first in this country, but the first in North America, who had erected a regular furnace; that they ran altogether upon bloomerys in New England and Pennsylvania till his example had made them attempt greater works." The correctness of this statement cannot be maintained, nor can that of Colonel Byrd, made doubtless on the authority of Colonel Spotswood, that the furnace near Germanna was the first furnace in the country that was "built of rough stone."

In the valley of Virginia many furnaces and forges were built prior to the Revolution, and others were built before the close of the century. Zane's furnace and forge, on Cedar creek, in Frederick county, are said to have been the first iron works in the valley. Pine forge, in Shenandoah county, three and a half miles north of New Market, was built in 1725, according to Lesley. Isabella furnace, on Hawksbill creek, near Luray, in Page county, was built in 1760. In Augusta county, fifteen miles north of Staunton, a forge was built in 1757 on Mossy creek, and on the same stream a furnace was built in 1760.

Union forge, near Waynesborough, in Augusta county, was built about 1800. In Rockbridge county were two forges, built about 1800—Gibraltar forge, on North river, nine miles north of Lexington, and Buffalo forge, on Buffalo creek, the same distance south of Lexington. Moore's furnace, on Steele's creek, in this county, and a furnace on Smith's creek, in Rockingham county, were built before 1800.

A furnace was built in Loudon county before 1800, concerning which Bishop states that Mr. Clapham, its owner, "cut a canal through the end of Cotocktin mountain, 500 feet through solid rock and 60 feet beneath the surface, to obtain water for his furnace and mill."

Iron works were erected in Craig, Grayson, Wythe, Washington, Carroll, and other southwestern counties about the close of the last century. A forge on Chestnut creek, in Carroll county, was built about 1790, and another on Little Reed Island creek was built about the same time.

Bishop says that an excellent air furnace was built at Westham, six miles above Richmond, on the north side of the river, during the Revolution; there was also a cannon foundry here at the same period. Benedict Arnold destroyed the works at Westham in 1781. A rolling and slitting mill was afterwards built at Westham, which was probably the first in the state. The Government armory at Harper's Ferry was established in 1798.

At Lynchburg and in its vicinity, in the James River valley, several furnaces and forges were built in the last century, some of which are referred to in the following extract from Jefferson's *Notes on the State of Virginia*, written in 1781 and 1782, but not printed until 1788.

> The mines of iron worked at present are Callaway's, Ross's, and Ballendine's on the south side of James river; Old's on the north side, in Albemarle; Millar's in Augusta, and Zane's in Frederick. These two last are in the valley between the Blue ridge and North mountain. Callaway's, Ross's, Millar's, and Zane's make about 150 tons of bar iron each in the year. Ross's makes also about 1,600 tons of pig iron annually; Ballendine's, 1,000; Callaway's, Millar's, and Zane's, about 600 each. Besides these, a forge of Mr. Hunter's, at Fredericksburg, makes about 300 tons a year of bar iron, from pigs imported from Maryland; and Taylor's forge, on Neapsco of Patowmac, works in the same way, but to what extent I am not informed. The indications of iron in other places are numerous, and dispersed through all the middle country. The toughness of the cast iron of Ross's and Zane's furnace is very remarkable. Pots and other utensils cast thinner than usual, of this iron, may be safely thrown into or out of the wagons in which they are transported. Salt-pans made of the same, and no longer wanted for that purpose, cannot be broken up, in order to be melted again, unless previously drilled in many parts.
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> In the western country we are told of iron mines between the Muskingum and Ohio; of others on Kentucky, between the Cumberland and Barren rivers, between Cumberland and Tanissee, on Reedy creek, near the Long island, and on Chestnut creek, a branch of the Great Kanhaway near where it crosses the Carolina line. What are called the iron-banks, on the Mississippi, are believed, by a good judge, to have no iron in them. In general, from what is hitherto known of that country, it seems to want iron.

This account by Jefferson seems to establish the fact that the iron industry of Virginia was not very extensive just after the close of the Revolution. Ross's works were on Beaver creek, seven miles southeast of Lynchburg, and Thomas Callaway's were near Rocky Mount, or Franklin court-house. Lesley mentions Saunders's furnace at the latter place as having been abandoned about 1800. Miller's works were near the northern boundary of Augusta county, "at the foot of North mountain." About 1790 the iron industry of Virginia took a fresh start, as did many other manufactures of the state. This activity continued for many years, but it was partly checked in subsequent years by the greater attention given by the people of Virginia to agricultural pursuits.

No state in the Union gave more attention to domestic manufactures after the close of the Revolution than Virginia. Richmond, Lynchburg, Staunton, Winchester, and some other places became noted for the extent and variety of their manufactures. Household manufactures were also everywhere cultivated. The manufacture of nails was one of these household industries. Thomas Jefferson required about a dozen of the younger slaves owned by him to make nails, and it is said that "they made about a ton of nails a month at a considerable profit."

Lesley enumerates no less than 88 charcoal furnaces and 59 forges and bloomaries as having been built in Virginia prior to 1856; also 12 rolling mills. Several of these various enterprises were within the limits of the present state of West Virginia. The furnaces were located in 31 counties and the forges in 25 counties.

The first rolling mill of any kind west of the Allegheny mountains of which we can obtain exact information was located in West Virginia, and is described in Cramer's *Pittsburgh Almanac* for 1813, issued in 1812, as follows: "Jackson & Updegraff, on Cheat river, have in operation a furnace, forge, rolling and slitting mill, and nail factory—nails handsome, iron tough." Like all the rolling and slitting mills of that day, the Cheat river mill did not puddle iron nor roll bar iron, but rolled only sheet iron and nail plates. Hon. James Veech informed us in his lifetime that its location was on the road from Uniontown to Morgantown, about three miles south of the Pennsylvania state line, and eight miles north of Morgantown. In the old days before the civil war Wheeling was the center of the rolling-mill industry of Virginia, having seven of the twelve rolling mills in the state. Of the remaining five mills, four were in Richmond and one was on Reed creek, in Wythe county, twelve miles east of Wytheville. Since the war two rolling mills have been established at Lynchburg, and new mills have been built at Wheeling.

A large number of the furnaces and forges of Virginia were abandoned before 1850. In 1856 there were 39 charcoal furnaces and 43 forges enumerated by Lesley as being then in operation or prepared to make iron. Since 1856 many of the charcoal furnaces and most of the forges which were then in existence have been abandoned. Insufficient transportation facilities, coupled with the failure of ore in certain localities, have had much to do with the abandonment of many charcoal furnaces in Virginia, while the disappearance of the forges is attributable to other well-known causes. Of late years, however, the extension of railroads and the discovery of new and valuable ore deposits have given a fresh impetus to the manufacture of pig iron in Virginia and West Virginia, much of which is made with coke, West Virginia supplying an excellent quality of this fuel. The future of the iron industry of these two states is to-day very promising. The young state, however, in both 1870 and 1880 took higher rank among iron-producing states than the old state. It ranked tenth in 1870 and seventh in 1880; whereas Virginia ranked thirteenth in 1870 and sixteenth in 1880.

THE MANUFACTURE OF IRON IN NORTH CAROLINA.

Scrivenor says that in 1728–'29 there were imported into England from "Carolina" 1 ton and 1 cwt. of pig iron, and that in 1731 there were imported 2 qrs. and 12 lbs. of bar iron. Shipments of pig iron and bar iron from "Carolina" were made in subsequent years down to the Revolution. It is a curious fact that hoes made in Virginia and "Carolina" were sold in New York several years before the Revolution.

Bishop says that several iron works were in operation in North Carolina before the Revolution, some of which were put out of blast by that event. They were situated on branches of the Cape Fear, Yadkin, and Dan rivers. When the shadow of the approaching conflict with the mother country reached North Carolina, her patriotic citizens, first in convention at New Berne and afterwards in the provincial legislature, encouraged, by the offer of liberal premiums, the manufacture of crude and finished iron and steel, as well as other manufactured products. "John Wilcox was the proprietor of a furnace and iron works on Deep run in the beginning of the war. There were also iron works in Guilford county, probably on the same stream. In April, 1776, the provincial congress sent commissioners to treat with Mr. Wilcox for the use of his furnace and works for two years, or to purchase and repair those in Guilford, for casting ordnance, shot, etc., and empowered them to draw on the treasury for £5,000 for that purpose." Buffalo Creek furnace and forge were also built before the war on Buffalo creek, in Cleveland county, not far from King's mountain, on the southern border of the state.

Prior to 1800 there were in operation in Lincoln county four forges, two bloomaries, and two furnaces. One of the furnaces, Vesuvius, on Anderson's creek, built in 1780, was in operation down to 1873. Of other iron enterprises established in North Carolina in the last century we condense from Lesley and Bishop the following information: Union bloomary forge, on Snow creek, in Stokes county, six miles northeast of Danbury, was built in 1780. Iron works were built on Snow creek, also in the same county, and were conducted with spirit about 1790. Keyser's bloomary forge, on the headwaters of Town fork, in the same county, ten miles southwest of Danbury, was built in 1796. Hill's bloomary forge, on Tom's creek, in Surry county, nineteen miles west of Danbury, was built in 1791. In the same county, near the Yadkin, iron works were erected a few years after the Revolution, probably by Moravians from Pennsylvania, who had settled in the county as early as 1753. In Wilkes county a forge was built about the same time. A furnace and forge were erected on Troublesome creek, in Rockingham county, at an early day. In Burke county, at the foot of the Blue ridge, two bloomaries and two forges were erected before the close of the last century.

After 1800 the iron industry of North Carolina was still further developed. This development was, however, mainly confined to the manufacture of iron in bloomaries, the magnetic and hematite ores of the state being well adapted to this primitive mode of treatment. In 1810, according to Tench Coxe, there were six bloomaries, two rolling and slitting mills, and two naileries in Lincoln county; one bloomary in Iredell county; six bloomaries and one trip-hammer in Burke county; and five bloomaries in Surry county—eighteen bloomaries in all. In 1856 Lesley enumerated about forty bloomaries and a few forges, most of which were then in operation. The *trompe*, or water-blast, was in general use. He also described six furnaces: Vesuvius, already referred to; Madison, on Leiper's creek, in Lincoln county, built in 1810; Rehoboth, on the same creek and in the same county, built in 1810; Columbia, seven miles west of High Shoals, in Gaston county, then in ruins; Tom's Creek, near Hill's forge, on Tom's creek, destroyed by a flood in 1850; Buffalo creek, already referred to, and then in ruins. Vesuvius, Madison, and Rehoboth were blown with wooden "tubs." There was also active at this date a small rolling mill on Crowder's creek, in Gaston county, a mile and a quarter north of King's mountain, owned by Benjamin F. Briggs, of Yorkville, South Carolina, and built in 1853. At the same time another small rolling mill and forge, known as High Shoals iron works, and situated in Gaston county, were in ruins.

At least two furnaces were built in North Carolina during the civil war, one in Chatham and one in Lincoln county, and two were built in Chatham county after the war, but of these four furnaces, and Vesuvius, Madison, and Rehoboth, all of which are still standing, as may possibly be one or two other furnaces, not one has made a pound of iron since 1877. Of the long list of bloomaries and forges which the state could once boast, less than a dozen are now active, and there is not to-day a rolling mill or steel works in the state.

THE MANUFACTURE OF IRON IN SOUTH CAROLINA.

If the iron industry of North Carolina has declined in late years, that of South Carolina has suffered a worse fate; it has been an extinct industry for many years. Yet this state made some iron as early as the Revolutionary period, and subsequently it made iron in considerable quantities. In the northwestern part of South Carolina, including the counties of Union, Spartanburg, and York, are deposits of magnetic ores, and here, according to Dr. Ramsay, quoted by Bishop, the first iron works in the state were erected by Mr. Buffington in 1773, but they were destroyed by the Tories during the Revolutionary war.

At the beginning of the Revolution South Carolina followed the example of many other colonies by offering liberal premiums to those who would establish iron works, but we do not learn that the manufacture of iron was thereby increased. Mr. Buffington's experience probably deterred others from embarking in the business.

Several furnaces and forges were erected in this state a few years after the peace, the principal of which were the Era and Etna furnaces and forges in York county. The Era was built in 1787 and the Etna in 1788. These enterprises were situated on a creek flowing into the Catawba river, and about two miles west of it. In 1795 the nearest landing to these works was at Camden, seventy miles below. They were on the road leading from Charlotte, in North Carolina, to Yorkville. Iron ore was abundant in the neighborhood, and was easily smelted after having been roasted. "It was obtained, massive, in such quantity above the surface that it was thought there would be no occasion to resort to shafts or levels for half a century." William Hill was one of the principal owners of the works. He is said to have devised "a new blowing apparatus," by the aid of which he contrived to blow "all the fires, both of the forges and furnaces, so as to render unnecessary the use of wheels, cylinders, or any other kind of bellows." This apparatus was undoubtedly the *trompe*, or water-blast, but Mr. Hill did not invent it, nor was he the first in this country to use it. The statement, which Bishop quotes from some unknown authority, is, however, valuable, as it contains one of very few references to the use of the *trompe* in blowing a blast furnace in this country that have come under our notice. Bishop says that other iron works soon followed those of Mr. Hill, and that "they were erected in different places, including several in the mountain district of Washington, where iron, the only article made for sale to any extent, was manufactured, at the beginning of this century, as cheap and good as the imported."

In 1810 Tench Coxe enumerates two bloomaries in Spartanburg county, four in Pendleton county, two in Greenville county, and one in York county—nine in all. He also mentions one small nailery and one small steel furnace in the state. He makes no reference to blast furnaces.

Scrivenor mentions the following iron enterprises in South Carolina as existing apparently about 1815: "On Allison's creek, in York district, there are a forge, a furnace, a rolling mill for making sheet iron, and a nail manufactory. On Middle Tiger river are iron works on a small scale; also on the Enoree river and Rudy river, on the north fork of Saluda river, on George's creek, and on Twenty-six-mile creek. In 1802 an air-furnace was erected on a neck of land between Cooper and Ashley rivers, where good castings are made." (York district is the same as York county, the subdivisions of South Carolina having been known as districts down to 1868.)

In 1856 South Carolina had eight furnaces—one in York, one in Union, and six in Spartanburg county. They are described by Lesley. Four of these furnaces were then in operation, producing in the year named 1,506 tons of charcoal iron, but three others had been "out of repair for twenty years," and the remaining furnace had been abandoned. In 1856 there were also three small rolling mills in the state—one on Pacolet river, in Spartanburg county; one on Broad river, in Union county; and one on the same river, in York county. At the first two of these mills dry wood was used in the puddling and heating furnaces. In 1856 the three mills made 1,210 tons of bar iron and nails. In the same year there were also in South Carolina two bloomaries—one connected with the rolling mill in Union county, and the other connected with the rolling mill in York county. Their joint product was 640 tons of blooms. But South Carolina no longer makes iron. Every iron-producing establishment in the state is to-day silent, and has been silent for many years, and all are in a more or less dilapidated condition. South Carolina furnishes the only instance in the history of the country of a state having wholly abandoned the manufacture of iron.

THE EARLY MANUFACTURE OF IRON IN GEORGIA.

Georgia is the last of the original thirteen colonies whose iron history remains to be noticed. Unlike its sister colonies, however, Georgia has no colonial iron history. It was the last of the thirteen to be settled, and it was not until within a few years of the commencement of the Revolutionary struggle that the few settlements on the coast began to experience even moderate prosperity. After the close of the Revolution the settlement of the interior was for many years retarded by difficulties with the Indians, and it was not until 1838 that the Cherokees were induced to surrender their claims to a portion of the territory of the state. It will be seen that, under the circumstances which have been mentioned, the manufacture of iron in Georgia was destined to be the result entirely of comparatively modern enterprise.

In 1810 there was a bloomary in Warren county, a forge in Elbert county, and a nailery in Chatham county. These enterprises were on or near the Atlantic coast, and were doubtless among the first of their kind in the state, if they were not, indeed, the very first. Sequee bloomary forge, three miles south of Clarksville, in Habersham county, was built about 1830, and abandoned about 1835. Hodge's forge, in the same county, was probably built at an earlier date. Lesley says of it: "Situation unknown; history unknown; abandoned very long ago." The coast sections of Georgia did not possess ample resources for the manufacture of iron. No iron industry exists there to-day.

Old bloomary forges in Cass county, now Bartow county, were built as follows: Etowah, No. 1, in 1838; Etowah, No. 2, in 1841; Allatoona, about 1846. Ivy Log bloomary, in Union county, was built about 1839. Alicalsie bloomary, in Murray county, was built about 1843. A bloomary was built on Armuchy creek, in Walker county, about 1848. Lookout bloomary, in Dade county, was built at an earlier day. All of these enterprises were abandoned before 1856, in which year, however, several other bloomaries of more recent origin were in operation. In 1880 only two bloomaries in the state were reported to be in use. One forge, at Allatoona, made blooms from scrap iron in that year.

The first furnace in Georgia of which we have any account was Sequee furnace, built prior to 1832, near Clarksville, in Habersham county, and abandoned in 1837. Etowah furnace, on Stamp creek, in Cass county, now Bartow county, was built in 1837, abandoned in 1844, and torn down in 1850. A new furnace, built by its side in 1844, is now in ruins. Allatoona furnace, in Cass county, built in 1844; Union furnace, in the same county, built in 1852; Lewis furnace, in the same county, built about 1847; and Cartersville furnace, in the same county, built in 1852, have been abandoned. Clear Creek furnace, in Walker county, built about 1852, and rebuilt in 1857, has also been abandoned. All of these were charcoal furnaces. Of the furnaces existing in Georgia in 1880 Bartow county contained five charcoal furnaces and two coke furnaces—seven in all. Of these, the two Bear Mountain charcoal furnaces, built in 1842, were the oldest. Four other furnaces in the state were situated in Polk, Floyd, and Dade counties—two in Polk and one in Floyd using charcoal, and one in Dade using coke. Rising Fawn furnace, in Dade county, is 63 feet high by 16 feet wide at the boshes, and was the first furnace in the United States to use the Whitwell hot-blast stove, blowing in for the first time on June 18, 1875.

Georgia had two rolling mills in 1859—Etowah, in Cass county, built about 1849, and Gate City, at Atlanta, built in 1858. It is a curious fact that the state had just two rolling mills twenty-one years later, in 1880,—Atlanta, built in 1865, and Rome, built in 1869. The latter has been idle for several years. Lesley, in 1859, thus describes the Etowah rolling mill and its blast furnace and other connections, situated on the Etowah river: "This property has been building up and developing for twelve years. On it there has been expended $250,000. It contains a rolling mill, nail and spike factory, and all necessary apparatus; a blast furnace and foundry, with full equipment; a wheat mill (150 to 250 bushels per day), warehouse, cooper-house, hotel, and operative houses, two corn grist mills, two saw mills, and a coal mine; all using not one-tenth of the water-power on the premises. River 600 feet wide. Iron ore and wood are abundant. It is on the metamorphic rocks of the gold and copper belt, both minerals being found on it," etc.

Notwithstanding the decadence of its bloomaries, and the slow progress it has made in building up a rolling-mill industry, Georgia possesses to-day a very promising blast-furnace industry, which has been almost wholly rehabilitated during the past decade.

THE EARLY MANUFACTURE OF IRON IN KENTUCKY.

The first iron enterprise in Kentucky is said by Lesley to have been Slate furnace, erected by government troops in 1791 on Slate creek, a branch of Licking river, in Bath county, then Bourbon. It was successfully operated until 1838. This is the only furnace in Kentucky whose history can be definitely traced back to the last century. It will be remembered that Jefferson, in the extract from his *Notes on the State of Virginia*, already quoted, says that there were iron mines "on Kentucky, between the Cumberland and Barren rivers," and also "between Cumberland and Tanissee." It is probable that about the year 1800 there were a few bloomaries in eastern Kentucky, to supply local wants for bar iron, and possibly Slate furnace was not the only furnace that supplied castings to the Kentucky pioneers in the last century.

The original of the following memorandum was handed to the editor of the Portsmouth (Ohio) *Tribune* in 1880 by Mr. L. C. Robinson. It refers to a furnace in Kentucky called Bourbon, but which was probably the same as Slate furnace.

> KENTUCKY, *ss:* Memorandum of an Agreement made and Concluded upon this day between John Cockey Owings & Co., in Iron Works at the *Bourbon* Furnace of the one part, and Robert Williams (potter) of the other part. Witnesseth that the aforesaid Company doth this day agree to give the said Williams five pounds p month for three months' work and to find him provisions during the time he shall work until the three months are expired, and said Company doth further agree, in case the furnace is not ready to blow before or at the expiration of the three months, if the water will admit, or as soon as the water will admit after that time, to give him p month as much as he can make in a month at the potting Business for such time as said Furnace may not be Ready to put in Blast—as witness our hands this second day of June, 1793.
>
> JN. COCKEY OWINGS,
> WALTER BEALL,
> Test: JNO. MOCKBEE. CHRIST GEEENUP.

Lesley says that Slate furnace "was run by Colonel Owing," and that it went out of blast in 1838. The name of Bourbon furnace indicates its location in Bourbon county, and it is hardly probable that there were two furnaces in this county as early as 1793.

The term "potter" was applied to the molder, who cast pots, kettles, etc., from the melted iron which was taken direct from the furnace and poured into molds. Colonel Christopher Greenup afterwards became the third governor of Kentucky, serving from 1804 to 1808, and it was in his honor that Greenup county was so named.

For a number of years after 1800 the iron industry of Kentucky made but slow progress. Tench Coxe in 1810 mentions only four furnaces and three forges. One furnace was in Estill, one in Wayne, and two were in Montgomery county. One of the forges was in Estill, one in Wayne, and one in Montgomery county. About 1815 there were four nail factories at Lexington, making 70 tons of nails yearly.

About 1815 Richard Deering, a farmer of Greenup county, smelted in a cupola the first iron ore used in the Hanging Rock district of Kentucky. His experiment with the cupola proving to be successful, he took into partnership David and John Trimble, and these three persons erected as early as 1817 the first blast furnace in the district. It was called Argillite, and was located in Greenup county, about six miles southwest of Greenupsburg, upon the left bank of Little Sandy river. The stack, which was 25 feet high and 6 feet wide at the boshes, was cut in a cliff of black slate—hence the name, Argillite. Lesley says: "It was not a structure, but an excavation in the solid slate rock of the cliff, the archway below being excavated to meet it." This furnace was operated until 1837, when it was abandoned, but its product was always small.

The next furnace in this district appears to have been Pactolus, built by Ward & McMurtry in 1824, in Carter county, on the Little Sandy river, above Argillite furnace. It also was abandoned about 1837. A forge was connected with this furnace. The next iron enterprise in the district is said to have been Steam furnace, in Greenup county, situated about three miles from the Ohio river and five miles from Greenupsburg. It was built in 1824 by Leven Shreeves & Brother, and was operated with steam. It was abandoned after 1860. Enterprise furnace, on Tygart's creek, in Greenup county, was built in 1826, but Richard Deering is said to have erected a forge of the same name, on the same creek, in 1824. Bellefonte furnace, on Hood's creek, two and a half miles southwest of Ashland, in Boyd county, was built in 1826 by A. Paull, George Poague, and others, and was the first furnace in this county. It is still in operation.

Between 1817 and 1834 at least thirteen furnaces were built in Greenup, Carter, and Boyd counties. One of the earliest of these was Camp Branch, or Farewell, situated on Little Sandy river, fourteen miles from Greenupsburg, near the Carter county line, built by David and John Trimble. Subsequent to 1834 about fifteen other charcoal furnaces were built in these three counties and in Lawrence county. Many of the charcoal furnaces of this district have been abandoned. A few excellent bituminous coal and coke furnaces have, however, been erected in late years. Notwithstanding these additions to its furnace capacity, this district is not now so prominent in the manufacture of iron as it has been.

About 1830 there were a dozen forges in Greenup, Estill, Edmonson, and Crittenden counties, all of which, with one exception, were abandoned before 1850. Two forges were built below Eddyville, in Lyon county, about 1840. All of the forges mentioned refined pig iron into blooms, many of which found a market at Pittsburgh, Cincinnati, and Kentucky rolling mills. There is now only one forge in the state—Red river, in Estill county, and it is not active. The few bloomaries that once existed in Kentucky were abandoned early in this century.

In addition to the iron enterprises in the Hanging Rock region of Kentucky, furnaces were built before 1860 in several of the middle and western counties of the state—in Bath, Russell, Bullitt, Nelson, Muhlenburg, Lyon, Crittenden, Trigg, Calloway, and Livingston counties. In this period eight rolling mills were also built in various sections. The period from about 1825 to 1860 witnessed great activity in the development of the iron industry of Kentucky. Since the close of the civil war this activity has been maintained, but it cannot be said that the state has of late devoted that attention to the manufacture of iron which its position and resources would seem to invite. It was seventh in the list of iron-producing states in 1870, and eleventh in 1880. Of twenty-two furnaces in the state in 1880 eighteen used charcoal, the others using bituminous coal. In the same year there were eight rolling mills—two at Covington, two at Newport, two at Louisville, one at Ashland, and one in Lyon county; there were also two steel works in the state. The first rolling mill in Kentucky appears to have been built at Covington in 1829, a portion of its machinery having been obtained from the dismantled Union rolling mill at Pittsburgh. Ashland, in Boyd county, has recently become prominent as an iron center.

THE EARLY MANUFACTURE OF IRON IN TENNESSEE.

The first settlers of Tennessee erected iron works within its limits soon after the close of the Revolution Bishop says that a bloomary was built in 1790 at Emeryville, in Washington county. At Elizabethton, on Doe river, in Carter county, a bloomary was built about 1795. Wagner's bloomary, on Roane creek, in Johnson county, is said to have been built in the same year. A bloomary was also erected on Camp creek, in Greene county, in 1797. Two bloomaries in Jefferson county—the Mossy creek forge, ten miles north of Dandridge, and Dumpling forge, five miles west of Dandridge—were built in the same year. About the same time, if not earlier, David Ross, the proprietor of iron works in Campbell county, Virginia, erected a large furnace and forge at the junction of the two forks of the Holston river, in Sullivan county, near the Virginia line, on the "great road from Knoxville to Philadelphia." Bishop states an interesting fact in the following words: "Boats of 25 tons burden could ascend to Ross's iron works, nearly 1,000 miles above the mouth of the Tennessee. At Long Island, a short distance above, on the Holston, where the first permanent settlement in Tennessee was made in 1775, boats were built to transport iron and castings made in considerable quantities at these works, with other produce, to the lower settlements and New Orleans." A bloomary was built about 1795 below the mouth of the Watauga, and another at the same time about twenty-five miles above the mouth of French Broad river and thirty miles above Knoxville.

All of the above-mentioned enterprises were in East Tennessee. In West Tennessee iron was also made in the last decade of the last century. Nashville was founded in 1780, and a few years later iron ore was discovered about thirty miles west of the future city. Between 1790 and 1795 Cumberland furnace was erected on Iron fork of Barton's creek, in Dickson county, seven miles northwest of Charlotte. This furnace was rebuilt in 1825, and was in operation in 1880. Dickson county and its near neighbors, Stewart and Montgomery counties, afterwards became very prominent in the manufacture of charcoal pig iron. Other counties in the same section of the state have also, but in a less conspicuous degree, made iron in charcoal furnaces. The first furnace in Montgomery county was probably Yellow Creek, fourteen miles southwest of Clarksville, built in 1802.

The iron industry of Tennessee made steady progress after the opening of the present century. Both furnaces and bloomaries multiplied rapidly. In 1856 Lesley enumerated over seventy-five forges and bloomaries, seventy-one furnaces, and four rolling mills in Tennessee, each of which had been in operation at some period after 1790. Of the furnaces, twenty-nine were in East Tennessee, and forty-two in Middle and West Tennessee. Of the latter, fourteen were in Stewart county, twelve in Montgomery, seven in Dickson, two in Hickman, two in Perry, two in Decatur, two in Wayne, and one in Hardin county. There were at one time forty-one furnaces on the Cumberland river in Tennessee and Kentucky. The furnaces in East Tennessee were mainly in Sullivan and Carter counties—Sullivan having five and Carter seven, but Johnson, Washington, Greene, Cocke, Sevier, Monroe, Hamilton, Claiborne, Campbell, Grainger, and Union counties each had one or two furnaces, while Roane county had three. There was a very early furnace in Polk county, which is not noted by Lesley but is mentioned by Bishop. The forges and bloomaries were mainly located in East Tennessee: Johnson county contained fifteen, Carter ten, Sullivan six, Washington three, Greene ten, Campbell seven, Blount four, Roane seven, Rhea three, and a few other counties one and two each. Nearly all of these were bloomaries. In West Tennessee there were less than a dozen refinery forges, and one or two bloomaries. The forges of West Tennessee, like those of Kentucky, were mainly employed from about 1825 to 1860 in the manufacture of blooms for rolling mills, many of which were sold to mills in the Ohio valley. Most of the furnaces, forges, and bloomaries enumerated by Lesley have long been abandoned. There still remain in Tennessee twenty charcoal furnaces and about the same number of forges and bloomaries. There were also in the state in 1880 five bituminous furnaces—all of recent origin, four rolling mills, and two steel works. Cumberland rolling mill, on the left bank of the Cumberland river, in Stewart county, was built in 1829, and was probably the first rolling mill in the state. It was the only rolling mill in Tennessee as late as 1856.

Since the close of the civil war Chattanooga has become the most prominent iron center in Tennessee, having several iron enterprises of its own and others in the vicinity. Prior to the war Bluff furnace had been built in 1854 to use charcoal, and at the beginning of the war, in 1861, S. B. Lowe commenced the erection of the Vulcan rolling mill, to roll bar iron. This mill was not finished in 1863, when it was burned by the Union forces. Mr. Lowe rebuilt the mill in 1866. It is now owned and operated by the Powell Iron and Nail Company. In 1864 a rolling mill to reroll iron rails was erected by the United States Government, under the supervision of John Fritz, then superintendent of the Cambria iron works. It is now owned and operated by the Roane Iron Company. The first open-hearth steel made in any southern state was made by the Siemens-Martin process at Chattanooga, by this company, on the 6th day of June, 1878. Lookout rolling mill was built by the Tennessee Iron and Steel Company in 1876, and was started in October of that year. Lewis Scofield was at the time the president of the company. The prominence of Chattanooga as an iron center is partly due to the excellent bituminous coal which is found in the neighborhood, and partly to its superior transportation facilities.

Tennessee is destined to become much more prominent in the manufacture of iron than it has ever been. It will owe this prominence largely to the abundance of good bituminous coal which it possesses, but largely also to the improvements in the manufacture of charcoal pig iron which have already been adopted in many instances, and which are certain to be generally adopted at an early day. Of the good quality of Tennessee ores nothing needs to be said.

PRIMITIVE CHARACTER OF THE IRON WORKS OF NORTH CAROLINA AND TENNESSEE.

The establishment at an early day of so many charcoal furnaces and ore bloomaries in western North Carolina and East Tennessee—sections of our country remote from the sea-coast and from principal rivers—is an interesting fact in the iron history of the country. The people who built these furnaces and bloomaries were not only bold and enterprising, but they appear to have been born with an instinct for making iron. Wherever they went they seem to have searched for iron ore, and having found it their small charcoal furnaces and bloomaries soon followed. No states in the Union have shown in their early history more intelligent appreciation of the value of an iron industry than North Carolina and Tennessee, and none have been more prompt to establish it. It is true that their aim has been mainly to supply their own wants, but this is a praiseworthy motive, and people are not to be found fault with if a lack of capital and of means of transportation prevents them from cultivating a commercial spirit.

The enterprise of the early ironworkers of western North Carolina and East Tennessee assumes a picturesque aspect when viewed in connection with the primitive methods of manufacture which were employed by them, and which have been continued in use until the present day. Their charcoal furnaces were blown through one tuyere with wooden "tubs" adjusted to attachments which were slow in motion, and which did not make the best use of the water-power that was often insufficiently supplied by mountain streams of limited volume. A ton or two of iron a day, in the shape of pigs or castings, was a good yield. The bloomaries, with scarcely an exception, were furnished with the *trompe*, or water-blast,—a small stream with a suitable fall supplying both the blast for the fires and the power which turned the wheel that moved the hammer. Of cast-iron cylinders, steam-power, two tuyeres, and many other improvements in the charcoal-iron industry these people knew but little, and that little was mainly hearsay. They were pioneers and frontiersmen in every sense; from the great world of invention and progress they were shut out by mountains and streams and hundreds of miles of unsubdued forest. It is to their credit, and it should not be forgotten, that they diligently sought to utilize the resources which they found under their feet, and that they were not discouraged from undertaking a difficult task because the only means for its accomplishment of which they had any knowledge were crude in conception and often difficult to obtain.

It is a curious fact that the daring men who pushed their way into the wilds of western North Carolina and East Tennessee in the last century, and who set up their small furnaces and bloomaries when forts yet took the place of hamlets, founded an iron industry which still retains many of the primitive features that at first characterized it. There are to-day in Tennessee about two dozen bloomaries, and in North Carolina a dozen or more, which are in all respects the counterparts in construction of those which the pioneers established. Nearly every one of these bloomaries is to-day blown with the *trompe*, and in all other respects they are as barren of modern appliances as if the world's iron industry and the world itself had stood still for a hundred years. They are fitfully operated, as the wants of their owners or of the neighboring farmers and blacksmiths require, or as the supply of water for the *trompes* and hammers will permit. They furnish their respective neighborhoods with iron for horseshoes, wagon-tires, and harrow-teeth. Mr. J. B. Killebrew, of Nashville, informs us that throughout the counties of Johnson and Carter, in Tennessee, where many of these bloomaries are located, bar iron is used as currency. He says: "Iron is taken in exchange for shoes, coffee, sugar, calico, salt, and domestic and other articles used by the people of the country. It is considered a legal tender in the settlement of all dues and liabilities. This bar iron, after being collected by the merchants, is sent out and sold in Knoxville, Bristol, and other points affording a market."

The explanation of the survival in this day and in this country of primitive methods of making iron which have long been abandoned by progressive communities lies in the fact that the environments which hedged about the pioneers of western North Carolina and East Tennessee have never been broken down, and have been only slightly modified. Few of the mountains and streams and forests of these sections have been tunneled, or bridged, or traversed by modern means of communication. The iron horse has made but slow progress in bringing this part of our country into association with other sections. Cut off by their isolated situation and their poverty from all intimate relations with the outside world, the pioneers we have mentioned are not to be blamed for not adopting modern methods and for clinging to the customs of their fathers. They are rather to be praised for the efforts they have made to help themselves.

But old things must pass away, even in the iron industry of North Carolina and East Tennessee. At Chattanooga, Rockwood, Oakdale, Knoxville, South Pittsburg, and Cowan the transformation has already commenced. Before this century closes the people of whom we have been writing will wonder that the old ways of making iron stayed with them so long.

There are a few ore bloomaries still left in southwestern Virginia which are similar in all respects to those of western North Carolina and East Tennessee, and which are used for precisely similar purposes. But the manufacture of iron in bloomaries was never relatively so prominent a branch of the iron industry of Virginia as of the other two states mentioned.

THE MANUFACTURE OF IRON IN ALABAMA.

The earliest furnace in Alabama mentioned by Lesley was built about 1818, a few miles west of Russellville, in Franklin county, and abandoned in 1827. This unsuccessful venture appears to have had a dispiriting effect on other schemes to build furnaces in Alabama, as we do not hear of the erection of any for many years after it was abandoned. A furnace was built at Polksville, in Calhoun county, in 1843; one at Round Mountain, in Cherokee county, in 1852; and Shelby furnace at Shelby, in Shelby county, in 1848. These were all charcoal furnaces, and were the only ones in Alabama enumerated by Lesley in 1856. The total product in that year of the three last-named furnaces was 1,495 tons. Shelby furnace was built by Horace Ware, who many years afterwards added a small foundry and a small mill for rolling cotton-ties and bar iron. The furnace was burned in 1858, but was immediately rebuilt. The mill was commenced in 1859, and on the 11th of April, 1860, the first iron was rolled. It was burned in April, 1865, by General Wilson's command of Union troops, and has not been rebuilt.

Alabama had a bloomary two and a half miles southwest of Montevallo, in Shelby county, in 1825; several bloomaries in Bibb county between 1830 and 1840; one in Talladega county in 1842; two in Calhoun county in 1843; and others in various counties at later periods. In 1856 seventeen forges and bloomaries, mostly the latter, were mentioned as having been built at various periods prior to that year, about one-half of which were then in operation, producing 252 tons of blooms and bar iron. Since 1856 all of the forges and bloomaries of Alabama have gradually disappeared. Most of them were blown with the *trompe*, and the remainder with wooden "tubs."

It will be observed that as late as 1856 Alabama possessed a very small iron industry. During the civil war several new iron enterprises were undertaken. A furnace in Sanford county was built in 1861; Cornwall furnace, at Cedar Bluff, in Cherokee county, was built in 1862; a second Shelby furnace, in Shelby county, was built in 1863; Alabama furnace, in Talladega county, was built in 1863, burned by General Wilson in April, 1865, and rebuilt in 1873. Two furnaces and a small rolling mill were built at Brierfield, in Bibb county, in 1863 and 1864. All of the furnaces were built to use charcoal. The Brierfield rolling mill was first used for rolling bar iron and rails. In 1863 or early in 1864 it was sold to the Confederate government, by which it was operated until 1865, when it was burned by the Union troops under General Wilson. It was rebuilt after the war, and for some time was used to roll bar iron and cotton-ties, principally the latter. After having been idle for several years this mill is again in operation.

Since the close of the civil war the attention of northern capitalists has been attracted to the large deposits of rich ores in Alabama, and several new furnaces, with modern improvements, have been built by them, some to use charcoal and others to use coke. Most of these furnaces are now in operation. Two new rolling mills have also been built in Alabama since the war—one at Helena, in Shelby county, built in 1872, and one at Birmingham, in Jefferson county, built in 1880.

The existence of bituminous coal in Alabama was first observed in 1834 by Dr. Alexander Jones, of Mobile, but little was done to develop the ample coal resources of the state until after the close of the civil war, when it was found that the coal in the neighborhood of Birmingham and at other places would produce excellent coke for blast furnaces, and that at least two coal fields—the Black Warrior and Coosa—were so extensive as to set at rest all apprehension concerning a constant supply of coal for a long period of time. These discoveries, joined to the possession of an abundant supply of good ores, at once gave Alabama prominence as a state which would before many years boast a large iron industry, and this promise is now being fulfilled.

EARLY IRON ENTERPRISES IN OHIO.

The beginning of the iron industry of Ohio is cotemporary with the admission of the state into the Union. It was admitted in 1802, and in 1803 its first furnace, Hopewell, was commenced by Daniel Heaton, and in 1804 it was finished. (The name of Daniel Heaton was afterwards changed by act of assembly to Dan Eaton.) The furnace stood on Yellow creek, about one and a quarter miles from its junction with the Mahoning river, in the township of Poland, in Mahoning county. On the same stream, about three-fourths of a mile from its mouth, and on the farm on which the furnace of the Struthers Furnace Company now stands, in the village of Struthers, another furnace was built in 1806 by Robert Montgomery and John Struthers. This furnace was called Montgomery. Thomas Struthers writes: "These furnaces were of about equal capacity, and would yield about two and a half or three tons each per day. The metal was principally run into molds for kettles, bake-ovens, flat-irons, stoves, andirons, and such other articles as the needs of a new settlement required, and any surplus into pigs and sent to the Pittsburgh market." The ore was obtained in the neighborhood. Hopewell furnace is said by Mr. Struthers to have had a rocky bluff for one of its sides. It was in operation in 1807, but soon afterwards it was blown out finally. Montgomery furnace was in operation until 1812, when, Mr. Struthers says, "the men were drafted into the war, and it was never started again." This furnace stood "on the north side of Yellow creek, in a hollow in the bank." We are informed by Hon. John M. Edwards, of Youngstown, that Hopewell furnace was sold by Eaton to Montgomery, Clendenin & Co. about 1807, who were then the owners of Montgomery furnace—John Struthers having sold his interest, or part of it, to David Clendenin in 1807, and Robert Alexander and James Mackey having about the same time become part owners.

The above-mentioned iron enterprises were the first in Ohio, and, as will be observed, they were both on the Western Reserve. There were other early iron enterprises on the Reserve. At Nilestown, now Niles, in Trumbull county, as we are informed by Colonel Charles Whittlesey, of Cleveland, James Heaton built a forge in 1809, for the manufacture of bar iron from "the pig of the Yellow Creek furnace"—Montgomery furnace. "This forge produced the first hammered bars in the state." It continued in operation until 1838. About 1812 James Heaton built a furnace at Nilestown, near the mouth of Mosquito creek, where the Union school building now stands. It was called Mosquito Creek furnace, and for many years used bog ore, the product being stoves and other castings. It was in operation until 1856, when it was abandoned.

About 1816 Aaron Norton built a furnace at Middlebury, near Akron, in Summit county, and in 1819 Asaph Whittlesey built a forge on the Little Cuyahoga, near Middlebury. A furnace at Tallmadge, in the same county, was built about the same time. These two furnaces were operated until about 1835.

The beginning of the iron industry in the counties on Lake Erie probably dates from 1825, when Arcole furnace was built in Madison township, in the present county of Lake, by Root & Wheeler, and Concord furnace, in the same county, was built by Fields & Stickney. Geauga furnace, one mile north of Painesville, in Lake county, and Railroad furnace, at Perry, in Geauga county, were built about 1825—the former by an incorporated company and the latter by Thorndike & Drury, of Boston. During the next ten or twelve years several other furnaces were built near Lake Erie, in Ashtabula, Cuyahoga, Erie, Huron, and Lorain counties. At a still later period other charcoal furnaces were built in the lake counties. All of these lake furnaces, writes John Wilkeson in 1858, "were blown some eight months each year, and made about 30 tons per week of metal from the bog ore found in swales and swamps near, and generally to the north of, a ridge of land which was probably once the shore of Lake Erie, found extending, with now and then an interval, along from the west boundary of the state of New York to the Huron river in Ohio. The want of wood for charcoal, consequent upon the clearing up of the land, has occasioned the stoppage of most of these works. For a long time the settlers upon the shores of Lake Erie and in the state of Michigan were supplied with their stoves, potash-kettles, and other castings by these works."

All of the above-mentioned iron enterprises were on the Western Reserve. Just outside of its limits Gideon Hughes built a furnace in 1807 or 1808, on the Middle fork of Little Beaver creek, one and a half miles northwest of New Lisbon, in Columbiana county. It was in operation in 1808 and 1809. It was first called Rebecca of New Lisbon, but was afterwards named Dale furnace. Attached to this furnace a few years after its erection was a forge, which was used for making bar iron. John Frost, of New Lisbon, to whom we are indebted for this information, also writes us that "some two or three miles up the same stream Mr. Hughes and Joshua Malin erected a rolling mill in 1822, to which a company of Englishmen, said to be from Pittsburgh, not long afterwards added nail-making machinery. In addition to manufacturing bar iron, these works placed large quantities of nails in the market. This concern was more or less active till 1832, when the great flood of waters early in that year destroyed it, and it was never rebuilt." New Lisbon is located about twelve miles from the mouth of Little Beaver creek, which empties into the Ohio river.

Soon after the beginning of the iron industry on the Western Reserve the manufacture of iron was undertaken in some of the interior and southern counties of the state. Bishop says that Moses Dillon, who had been associated with Colonel Meason and John Gibson in the building of Union furnace, in Fayette county, Pennsylvania, in 1793, "afterwards erected a forge on Licking river, near Zanesville, Ohio, possibly the first in the state." This enterprise was preceded or immediately succeeded by a furnace, and the date of its erection is said to have been 1808, but it may have been a few years later. It was located "at the falls of Licking," four miles northwest of Zanesville, in Muskingum county, and its capacity was about one ton per day. It was used to produce castings, as well as pig iron for the forge. Lesley says that this furnace was not abandoned "until 1850 or later." The forge was also operated until about 1850. The furnace and forge were known as Dillon's, and were widely celebrated.

Mary Ann furnace, ten miles northeast of Newark, in Licking county, was built about 1816 by Dr. Brice and David Moore. It was burned down about 1850. In Tuscarawas county the Zoar Community owned two early charcoal furnaces. One of these, called Tuscarawas, was built about 1830 by Christmas, Hazlett & Co., and was afterwards sold to the Community; the other, called Zoar, was built about the same time by the Community. Both furnaces were blown out finally before 1850.

Three furnaces were built in Adams county between 1811 and 1816. The first of these, Brush Creek, on the stream of that name, and twelve miles from the Ohio river, was operated in 1813 by James Rodgers. It was probably built in 1811, its builders being Andrew Ellison, Thomas James, and Archibald Paull. It was in operation as late as 1837, when it produced 200 tons of iron in 119 days. On the same stream, twenty-two miles from the Ohio, was Marble furnace, built in 1816. Another furnace, known as Old Steam, was built in 1814. This furnace is said to have been built by James Rodgers, Andrew Ellison, and the Pittsburgh Steam Engine Company. Thomas W. Means informs us that "the first blast furnace run by steam in southern Ohio, if not in the United States, was built by James Rodgers in Adams county about 1814." This reference is to Old Steam furnace. "Its product was less than two tons of iron a day. Brush Creek furnace, in the same county, and other furnaces of that period which were run by water, hardly averaged one ton of iron a day." Marble and Old Steam furnaces were abandoned about 1826. Lesley mentions three forges in Adams county—Steam, at Old Steam furnace; Scioto, on the Little Scioto; and Brush Creek, probably connected with Brush Creek furnace. The date of the erection of these forges is not given, but they were doubtless built soon after the three Adams county furnaces. They were all abandoned many years ago. There is now no iron industry in Adams county.

In the chapter relating to Kentucky the beginning of the iron industry in the Hanging Rock region has been noted. This celebrated iron district embraces Greenup, Boyd, Carter, and Lawrence counties in Kentucky, and Lawrence, Jackson, Gallia, and Vinton counties and part of Scioto county in Ohio. Just north of the Ohio portion of this district is the newly-developed Hocking Valley iron district, embracing Hocking and several other counties. The Hanging Rock district takes its name from a projecting cliff upon the north side of the Ohio river, situated back of the town of Hanging Rock, which is three miles below Ironton, in Lawrence county. The first furnace in the Ohio part of the Hanging Rock district was Union furnace, situated a few miles northwest of Hanging Rock, built in 1826 and 1827 by John Means, John Sparks, and James Rodgers, the firm's name being James Rodgers & Co. Franklin furnace was the second on the Ohio side. It stood sixteen miles east of Portsmouth and half a mile from the Ohio river, in Scioto county, and was built in 1827 by the Rev. Daniel Young and others. The next furnace was Pine Grove, on Sperry's fork of Pine creek, back of Hanging Rock, and five miles from the Ohio river, in Lawrence county, built in 1828 by Robert Hamilton and Andrew Ellison. In the same year Scioto furnace, in Scioto county, fifteen miles north of Portsmouth, was built by William Salters. From this time forward blast furnaces increased rapidly on the Ohio side of the district, as well as on the Kentucky side. From 1826 to 1880 the whole number built on the Ohio side was about sixty, and on the Kentucky side about thirty. All of the early furnaces were built to use charcoal, but timber becoming scarce coke was substituted at some of them, while others were abandoned. In late years a few furnaces have been built in the district expressly to use coke or raw coal. In 1880 there were on the Ohio side thirty-one charcoal furnaces and seventeen bituminous coal or coke furnaces.

At Vesuvius furnace, on Storm's creek, in Lawrence county, Ohio, six miles northeast of Ironton, the hot-blast was successfully applied in 1836 by John Campbell and others, William Firmstone putting up the apparatus.

The Hanging Rock district, on both sides of the Ohio, has produced many eminent ironmasters, and its iron resources have been developed with great energy. Most prominent among its ironmasters of the generation now passing away are John Campbell, of Ironton, and Thomas W. Means, of Hanging Rock. Mr. Campbell, who is a native of Brown county, Ohio, was born in 1808. In connection with others he has built eleven furnaces in the Hanging Rock district. He projected the town of Ironton and gave it its name, and also assisted in the founding of Ashland, Kentucky, and in building its railroad. Like most of the ironmasters of this district he is of Scotch-Irish extraction, his ancestors having removed in 1612 from Inverary, in Argyleshire, Scotland, to the neighborhood of Londonderry, in Ulster, Ireland. Their descendants removed in 1729 and 1739 to Augusta county, Virginia; thence, in 1790, to Bourbon county, Kentucky; and thence, in 1798, to that part of Adams county, Ohio, which is now embraced in Brown county. Mr. Means was born in South Carolina in 1803, and is also of Scotch-Irish origin. His father, John Means, was an owner of one of the furnaces and forges in Adams county, Ohio. He was born in Union district, South Carolina, on March 14, 1770, and moved to Adams county, Ohio, in 1819, taking with him his slaves, whom he liberated. He died on his farm near Manchester, in Adams county, on March 15, 1837, and was buried in the churchyard in Manchester. Andrew Ellison, Robert Hamilton, James Rodgers, and Andrew Dempsey, now deceased, were enterprising and prominent iron manufacturers. In December, 1844, Mr. Hamilton successfully tried the experiment of stopping Pine Grove furnace, which he then owned, on Sunday, and his example has since been generally followed in the Hanging Rock region. This furnace is still active. John Campbell, Robert Hamilton, and Thomas W Means were united in marriage with members of the Ellison family. The third generation of this family is now engaged in the iron business of southern Ohio.

In 1833 a forge was built at Hanging Rock, after which it was named, to manufacture blooms. It was owned by J. Riggs & Co., and was built under the superintendence of John Campbell and Joseph Riggs. A rolling mill was added before 1847. Both the forge and rolling mill have long been abandoned. A forge was built at Sample's Landing, fifteen miles below Gallipolis, soon after 1830, to make blooms for the Covington rolling mill. Bloom forge was built at Portsmouth, in Scioto county, in 1832, and in 1857 a rolling mill was added. A forge called Benner's, on Paint creek, near Chillicothe, in Ross county, once owned by James & Woodruff, was abandoned about 1850. There never were many forges in Ohio for refining iron, and there have been few, if any, for making bar iron directly from the ore. The first iron enterprises in the state preceded by only a few years the building of rolling mills at Pittsburgh.

The Globe rolling mill was built at Cincinnati in 1845. Joseph Kinsey writes us that it "was the first built in Cincinnati for the purpose of making general sizes of merchant iron, hoops, sheets, and plates. It was built by William Sellers and Josiah Lawrence, and was considered a great enterprise at that time. Soon afterwards a wire mill was added for the purpose of making the first wire used for the lines of telegraph extending through this country."

The foregoing details relate to what may be termed the charcoal era of the Ohio iron industry. The second stage in the development of the iron industry of this state dates from the introduction in its blast furnaces of the bituminous coal of the Mahoning valley in its raw state. This coal is known as splint, or block, coal, or as Brier Hill coal, from a locality of that name near Youngstown where it is largely mined. The first furnace in Ohio to use the new fuel was built expressly for this purpose at Lowell, in Mahoning county, in 1845 and 1846, by Wilkeson, Wilkes & Co., and it was successfully blown in on the 8th of August, 1846. The name of this furnace was Mahoning. A letter from John Wilkeson, now of Buffalo, New York, informs us that William McNair, a millwright, was the foreman who had charge of its erection. It was blown in by John Crowther, who had previously had charge of the furnaces of the Brady's Bend Iron Company, at Brady's Bend, Pennsylvania. Mr. Wilkeson and his brothers had for many years been prominent charcoal-iron manufacturers on the Western Reserve. They are of Scotch-Irish extraction. Their father was a native of Carlisle, Pennsylvania.

Immediately after the successful use of uncoked coal in the furnace at Lowell many other furnaces were built in the Mahoning valley to use the new fuel, and it was also substituted for charcoal in some old furnaces. At a later day the use of this fuel and of Connellsville coke contributed to the further development of the manufacture of pig iron in Ohio, and at a still later and very recent date the opening of the extensive coal beds of the Hocking valley and the utilization of its carbonate ores still further contributed to the same development.

The beginning of the iron industry at Youngstown, which now has within its own limits or in the immediate vicinity twelve furnaces and six rolling mills, dates from about 1835, when a charcoal furnace called Mill Creek was built on a creek of the same name, a short distance southwest of the city, by Isaac Heaton, a son of James Heaton. There was no other furnace at Youngstown until after the discovery at Lowell that the block coal of the Mahoning valley could be successfully used in the smelting of iron ore. In a recent sketch of the history of Youngstown Hon. John M. Edwards says: "In 1846 William Philpot & Co. built in the northwestern part of Youngstown, adjoining the present city, and near the canal, the second furnace in the state for using raw mineral coal as fuel. In the same year a rolling mill was built in the southeastern part of the village, and adjoining the canal, by the Youngstown Iron Company. This mill is now owned by Brown, Bonnell & Co." In a sketch of *Youngstown, Past and Present*, printed in 1875, a fuller account is given of the first bituminous furnace at that place. It was known as the Eagle furnace, and was "built in 1846 by William Philpot, David Morris, Jonathan Warner, and Harvey Sawyer, on land purchased of Dr. Henry Manning, lying between the present city limits and Brier Hill. The coal used was mined from land contiguous, leased from Dr. Manning." The second furnace at Youngstown to use raw coal was built in 1847 by Captain James Wood, of Pittsburgh. It was called Brier Hill furnace.

The proximity of the coal fields of Ohio to the rich iron ores of Lake Superior has been an important element in building up the blast-furnace industry of the state. The use of these ores in Ohio soon followed the first use in the blast furnace of the block coal of the Mahoning valley. An increase in the rolling-mill capacity of Ohio was naturally coincident with the impetus given to the production of pig iron by the use of this coal and Lake Superior ores. David Tod, afterwards governor of Ohio, bore a prominent part in the development of the coal and iron resources of the Mahoning valley.

The iron industry of Cleveland has been built up during this period, and the city is now one of the most prominent centers of iron and steel production in the country. Charles A. Otis, of Cleveland, writes us as follows concerning the first rolling mills in that city: "The first rolling mill at Cleveland was a plate mill, worked on a direct ore process, which was a great failure. It went into operation in 1854 or 1855. The mill is now owned by the Britton Iron and Steel Company. The next mill was built in 1856 by A. J. Smith and others, to reroll rails. It was called Railroad rolling mill, and is now owned by the Cleveland Rolling Mill Company. At the same time a man named Jones, with several associates, built a mill at Newburgh, six miles from Cleveland, also to reroll rails. It was afterwards operated by Stone, Chisholm & Jones, and is now owned by the Cleveland Rolling Mill Company. In 1852 I erected a steam forge to make wrought-iron forgings, and in 1859 I added to it a rolling mill to manufacture merchant bar, etc. The Union rolling mills were built in 1861 and 1862 to roll merchant bar iron."

In the list of persons connected with the development of the iron and steel industries of Cleveland the name of Henry Chisholm is most prominent. Mr. Chisholm was born at Lochgelly, in Fifeshire, Scotland, on April 27, 1822, and died at Cleveland on May 9, 1881, aged 59 years.

From 1846 to 1880 the iron industry of Ohio has made steady progress, and the state now ranks second among the iron-producing states of the Union. This was also its rank in 1870.

EARLY IRON ENTERPRISES IN INDIANA.

Indiana possessed a small charcoal-iron industry before 1850, but at what period in the present century this industry had its beginning cannot now be definitely determined. Tench Coxe makes no reference to it in 1810, but mentions one nailery in the territory, which produced in that year 20,000 pounds of nails, valued at $4,000. He does not locate this enterprise. In 1840 the census mentions a furnace in Jefferson county, one in Parke, one in Vigo, one in Vermillion, and three in Wayne county, the total product being only 810 tons of "cast iron." A forge in Fulton county, producing 20 tons of "bar iron," is also mentioned. The census of 1840, however, frequently confounds furnaces with foundries, and it is therefore possible that some of the alleged furnaces in Indiana at that period were foundries.

In 1859 Lesley enumerated five charcoal furnaces in Indiana, as follows: Elkhart, in Elkhart county, date of erection unknown; La Porte, near the town of that name, in La Porte county, built in 1848; Mishawaka, in Saint Joseph county, built about 1833; Richland, on Richland creek, in Greene county, built in 1844 by A. Downing; and Indiana, a few miles northwest of Terre Haute, in Vigo county, built in 1839. The three last named were in operation in 1857, but were abandoned about 1860. Elkhart and La Porte furnaces were idle in 1857, and probably had been abandoned at that time. Elkhart, La Porte, and Mishawaka used bog ore exclusively, and Richland used it in part; in 1857 Mishawaka was still using it. Indiana furnace used brown hematite found in the neighborhood. In a chapter on the geology of Monroe county, by George K. Greene, printed in 1881, it is stated that "nearly forty years ago an iron furnace was erected by Randall Ross, of Virginia, on the lands of George Adams, of Monroe county, on section 7, township 7, range 2 west. The investment soon proved a failure, and the furnace has long gone to decay. The ruins of the 'old iron furnace' are to-day the mournful monument of an early spirit of enterprise that deserved a better fate." The early Indiana furnaces doubtless made more castings than pig iron.

In 1860 there was only one furnace in blast in Indiana—Richland. It was abandoned probably in that year, and from this time until 1867 no pig iron was made in Indiana. In the latter year the manufacture of pig iron in this state was revived, the development of the block-coal district in the neighborhood of Brazil, in Clay county, having led to the belief that this fuel might be profitably used in blast furnaces. Planet furnace, at Harmony, in Clay county, built in the summer of 1867, and put in blast in November of that year, was the first of eight furnaces that were built in Indiana between 1867 and 1872 to use this coal, the ores for the furnaces being mainly obtained from Missouri and Lake Superior. Five of these furnaces were in Clay county. Of the eight furnaces built, four have been abandoned and torn down since 1872, and, of the remaining four, one is now using charcoal and three are using block coal. No furnaces have been built in Indiana since 1872.

Except the solitary forge above mentioned we have no record of any forges or bloomaries having been built in Indiana at any period. The first rolling mill in the state was probably the Indianapolis mill, built by R. A. Douglas, which was completed in the autumn of 1857, and put in operation in November of the same year. Lesley in 1858 says: "The machinery and building were planned by Lewis Scofield, of Trenton, New Jersey, who also built the Wyandotte mill and is building the mill at Atlanta, Georgia." There were in 1880 nine rolling mills in Indiana, four of which were rail mills. The state contained no steel works in that year.

EARLY IRON ENTERPRISES IN ILLINOIS.

In 1839 a small charcoal furnace was built four miles northwest of Elizabethtown, in Hardin county, in the extreme southeastern part of Illinois, by Leonard White, Chalen Guard & Co. It was called Illinois. This is the first furnace in the state of which there is any record, and it probably had no predecessor. In 1853 it was purchased by C. Wolfe & Co., of Cincinnati, who tore down the stack and built a larger one in 1856, with modern additions. In 1873 this furnace, after having been out of blast for several years, was repaired, but it has not since been put in blast. A charcoal furnace called Martha was built in 1848 by Daniel McCook & Co. about two miles east of Illinois furnace. It was probably the second furnace in the state. Illinois and Martha furnaces were both in blast in 1850, but in 1860 only Illinois was in blast. Martha had not been in operation since 1856, and it probably never made any iron after that year. It has long been abandoned. These furnaces were supplied with limestone ore from the immediate neighborhood. They seem to have been the only charcoal-iron enterprises of any description that ever existed in Illinois.

In the census of 1840 mention is made of a furnace in Cook county, one in Fulton, one in Hardin, and one in Wabash county. The furnaces in Fulton and Hardin counties were idle; the furnace in Wabash county produced eight tons, and the furnace in Cook county produced 150 tons, of "cast iron." As the census of 1840 frequently confounds blast furnaces with foundries, reliance cannot be placed in the correctness of its statements concerning furnaces in Illinois. We have definitely ascertained that there was no furnace in Cook county in that year, and that the furnace with which it is credited in the census was Granger's foundry, the only one in Chicago at that time.

There appears to have been no furnace in operation in Illinois from 1860 to 1868. Soon after the close of the civil war the attention of iron manufacturers was attracted to the Big Muddy coal fields, in the southwestern part of Illinois, and to the proximity to these coal fields of the rich iron ores of Missouri. In 1868 the Grand Tower Mining, Manufacturing, and Transportation Company built two large furnaces at Grand Tower, in Jackson county, Illinois, to use the Big Muddy coal in connection with Missouri ores; and in 1871 another large furnace, called Big Muddy, was built at Grand Tower, by another company, to use the same fuel and ores. The two Grand Tower furnaces have been out of blast for several years and are now abandoned, but the Big Muddy furnace is still in blast. At East Saint Louis the Meier Iron Company built two large coke furnaces between 1873 and 1875. These furnaces are now in operation, their fuel being mainly Carbondale coke, from Jackson county, Illinois.

The iron industry at Chicago and in its vicinity properly dates from 1857, when Captain E. B. Ward, of Detroit, built the Chicago rolling mill, on the right bank of the Chicago river, "just outside of the city." This mill was built to reroll iron rails. It formed the nucleus of the present very extensive works of the North Chicago Rolling Mill Company. There was no furnace at Chicago until 1868, when two furnaces were built by the Chicago Iron Company. They are now owned by the Union Iron and Steel Company. One was blown in early in 1869, and the other late in the same year. Two furnaces were built at Chicago in 1869 by the North Chicago Rolling Mill Company. No other furnaces were built at Chicago until 1880, when seven new furnaces were undertaken, three of which were finished in that year and two in 1881. At Joliet, thirty-seven miles southwest of Chicago, the Joliet Iron and Steel Company built two furnaces in 1873. They are now owned by the Joliet Steel Company.

In 1880 there were thirteen rolling mills and steel works in Illinois, three of which were Bessemer steel works—two at Chicago and one at Joliet, and one was an open-hearth steel works at Springfield. At the beginning of 1880 there were ten blast furnaces in the state, and, as has been mentioned, three new furnaces were finished during the year and four others were undertaken. In 1880 Illinois ranked fourth among the iron and steel producing states of the Union, making a great stride since 1870, when it ranked fifteenth.

EARLY IRON ENTERPRISES IN MICHIGAN.

If we could credit the census of 1840 there were fifteen blast furnaces in Michigan in that year—one in each of the counties of Allegan, Branch, Cass, Kent, Monroe, and Oakland, two in Calhoun, two in Washtenaw, and five in Wayne county. Some of these alleged furnaces were doubtless foundries, particularly in counties lying upon or not very remote from Lake Erie, vessels upon which could bring pig iron for their use from neighboring states. Others were undoubtedly true blast furnaces, producing household and other castings from bog ores. All of the fifteen enterprises mentioned were in the southern part of the state. Their total production in 1840 was only 601 tons of "cast iron." Neither forges nor bloomaries are mentioned in the census of 1840.

From 1840 to 1850 the iron industry of Michigan certainly made no progress, and possibly declined. From 1850 to 1860 a marked improvement took place. Three new furnaces were built in the southern part of the state to use bog ore, and in the northern peninsula and at Detroit and Wyandotte a commencement was made in smelting the rich ores which had been discovered in the now celebrated Lake Superior iron-ore region. In 1859 Lesley enumerated the following bog-ore furnaces in the southern part of the state: Kalamazoo, at the city of that name, in Kalamazoo county, built in 1857 to take the place of an earlier furnace; Quincy, three miles north of the town of that name, in Branch county, built in 1855; and Branch county, one mile from Quincy furnace, built in 1854. All of these bog-ore furnaces made pig iron in 1857. It is a curious fact that furnaces to use bog ore should have been built in this country after 1850.

The development of the Lake Superior iron-ore region marks an important era in the history of the American iron trade, and the incidents attending its commencement have fortunately been preserved.

We learn from A. P. Swineford's *History of the Lake Superior Iron District* that the existence of iron ore on the southern border of Lake Superior was known to white traders with the Indians as early as 1830. The same writer further informs us that the first discovery by white men of the iron ore of this region was made by William A. Burt, a deputy surveyor of the General Government, on the 16th of September, 1844, near the eastern end of Teal lake. In June, 1845, the Jackson Mining Company was organized at Jackson, Michigan, for the purpose of exploring the mineral districts of the southern shore of Lake Superior, and in the summer of the same year this company, through the disclosures of a half-breed Indian, named Louis Nolan, and the direct agency of an old Indian chief, named Man-je-ki-jik, secured possession of the now celebrated Jackson iron mountain, near the scene of Mr. Burt's discovery. It appears, however, that the representatives of the company had not heard of Mr. Burt's discovery until they met Nolan and the Indian chief. Mr. P. M. Everett, the president of the company, was the leading spirit of the exploring party which secured possession of this valuable property. The actual discovery of Jackson mountain was made by S. T. Carr and E. S. Rockwell, members of Mr. Everett's party, who were guided to the locality by the Indian chief.

In a letter written on the 10th of November, 1845, at Jackson, Michigan, Mr. Everett, referring to the ore of Jackson mountain, says that "since coming home we have had some of it smelted, and find that it produces iron and something resembling gold—some say it is gold and copper." This smelting is not further described. In 1846 A. V. Berry, one of the Jackson Mining Company, and others, brought about 300 pounds of the ore to Jackson, and in August of that year, writes Mr. Berry, "Mr. Olds, of Cucush Prairie, who owned a forge, then undergoing repair, in which he was making iron from bog ore, succeeded in making a fine bar of iron from our ore in a blacksmith's fire—the first iron ever made from Lake Superior ore." Mr. Swineford says that "one end of this bar of iron Mr. Everett had drawn out into a knife-blade."

In 1847 the Jackson Mining Company commenced the erection of a forge on Carp river, about ten miles from its mouth, and near Jackson mountain, which was finished early in 1848, and on the 10th of February of that year the first iron made in the Lake Superior region was made at this forge by Ariel N. Barney. Mr. Swineford says that the forge, which was named after Carp river, had "eight fires, from each of which a lump was taken every six hours, placed under the hammer, and forged into blooms four inches square and two feet long, the daily product being about three tons. The first lot of blooms made at this forge—the first iron made on Lake Superior, and the first from Lake Superior ores, except the small bar made by Mr. Olds—was sold to the late E. B. Ward, and from it was made the walking-beam of the side-wheel steamer *Ocean*." The forge was kept in operation until 1854, when it was abandoned, having in the mean time "made little iron and no money."

In 1849 the Marquette Iron Company, a Worcester (Massachusetts) organization, undertook the erection of a forge at Marquette, and in July, 1850, it was finished and put in operation. Mr. Swineford says that "it started with four fires, using ores from what are now the Cleveland and Lake Superior mines." It was operated irregularly until December, 1853, when it was burned down and was not rebuilt.

The Collins Iron Company was organized in 1853, with Edward K. Collins, of New York, at its head, and in 1854 it built a forge on Dead river, about three miles northwest of Marquette, and in the fall of 1855 the manufacture of blooms was commenced from ore obtained at the company's mines. This forge was in operation in 1858, after which time it seems to have been abandoned.

Another forge on Dead river was built in 1854 or 1855 by William G. McComber, Matthew McConnell, and J. G. Butler. The company failed in a few years, and in 1860 Stephen R. Gay erected Bancroft furnace on the site of the forge. Before 1860 every forge in Michigan appears to have been abandoned.

It will be observed that all of the first iron enterprises in the Lake Superior district were bloomary forges, the intention evidently having been to build up an iron industry similar to that of the Lake Champlain district.

The first pig iron produced in the Lake Superior region was made in 1858 by Stephen R. Gay, who then leased the forge of the Collins Iron Company and converted it in two days, at an expense of $50, into a miniature blast furnace. Mr. Gay writes to C. A. Trowbridge that this furnace was "2½ feet across the bosh, 8 feet high, and 12 inches square at the top and 15 inches square in the hearth," and would hold eight bushels of coal. He gives the following details of its first and only blast: "Began on Monday, finished and fired on Wednesday, filled with coal Thursday noon, blast turned on Friday noon, and thenceforth charged regularly with 1 bushel coal, 20 pounds of ore, and 7 pounds of limestone. Cast at six o'clock 500 pounds, and again at eight o'clock Saturday morning, half a ton in all, 92 pounds of which were forged by Mr. Eddy into an 85-pound bloom. This little furnace was run two and a half days, made 2½ tons, carrying the last eight hours 30 pounds of ore to a bushel of coal, equal to a ton of pig iron to 100 bushels of coal." These experiments were made in February.

The first regular blast furnace in the Lake Superior region was built by the Pioneer Iron Company in the present city of Negaunee, convenient to the Jackson mine. It was commenced in June, 1857, and in February, 1858, it was finished. Another stack was added in the same year. These furnaces took the name of the company. Pioneer No. 1 was put in blast in April, 1858, and Pioneer No. 2 on May 20, 1859. Both furnaces are now owned by the Iron Cliffs Company, and both were in operation in 1880. The second regular blast furnace in this region was the Collins furnace, built in 1858 by Stephen R. Gay, near the site of the Collins forge. It made its first iron on December 13 of that year. It was abandoned in 1873, owing to the failure of a supply of charcoal. Other furnaces in the Lake Superior region soon followed the erection of the Pioneer and Collins furnaces.

While these early furnaces and the few forges that have been mentioned were being built on the shore of Lake Superior two furnaces were built at or near Detroit to smelt Lake Superior ores. These were the Eureka furnace, at Wyandotte, built in 1855 by the Eureka Iron Company, of which Captain E. B. Ward was president, and put in blast in 1856; and the Detroit furnace, at Detroit, built in 1856 by the Detroit and Lake Superior Iron Manufacturing Company, of which George B. Russell was president, and put in blast in January, 1857. These furnaces and the others that have been mentioned used charcoal as fuel.

The first shipment of iron ore from the Lake Superior region was made in 1850, according to Mr. Swineford, and consisted of about five tons, "which was taken away by Mr. A. L. Crawford, of Newcastle, Pennsylvania." A part of this ore was made into blooms and rolled into bar iron. "The iron was found to be most excellent, and served to attract the attention of Pennsylvania ironmasters to this new field of supply for their furnaces and rolling mills." In 1853 three or four tons of Jackson ore were shipped to the World's Fair at New York.

The first use of Lake Superior ore in a blast furnace occurred in Pennsylvania. The important event is described in a letter to us from David Agnew, of Sharpsville, Mercer county, Pennsylvania, from which we quote as follows:

> The Sharon Iron Company, of Mercer county, Pennsylvania, about the year 1850 or 1851 purchased the Jackson mines, and, in expectation of the speedy completion of the Sault canal, commenced to open them, to construct a road to the lake, and to build docks at Marquette, expending a large sum of money in these operations. The opening of the canal was, however, unexpectedly delayed until June, 1855. Anxious to test the working qualities of this ore, the Sharon Iron Company brought, at great expense, to Erie, in the year 1853, about 70 tons of it, which was shipped by canal to Sharpsville furnace, near Sharon, owned by David and John P. Agnew. The first boat-load of ore, on its receipt, was immediately used in the furnace, partly alone and partly in mixture with native ores, and the experiment was highly successful, the furnace working well and producing an increased yield of metal, which was taken to the Sharon iron works and there converted into bar iron, nails, etc., of very superior quality. The second boat-load of ore was also brought to Sharpsville, but, having been intended to be left at the Clay furnace, owned by the Sharon Iron Company, was returned and used at that establishment.

In 1854, 1855, and 1856 Clay furnace continued the use of Lake Superior ore, most of it mixed with native ore, and used in all until August, 1856, about 400 tons. "Up to that date," as is stated by Mr. Frank Allen, its manager, "the working of it was not a success. In October, 1856, we gave the Clay furnace a general overhauling, put in a new lining and hearth, and made material changes in the construction of the same, put her in blast late in the fall, and in a few days were making a beautiful article of iron from Lake Superior ore alone." The fuel used at Sharpsville and Clay furnaces was the block coal of the Shenango valley. After 1856 other furnaces in Pennsylvania and in other states began the regular use of Lake Superior ore.

Until about 1877 the mining of iron ore in the Lake Superior region was confined to the territory in the immediate vicinity of Marquette. Since 1877, and particularly since 1879, a new iron-mining region has been developed in the northern part of Menominee county and the southern part of Marquette county, which takes its name from the former county. This region has proved to be very productive and the ore to be very desirable.

Since the discovery of iron ore in the Lake Superior region there have been built on the upper peninsula, in the vicinity of the mines, twenty-three furnaces, of which ten have been abandoned. There have also been built at other points in the state of Michigan, to use Lake Superior ore, fifteen furnaces, of which none had been abandoned in 1880. All of these furnaces, with the exception of two at Marquette, were built to use charcoal, and the abandonment of many of them in the upper peninsula is attributable to the scarcity of timber for fuel. Michigan is, however, the first state in the Union to-day in the manufacture of charcoal pig iron, having twenty-eight furnaces, of which all but one furnace at Marquette now use charcoal when in operation. The three bog-ore furnaces in Kalamazoo and Branch counties have been abandoned.

There are now two active rolling mills in Michigan—the Eureka, formerly the Wyandotte, at Wyandotte, built in 1855, and the rolling mill of the Baugh Steam Forge Company, at Detroit, built in 1877, the forge having been built in 1870. In 1871 a rolling mill was built at Marquette, which has since been abandoned. In 1872 a rolling mill was built at Jackson, in Jackson county, but it was torn down in 1879, and the machinery removed to the mill of the Springfield Iron Company at Springfield, Illinois.

From the Marquette *Mining Journal*, edited by Mr. Swineford, we take the following statement in gross tons of the aggregate production of the Lake Superior iron-ore mines for each calendar year since the commencement of mining operations in the district.

Year.	Gross tons.	Year.	Gross tons.	Year.	Gross tons.	Year.	Gross tons.
1856 and previous	86, 319	1863	203, 055	1870	859, 507	1877	1, 025, 129
1857	25, 646	1864	247, 059	1871	813, 984	1878	1, 125, 093
1858	22, 876	1865	193, 758	1872	948, 553	1879	1, 414, 182
1859	68, 832	1866	296, 713	1873	1, 195, 234	1880	1, 987, 598
1860	114, 401	1867	465, 504	1874	935, 488	Total	15, 321, 128
1861	114, 258	1868	510, 522	1875	910, 840		
1862	124, 169	1869	639, 097	1876	993, 311		

The iron ores of Lake Superior that are not used in Michigan are mainly shipped to Ohio, Pennsylvania, Illinois, and Wisconsin. About one-third of all the pig iron that is now manufactured in the United States is made from these ores.

Captain Ward was the most prominent of all the iron manufacturers of Michigan, his enterprise in this respect extending to other states than his own. He was born in Canada, of Vermont parents, on December 25, 1811, and died suddenly at Detroit, on January 2, 1875.

In 1870 Michigan ranked eighth in the list of iron-producing states, and in 1880 its rank was the same.

THE EARLY MANUFACTURE OF IRON IN WISCONSIN.

In 1840 the census mentions a furnace in "Milwaukee town," which produced three tons of iron in that year. This was doubtless a small foundry. In 1859 Lesley mentions three charcoal furnaces in Wisconsin—Northwestern, or Mayville, at Mayville, in Dodge county, forty miles northwest of Milwaukee, and five miles from the Iron ridge, built in 1853 by the owners of Mishawaka furnace in Indiana, and to which a foundry was added in 1858; Ironton, at Ironton, in Sauk county, built in 1857 by Jonas Tower; and Black River, built in 1857 by a German company on the east bank of Black river, near the falls, in German county. Of these furnaces at least one, Ironton, was built to produce castings. A description of it in 1858 says: "It is a small blast furnace capable of producing about three tons of iron per day, and intended for the manufacture of stoves, castings, etc." The Ironton furnace still produces castings as well as pig iron. The Mayville furnace is also still in operation, having been rebuilt in 1872, but the Black River furnace has long been abandoned. There appear to have been no forges or bloomaries in Wisconsin in 1840, 1850, or 1860.

The furnaces which have been mentioned were all that the state could boast until 1865, when a charcoal furnace at Iron Ridge, in Dodge county, was built by the Wisconsin Iron Company. This was soon followed by several other furnaces, some of which were built to use native ores and some to use Michigan ores from Lake Superior. The Appleton Iron Company built two furnaces at Appleton, in Outagamie county, in 1871 and 1872; C. J. L. Meyer built a furnace at Fond du Lac in 1874, but it had not been put in blast down to November 15, 1881; the Fox River Iron Company built two furnaces at West Depere, in Brown county, in 1869 and 1872; the Green Bay Iron Company built a furnace at Green Bay, in the same county, in 1870; and the National Furnace Company built two furnaces at Depere, in the same county, in 1869 and 1872. All of these furnaces were built to use charcoal. In 1870 and 1871 the Milwaukee Iron Company built two large furnaces at Bay View, near Milwaukee, and in 1873 the Minerva Iron Company built a furnace at Milwaukee. These three furnaces were built to use mineral fuel and Lake Superior ores. A furnace called Richland was built in 1876 at Cazenovia, in Richland county, and was torn down in 1879. In 1880 there were fourteen furnaces in the state, eleven of which used charcoal and three used anthracite coal and coke.

Wisconsin had no rolling mill until 1868, when its first and thus far its only mill was built at Milwaukee by the Milwaukee Iron Company, of which Captain E. B. Ward was a leading member. This was from the first a large mill, and was built to roll new iron rails. In 1874 a merchant bar mill was added. This mill and the two Bay View furnaces are now operated by the North Chicago Rolling Mill Company.

Wisconsin advanced rapidly in the manufacture of iron in the decade between 1870 and 1880, and in the latter year it ranked sixth among the iron-producing states of the Union. In 1870 it was twelfth in rank.

EARLY IRON ENTERPRISES IN MISSOURI.

Missouri has an iron history which antedates its admission into the Union in 1820. The celebrated iron district, in Iron and Saint Francois counties, which embraces Iron Mountain and Pilot Knob, contained a blast furnace before 1819, and possibly as early as 1812 or 1814, as we find in a prospectus of the Missouri Iron Company, written in 1837, the statement that "cannon balls, made from the Iron Mountain ore during the late war, after having been exposed for several years to the open atmosphere and rains, still maintained their original metallic lustre." The cannon balls referred to would probably be used for the defense of New Orleans. This furnace was called Springfield, and was situated in the vicinity of Iron Mountain, and about forty miles from the Mississippi river, but its exact location we cannot learn. It was in Washington county, as the county was then bounded. In 1858 Lesley says that "an old charcoal furnace was once in operation in township 33, range 4 north, half section 2" of Iron county. This may have been Springfield furnace. John Perry and Colonel Ruggles, whether jointly or severally the authority from which we quote does not state, operated Springfield furnace "for more than fifteen years" prior to 1837. In that year the furnace was in operation, when it was called "a small furnace." A forge was then attached to it, and "a blooming forge" was promised "the ensuing year."

Maramec furnace, in Phelps county, about sixty miles west of Iron Mountain, was built in 1826, and rebuilt many years afterwards. It is still standing but not in operation. At an early day a forge was added to the furnace, to convert its pig iron into bar iron, and this forge, with eight fires, is also still standing but not in operation, its product when last employed being charcoal blooms. In 1843 a rolling mill was added, but it was "abandoned after one year's trial, because of the sulphur in the stone coal obtained at a bank fourteen miles southeast."

In the census of 1840 Missouri is credited with two furnaces—one in Crawford county, and one in Washington county. It is also credited with three forges in Crawford county and one in Washington county. The furnace in Crawford county was Maramec—Phelps county not having been then organized, and the forges in Crawford county were probably attached to Maramec furnace. The furnace in Washington county was Springfield, and the forge was doubtless the one attached to this furnace. We do not hear of Springfield furnace and forge after this time.

In 1836 the remarkable iron-ore mountains already mentioned—Iron Mountain and Pilot Knob—attracted the attention of some Missouri capitalists, and in the fall of that year the Missouri Iron Company, with a nominal capital of $5,000,000, was formed to utilize their ores, the legislature chartering the company on December 31, 1836. In January, 1837, the company was fully organized under the presidency of Silas Drake, of Saint Louis, who was soon succeeded by J. L. Van Doren, of Arcadia, but active work in the development of its property does not appear to have been undertaken until some years afterwards, when a few furnaces were erected at the foot of the mountains by other companies. In 1846 a furnace was built at the southwest base of Little Iron Mountain, which was followed in 1850 by another furnace at the same place, and in 1854 by still another. In 1849 a furnace was built on the north side of Pilot Knob, which was followed in 1855 by another at the same place. These were all charcoal furnaces, and were exceptionally well managed in 1857, when they were visited and described by Charles B. Forney, of Lebanon, Pennsylvania. At that time two of the Iron Mountain furnaces and one of the Pilot Knob furnaces were blown with hot-blast.

In 1846 Moselle furnace was built at Moselle, in Franklin county, and in 1859 a furnace was built at Irondale, in Washington county—both furnaces to use charcoal. These, with the furnaces previously mentioned, appear to be all that were built in Missouri prior to 1860. It will be observed that they were all built in the same part of the state—southwest of Saint Louis.

The iron industry of Saint Louis appears to have had its commencement in 1850, when the Saint Louis, or Laclede, rolling mill was built. It was followed by the Missouri rolling mill, built in 1854; by the Allen rolling mill, built in 1855; by the Pacific rolling mill, built in 1856; and by Raynor's rolling mill, built in 1858. In 1880 there were seven rolling mills in Saint Louis, and there were no others in Missouri. One of these mills, the Vulcan, built in 1872, was connected with the Bessemer steel works of the Vulcan Steel Company, and rolled steel rails. Two other mills rolled light rails and bar iron. The Bessemer works of the Vulcan Steel Company were built in 1875 and 1876. The state had no other steel works in 1880.

Saint Louis had no blast furnaces until 1863, when the Pioneer furnace was built at Carondelet, to use coke. It was in blast in 1873, but in 1874 it was torn down and removed by the Pilot Knob Iron Company. In 1869 the Vulcan Iron Works, now called the Vulcan Steel Company, built two furnaces, which were followed in 1872 by another furnace built by the same company. In 1870 and 1872 the South Saint Louis Iron Company built two furnaces; in 1870 the Missouri Furnace Company built two; and in 1873 Jupiter furnace was built, but it was not put in blast until 1880. These eight furnaces were all built to use Illinois or Connellsville coke and Missouri ores.

In 1871 a large forge was built at South Saint Louis, called the Germania iron works, to make charcoal blooms from pig iron, but it has been idle for several years. In 1873 a forge was built at Kimmswick, in Jefferson county, and enlarged and remodeled in 1877 by the Peckham Iron Company, its product after the enlargement being charcoal blooms from the ore. It was in operation in 1880.

There were in 1880 ten charcoal furnaces and eight coke furnaces in Missouri, and two charcoal furnaces were in course of erection. During the decade between 1870 and 1880 the iron industry of Missouri was subject to exceptional vicissitudes, but in the latter year it was apparently placed upon a more substantial basis of prosperity than it had ever before occupied, and to-day its future is hopeful, although it has lost the prominent rank it held among iron-producing states in 1870. It then ranked sixth, but in 1880 it had fallen to the tenth place. The shipments of iron ore from Missouri to other states have for many years averaged over 100,000 tons annually.

THE MANUFACTURE OF IRON IN VARIOUS WESTERN STATES AND IN THE TERRITORIES.

Minnesota has one furnace, situated at Duluth, which was commenced in 1873 and not finished until 1880, when it was put in blast. Its projectors failed, and after passing through the hands of creditors it was purchased by the Duluth Iron Company, its present owners. It uses charcoal as fuel and obtains its supply of ore from the Lake Superior mines in Michigan.

In 1857 a bloomary called Big Creek was built about six miles southwest of Smithville, in Lawrence county, Arkansas, by Alfred Bevens & Co. In 1858 Lesley describes it as "a bloomary with two fires and a hammer, making 250 pounds of swedged iron per day per fire, with a cold-blast in November, 1857, but has now a hot-blast, and is making perhaps 800 pounds, using 300 bushels of charcoal to the ton of finished bars, made out of brown hematite ore." The bloomary was driven by water-power. It is not mentioned in the census of 1860 or 1870, and has been abandoned. We have no knowledge of any other iron-manufacturing enterprise having ever existed in this state.

Texas does not appear to have had any iron enterprises of any kind before the civil war, but three small furnaces are reported to have been abandoned at the close of the war. They were probably built during its continuance to meet the necessities of the Confederate government. In 1869 a charcoal furnace was built at Jefferson, in Marion county, which was rebuilt in 1874. It was in operation in 1880, and was then the only furnace in the state. It is called Kelly furnace, after Mr. G. A. Kelly, the president of the Jefferson Iron Company, by which it is owned. It uses brown hematite ore found in the neighborhood.

Kansas had two rolling mills in operation in 1880, both of which were built to reroll rails. One of these, at Rosedale, in Wyandotte county, three miles from Kansas City, is owned by the Kansas Rolling Mill Company. This mill was once in operation at Decatur, Illinois, where it was built in 1870, and whence it was removed to Rosedale in 1875. The other mill is located at Topeka, and was built in 1874 by the Topeka Rolling Mill Company. This mill was burned in April, 1881.

Nebraska had one iron enterprise in operation in 1880—a rolling mill and cut-nail factory at Omaha, owned by the Omaha Iron and Nail Company. These works were first built at Dunleith, Illinois, in 1875 and 1876, and were removed to Omaha in 1879 and considerably enlarged. They have a capacity of 60,000 kegs of nails annually. They use old iron exclusively.

In 1877 a rolling mill was removed by William Faux from Danville, Pennsylvania, to Pueblo, Colorado, and put in operation on March 1, 1878, its product being rerolled rails. In the same year it was removed to Denver. It was in operation in 1880, rolling bar iron as well as rerolling rails. This mill is now owned by the Colorado Coal and Iron Company. In 1880 this company commenced the erection of a large coke furnace at South Pueblo, in Colorado, which was put in blast on September 7, 1881. In the former year it commenced the construction of Bessemer steel works at the same place. These enterprises are the pioneers of a very extensive and complete iron and steel establishment which has been projected by this company, and which is to embrace two blast furnaces, Bessemer steel works, and a rolling mill for rolling steel rails. Coke works on an extensive scale have already been built by the company at El Moro. The number of ovens now completed is over 200, and others are being erected. Colorado has apparently a great future before it in the production of iron and steel, all the elements necessary to their manufacture being found within its limits.

The Union Pacific Railroad Company built a rolling mill to reroll rails at Laramie City, Wyoming territory, in 1874, and put it in operation in April, 1875. It was in operation in 1880.

In 1859 Lesley reported a forge in Utah territory, "smelting iron ore found in the mountains east of Salt Lake City, but no reliable information could be obtained respecting it." It does not appear in the census of 1860. Dr. J. S. Newberry writes that in 1880 he "visited the deposit of crystalline iron ore of Iron county, in the southern part of the territory. These ore beds have been long known, and were to some extent utilized by the Mormons in their first advent thirty years ago. The iron region referred to lies nearly 300 miles directly south of Salt Lake City." In 1874 the Great Western Iron Company, of which John W. Young was president, built a charcoal furnace at Iron City, in Iron county. It was in blast in that year and in the two following years, but has since been idle.

This is a very small furnace, being only nineteen feet high and four feet wide at the boshes, with a daily capacity of five tons. The erection of a much larger furnace, also to use charcoal, was commenced at Ogden City, Utah, in 1875, by the Ogden Iron Manufacturing Company, and was intended to use hematite and magnetic ores found in the neighborhood. The furnace had not been put in blast at the close of 1880, and was not then entirely completed. The same company commenced to build a rolling mill at Ogden City in 1875, which had not been completed in 1880.

California has for many years had a very complete rolling mill at San Francisco, owned by the Pacific Rolling Mill Company. It was first put in operation on July 25, 1868. It rolls rails, bar iron, angle iron, shafting, etc. It was in operation in 1880, and has always been well employed. The California Iron Company commenced in 1880 the erection of a charcoal furnace at Clipper Gap, in Placer county, where iron ore had been discovered, and in the same year the Central Pacific Railroad Company commenced the erection at Sacramento City of a small mill to roll bar iron. The Clipper Gap furnace was successfully put in blast in April, 1881, and the first cast was made on the 24th of that month. California may have had a forge or two while it was Mexican territory, but it is doubtful whether its Mexican inhabitants ever engaged in the manufacture of iron.

At Oswego, in Clackamas county, Oregon, a furnace to use charcoal was built in 1866 and enlarged in 1879. It was in blast in 1880, when it produced 5,000 net tons of pig iron. Its charcoal is made exclusively from the fir tree.

A furnace at Irondale, near Port Townsend, in Jefferson county, Washington territory, was built in 1880, and put in blast early in 1881. It is a small furnace, and was built to make charcoal pig iron from Puget sound bog ore mixed with Texada Island magnetic ore. It is owned by the Puget Sound Iron Company, of Port Townsend. The company is said to contemplate the erection of another blast furnace on Texada Island, which is in British Columbia.

THE FIRST IRON WORKS IN CANADA.

A brief notice in this report of the first iron works in Canada seems to be proper, more especially as these works are still in operation. They are known as the Forges of the St. Maurice, and are located near Three Rivers, in the province of Quebec. Mr. A. T. Freed, one of the editors of the Hamilton (Ontario) *Spectator*, informs us that iron ore in the vicinity of Three Rivers was discovered as early as 1666. In 1685 the Marquis de Denouville sent to France a sample of the ore at Three Rivers, which the French ironworkers found to be "of good quality and percentage." In 1672 the Count de Frontenac reported that he had begun to mine the ore at Three Rivers. He strongly urged the establishment of forges and a foundry. But no effort to establish iron works at this place appears to have been made until the next century, when the St. Maurice works were undertaken. Dr. T. Sterry Hunt, of Montreal, has supplied us with the following brief history of these works.

> King Louis XIV. gave a royal license in 1730 to a company to work the iron ores of St. Maurice and the vicinity, and advanced 10,000 livres for aid in erecting the furnace, etc. No work being done he took back the license, and in 1735 granted it to a new company, which received 100,000 livres in aid, and in 1737 built a blast furnace. In 1843, however, the works reverted to the crown, and were worked for the king's profit. He then sent out from France skilled workmen, who rebuilt, in part at least, the blast furnace as it now stands, and erected a Walloon hearth, which is still in use, for refining. The works became the property of the British Crown at the conquest, and were at first rented to a company and afterwards sold. Smelting has been carried on at this place without interruption to the present time, the bog ores of the region being exclusively used. Three tons of ore make one ton of iron.
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> There seems to be no doubt that the stack is the one built in 1737, and it is still in blast. It is 30 feet high, and the internal diameter at the hearth is 2½ feet, at the boshes 7 feet, and at the throat 3½ feet. There are two tuyeres, and the blast is cold, with a pressure of one pound. The daily production of iron is four tons, and the consumption of charcoal is 180 bushels, (French,) of about 12 pounds each, per ton of iron. The metal was formerly used in the district for ordinary castings, but is now in great demand for car wheels. A very little is, however, refined in the Walloon hearth, and is esteemed by the blacksmiths for local use. The analysis of a sample of the gray pig of St. Maurice made by me in 1868 gave: Phosphorus, .450; silicon, .860; manganese, 1.240; graphite, 2.820; carbon combined, 1.100.

In addition to the above information from Dr. Hunt, we find some facts of interest concerning the St. Maurice iron works in Peter Kalm's *Travels into North America*, written in 1749.

> The iron work, which is the only one in this country, lies three miles to the west of Trois Rivieres. Here are two great forges, besides two lesser ones to each of the great ones, and under the same roof with them. The bellows were made of wood, and everything else as it is in Swedish forges. The melting ovens stand close to the forges, and are the same as ours. The ore is got two French miles and a half from the iron works, and is carried thither on sledges. It is a kind of moor ore, which lies in veins, within six inches or a foot from the surface of the ground. Each vein is from six to eighteen inches deep, and below it is a white sand. The veins are surrounded with this sand on both sides, and covered at the top with a thin mould. The ore is pretty rich and lies in loose lumps in the veins, of the size of two fists, though there are a few which are eighteen inches thick. These lumps are full of holes, which are filled with ochre. The ore is so soft that it may be crushed betwixt the fingers. They make use of a grey limestone, which is broke in the neighborhood, for promoting the fusibility of the ore; to that purpose they likewise employ a clay marble, which is found near this place. Charcoals are to be had in great abundance here, because all the country round this place is covered with woods which have never been stirred. The charcoals from evergreen trees, that is from the fir kind, are best for the forge, but those of deciduous trees are best for the smelting oven. The iron which is here made was to me described as soft, pliable, and tough, and is said to have the quality of not being attacked by rust so easily as other iron; and in this point there appears a great difference between the Spanish iron and this in shipbuilding.
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> This iron work was first founded in 1737, by private persons, who afterwards ceded it to the king; they cast cannon and mortars here, of different sizes, iron stoves, which are in use all over Canada, kettles, etc., not to mention the bars which are made here. They have likewise tried to make steel here, but cannot bring it to any great perfection, because they are unacquainted with the manner of preparing it.

Mr. Freed says that the French company which established the St. Maurice iron works in 1737 was known as *Cugnet et Cie.* He also says that there was a French garrison at Trois Rivieres at the time, and that the soldiers were the principal workmen. He sends us a copy of a report made in 1752 to M. Bigot, Intendant of New France, residing at Quebec, by M. Franquet, who had been instructed to visit and examine the St. Maurice works. From this report the following extract is taken:

> On entering the smelting forge I was received with a customary ceremony: the workmen moulded a pig of iron about 15 feet long for my especial benefit. The process is very simple: it is done by plunging a large ladle into the liquid-boiling ore and emptying the material into a gutter made in the sand. After this ceremony I was shown the process of stove moulding, which is also a very simple but rather intricate operation. Each stove is in six pieces, which are separately moulded; they are fitted into each other and form a stove about three feet high. I then visited a shed where the workmen were moulding pots, kettles, and other hollow-ware. On leaving this part of the forge we were taken to the hammer forge, where bar iron of every kind is hammered out. In each department of the forges the workmen observed the old ceremony of brushing a stranger's boots, and in return they expect some money to buy liquor to drink the visitor's health. The establishment is very extensive, employing upward of 180 men. Nothing is consumed in the furnaces but charcoal, which is made in the immediate vicinity of the post. The ore is rich, good, and tolerably clean. Formerly it was found on the spot; now the director has to send some little distance for it. This iron is preferred to the Spanish iron, and is sold off in the king's stores in Quebec.

Still quoting from Mr. Freed, we learn that in 1815 a visitor to the St. Maurice works wrote as follows: "The foundry itself is replete with convenience for carrying on an extensive concern; furnaces, forges, casting-houses, workshops, etc. The articles manufactured consist of stoves of all descriptions that are used throughout the provinces, large caldrons or kettles that are used for making potashes, machinery for mills, with cast or wrought iron-work of all denominations. There are likewise large quantities of pig and bar iron exported. The number of men employed is from 250 to 300." The works remained in the ownership of the British government until 1846, when they were sold to Henry Stuart. The latest information concerning them is contained in a report to the Dominion Parliament in 1879, which says that they were then owned by F. Macdougall & Son, of Three Rivers, and were using bog ore and making good iron with charcoal. "The first furnace was erected in 1737; still running; capacity four tons."

THE MANUFACTURE OF IRON IN THE UNITED STATES WITH ANTHRACITE COAL.

The details which have been given in preceding chapters of the early iron history of the Atlantic states of the Union relate almost entirely to the manufacture of charcoal iron, no other fuel than charcoal having been used in American blast furnaces until about 1840. The period of our iron history prior to 1840 may therefore very properly be styled the charcoal era. The later development of the iron and steel industries of the Atlantic states and of other states which have a more modern iron history will be generally instead of provincially treated in the present and succeeding chapters.

The line which separates the charcoal era of our iron history from the era which succeeded it, and which may be said to still continue, is marked by the introduction of anthracite and bituminous coal in the manufacture of pig iron. This innovation at once created a revolution in the whole iron industry of the country. Facilities for the manufacture of iron were increased; districts which had been virtually closed to the manufacture because of a local scarcity of charcoal were now opened to it; and the cheapening of prices, which was made possible by the increased production and consequent increased competition, served to stimulate consumption. A notable effect of the introduction of mineral fuel was that, while it seriously affected the production of charcoal pig iron in states which, like Pennsylvania, possessed the new fuel, it did not injuriously affect the production of charcoal pig iron in other states. Some of these states, like Michigan, which scarcely possessed an iron industry of any kind in 1840, now manufacture large quantities of charcoal pig iron. The country at large now annually makes more charcoal pig iron than it did in 1840 or in any preceding year. The introduction of mineral fuel did not, therefore, destroy our charcoal-iron industry, but simply added to our resources for the production of iron. This introduction, however, marked such radical changes in our iron industry, and so extended the theater of this industry, that we are amply justified in referring to it as a revolution, and as one which ended the distinctive charcoal era.

Of the two forms of mineral fuel—anthracite and bituminous coal—anthracite was the first to be largely used in American blast furnaces, and for many years after its adaptability to the smelting of iron ore was established it was in greater demand for this purpose than bituminous coal. In recent years the relative popularity of these two fuels for blast-furnace use has been reversed.

The natural difficulties in the way of the successful introduction of anthracite coal in our blast furnaces were enhanced by the fact that, up to the time when we commenced our experiments in its use, no other country had succeeded in using it as a furnace fuel. The successive steps by which we were enabled to add the manufacture of anthracite pig iron to that of charcoal pig iron will be presented in chronological order.

In 1840 Jesse B. Quinby testified, in the suit of Farr & Kunzi against the Schuylkill Navigation Company, that in 1815 he used anthracite coal for a short time at Harford furnace, Maryland, mixed with one-half charcoal.

Between 1824 and 1828 Peter Ritner, whose brother, Joseph Ritner, afterwards became governor of Pennsylvania, was successful for a short time in using anthracite coal in a charcoal furnace in Perry county, Pennsylvania, mixed with charcoal. In 1826 the Lehigh Coal and Navigation Company erected near Mauch Chunk, in Pennsylvania, a small furnace intended to use anthracite coal in smelting iron ore. The enterprise was not successful. In 1827 unsuccessful experiments in smelting iron ore with anthracite coal from Rhode Island were made at one of the small blast furnaces in Kingston, Plymouth county, Massachusetts. In 1827 and 1828 a similar failure in the use of anthracite coal took place at Vizille, in France. All of these experiments failed because the blast used was cold. The hot-blast had not then been invented.

In 1828 James B. Neilson, of Scotland, obtained a patent for the use of hot air in the smelting of iron ore in blast furnaces, and in 1829 pig iron was made in several Scotch furnaces with the apparatus which he had invented. But the coal used was bituminous. It was not until 1836 that the smelting of iron ore with anthracite coal by means of the hot-blast invented by Neilson was undertaken in Great Britain. In the mean time the application of the hot-blast to anthracite coal in American furnaces was successfully experimented upon by an enterprising German-American, the Rev. Dr. Frederick W. Geissenhainer, a Lutheran clergyman of New York city. A copy in his own handwriting of a letter written by him in November, 1837, to the commissioner of patents, gives some interesting and valuable details concerning his experiments. In this letter, which we have before us, he says: "I can prove that, in the month of December, 1830, and in the months of January, February, and March, 1831, I had already invented and made many successful experiments as well with *hot air* as with an atmospheric air blast to smelt iron ore with anthracite coal in my small experimenting furnace here in the city of New York."

On the 5th of September, 1831, Dr. Geissenhainer filed in the patent office at Washington an account of his invention, for which he claimed a patent. On the 19th of December, 1833, a patent was granted to him for "a new and useful improvement in the manufacture of iron and steel by the application of anthracite coal." From the long and remarkably clear and learned specification by the Doctor, which accompanied the patent, we learn that he discovered that iron ore could be smelted with anthracite coal by applying "a blast, or a column, or a stream or current of air in or of such quantity, velocity, and density or compression as the compactness or density and the continuity of the anthracite coal requires. The blast may be of common atmospheric *or of heated air*. Heated air I should prefer in an economical point of view."

The Doctor distinctly disclaims in his specification "an exclusive right of the use of heated air for any kind of fuel," from which it is to be inferred that he had full knowledge of Neilson's experiments with hot air in Scotland. He appears to have relied for success largely upon the effect of a strong blast.

The patent having been granted, Dr. Geissenhainer proceeded to build a furnace for the practical application of his invention. This was Valley furnace, situated on Silver creek, in Schuylkill county, Pennsylvania, about ten miles northeast of Pottsville. In August and September, 1836, he was successful in making pig iron at this furnace exclusively with anthracite coal as fuel. His own testimony on this point is given in the letter from which we have already quoted. The blast used varied from 3½ to 3¼, to 3, and to 2¾ pounds to the square inch. That the furnace did not continue to make iron after the fall of 1836 is explained by Dr. Geissenhainer to have been due to an accident to its machinery. He adds: "My furnace would have been put in operation again long before this time with strong iron machinery, and a hot-air apparatus, had I not been prevented by the pressure of the times and by a protracted severe sickness from bestowing my attention to this matter. The drawings for the iron machinery and for the hot-air apparatus are already in the hands of Messrs. Haywood & Snyder, in Pottsville, who are to do the work." The blast used in August and September, 1836, was heated.

Before the Doctor's plans for improving his furnace were completed he was called to another world. He died at New York on the 27th of May, 1838, aged sixty-six years and eleven months. He was born at Muhlberg, in the electorate of Saxony, in 1771, and came to this country when about eighteen years old. His remains rest in the family burial vault in the Lutheran cemetery in Queens county, New York.

Prior to his erection of Valley furnace Dr. Geissenhainer had been engaged in the development of the iron and coal resources of Pennsylvania. As early as 1811 he was associated with Peter Karthaus, of Baltimore, in the mining of bituminous coal in Clearfield county, and a few years later in the ownership of a charcoal furnace in that county. For two or three years before 1830 he owned and operated a small charcoal furnace in Schuylkill county, and it was near this furnace that he afterwards built Valley furnace. Attached to the charcoal furnace was a puddling furnace. He was the pioneer in the development of the Silver creek anthracite coal mines, the projector of the Schuylkill Valley railroad, and the sole owner of the Silver Creek railroad. Dr. Geissenhainer was, as will be seen, a man of great enterprise. His memory as the first successful manufacturer of pig iron with anthracite coal and the hot-blast is entitled to greater honor than it has yet received.

On the 28th of September, 1836, when Dr. Geissenhainer's Valley furnace was successfully making pig iron, and almost three years after the Doctor had obtained a patent for his invention, George Crane, the owner of several furnaces at Yniscedwin, in South Wales, obtained a patent from the British government for the application of the hot-blast to the smelting of iron ore with anthracite coal. On the 7th of February, 1837, he successfully commenced the use of anthracite with the hot-blast at one of his furnaces, obtaining 36 tons a week. In May of that year Solomon W. Roberts, of Philadelphia, visited his works and witnessed the complete success of the experiment, which was the first successful experiment with anthracite coal in a blast furnace in Europe.

Mr. Crane endeavored to obtain a patent in this country for his application of the hot-blast to anthracite coal in the blast furnace, but was unsuccessful, Dr. Geissenhainer's invention being accorded priority. His patent, which was only for the United States, was purchased from his executors in 1838 by Mr. Crane, who, in November of that year, patented some additions to it in this country. The patents could not be enforced here, but Mr. Crane compelled the ironmasters of Great Britain to pay him for the use of his invention. Dr. Geissenhainer never attempted to enforce his patent. The consideration which his executors received from Mr. Crane was $1,000 and the privilege of erecting, free of royalty, fifteen furnaces for the use of anthracite coal with the hot-blast. The following advertisement by Mr. Crane's agents in this country we take from a Philadelphia newspaper published in December, 1839:

> ANTHRACITE IRON.—The subscribers, agents of George Crane, Esq., are prepared to grant licenses for the manufacture of iron with anthracite coal, under the patent granted to Mr. Crane by the United States, for smelting iron with the above fuel, in addition to which Mr. Crane holds an assignment of so much of the patent granted to the late Reverend Dr. Geissenhainer as pertains to making iron with anthracite coal. The charge will be 25 cents per ton on all thus manufactured. It has been completely successful both in Wales and at Pottsville, one furnace at the latter place yielding an average product of 40 tons per week of excellent iron. All persons are cautioned against infringing upon either of the above patents. Any application of hot-blast in the smelting of iron ore with anthracite coal, without a license, will be an infringement, and will be treated accordingly. Apply to A. & G. RALSTON & CO.,
> dec 9—1m 4 South Front st.

Mr. Crane was born about 1785 at Bromsgrove, in Worcestershire, England, whence he removed in 1824 to Wales.

Two interesting experiments in the use of anthracite coal in the blast furnace were made in this country about the time that Dr. Geissenhainer was successful with his experiment at Valley furnace. In 1836 and 1837 John Pott experimented at Manheim furnace, at Cressona, in Schuylkill county, with anthracite coal as a fuel for smelting iron ore. He first used a mixture of anthracite coal and charcoal with cold-blast. The results accomplished were so encouraging that he added a hot-blast and gradually reduced the proportion of charcoal until only anthracite was used. This he used alone and successfully for a short time. But the blast was too weak, and the furnace was not long in operation. Before necessary improvements could be made it was destroyed by a freshet. In 1837 Jarvis Van Buren, acting for a company, built a furnace at South Easton, in Northampton county, for the purpose of experimenting with anthracite coal. Early in 1838 he was successful in making 20 tons of pig iron, when further operations were stopped in consequence of the blast being too weak. We are not informed whether it was hot or cold.

It is claimed that a successful experiment in the manufacture of pig iron with anthracite coal was made in 1837 by a Mr. Bryant, in a foundry cupola at Manayunk, near Philadelphia. The blast used was produced by "wooden bellows." A few tons of the iron made were used by Parke & Tiers, the owners of the foundry, "and proved to be of good gray quality and of uncommon strength." The experiment was conducted under the auspices of this firm and of Mr. Abraham Kunzi, of the firm of Farr & Kunzi, manufacturing chemists, of Philadelphia. We cannot learn whether the blast was hot or cold.

The record which we shall now give of the successful use of anthracite coal in American furnaces, after Dr. Geissenhainer and George Crane had established the practicability of such use, will embrace only a few of the early anthracite furnaces, and this we condense from Walter R. Johnson's *Notes on the Use of Anthracite*, published in 1841, and from William Firmstone's *Sketch of Early Anthracite Furnaces*, published in the third volume of the *Transactions of the American Institute of Mining Engineers.*

Late in 1837 Joseph Baughman, Julius Guiteau, and Henry High, of Reading, experimented in smelting iron ore with anthracite coal in the old furnace of the Lehigh Coal and Navigation Company at Mauch Chunk, using about 80 per cent. of anthracite. The results were so encouraging that they built a small water-power furnace near the Mauch Chunk weigh-lock, which was completed in July, 1838. Blast was applied to this furnace on August 27, and discontinued on September 10, the temperature being heated up to about 200° Fahrenheit. The fuel used was mainly anthracite, but not exclusively. A new heating apparatus was procured, placed in a brick chamber at the tunnel-head, and heated by a flame therefrom. Blast was applied late in November, 1838, the fuel used being anthracite exclusively, and "the furnace worked remarkably well for five weeks," up to January 12, 1839, when it was blown out for want of ore. Some improvements were made, and on July 26, 1839, the furnace was again put in blast, and so continued until November 2, 1839. Mr. F. C. Lowthorp, of Trenton, was one of the partners at this time. For "about three months" no other fuel than anthracite was used, the temperature of the blast being 400° to 600°. About 100 tons of iron were made.

The next furnace to use anthracite was the Pioneer, built in 1837 and 1838 at Pottsville, by William Lyman, of Boston, under the auspices of Burd Patterson, and blast was unsuccessfully applied on July 10, 1839. Benjamin Perry then took charge of it, and blew it in on October 19, 1839, with complete success. This furnace was blown by steam-power. The blast was heated in ovens at the base of the furnace, with anthracite, to a temperature of

600°. The product was about 28 tons a week of good foundry iron. The furnace continued in blast for some time. A premium of $5,000 was paid by Nicholas Biddle and others to Mr. Lyman, as the first person in the United States who had made anthracite pig iron continuously for one hundred days.

Danville furnace, in Montour county, was successfully blown in with anthracite in April, 1840, producing 35 tons of iron weekly with steam-power. Roaring Creek furnace, in Montour county, was next blown in with anthracite on May 18, 1840, and produced 40 tons of iron weekly with water-power.

A charcoal furnace at Phœnixville, built in 1837 by Reeves, Buck & Co., was blown in with anthracite on June 17, 1840, by William Firmstone, and produced from 28 to 30 tons of pig iron weekly with water-power. The hot-blast stove, which was planned and erected by Julius Guiteau, of the Mauch Chunk furnace, was situated on one side of the tunnel-head, and heated by the flame of the furnace. This furnace continued in blast until 1841.

Columbia furnace, at Danville, was blown in with anthracite by Mr. Perry on July 2, 1840, and made from 30 to 32 tons of iron weekly, using steam-power.

The next furnace to use anthracite, and the last one we shall mention, was built at Catasauqua, for the Lehigh Crane Iron Company, in 1839, by David Thomas, who had been associated with Mr. Crane in his experiments at Yniscedwin. It was successfully blown in by him on the 3d of July, 1840, and produced 50 tons a week of good foundry iron, water-power being used. This furnace was in active use until 1879, when it was torn down. Mr. Firmstone says that "with the erection of this furnace commenced the era of higher and larger furnaces and better blast machinery, with consequent improvements in yield and quality of iron produced."

David Thomas is still living at Catasauqua in the full enjoyment of all his faculties—the oldest ironmaster in the United States in length of service, and, next to Peter Cooper, the oldest in years. He is now 87 years old. He was born on November 3, 1794, at a place called, in English, Grey House, within two and a half miles of the town of Neath, in the county of Glamorgan, South Wales. He landed in the United States on June 5, 1839, and on July 9 of that year he commenced to build the furnace at Catasauqua. Father Thomas's character and services to the American iron trade are held in high honor by every American iron and steel manufacturer. William Cullen Bryant and Mr. Thomas were born on the same day.

In 1835 the Franklin Institute, of Philadelphia, offered a premium of a gold medal "to the person who shall manufacture in the United States the greatest quantity of iron from the ore during the year, using no other fuel than anthracite coal, the quantity to be not less than twenty tons," but we cannot learn that it was ever awarded to any of the persons who were instrumental in establishing the manufacture of anthracite pig iron in this country.

The discovery that anthracite coal could be successfully used in the manufacture of pig iron gave a great impetus to the iron industry in Maryland, New Jersey, and New York, as well as in Pennsylvania. In 1840 there were only six furnaces in the United States which used anthracite coal, and they were all in Pennsylvania. The first anthracite furnace outside of Pennsylvania was built at Stanhope, New Jersey, in 1840 and 1841, by the Stanhope Iron Company, and it was successfully blown in on April 5, 1841. On the 1st of April, 1846, there were forty-two furnaces in Pennsylvania and New Jersey which used anthracite coal as fuel, their annual capacity being 122,720 gross tons. In 1856 there were 121 anthracite furnaces in the country which were either "running or in running order"—ninety-three in Pennsylvania, fourteen in New York, six in Maryland, four in New Jersey, three in Massachusetts, and one in Connecticut. Soon after 1856 many other furnaces were built to use anthracite as fuel.

Although the revolution to which we have referred properly dates from the first successful use of anthracite coal in the blast furnace, this fuel had been previously used in a small way in our country in other ironmaking operations. Its use in these operations became general about the time when pig iron was made with it.

The first use of anthracite coal in connection with the manufacture of iron in the United States dates from 1812, in which year Colonel George Shoemaker, of Pottsville, Pennsylvania, loaded nine wagons with coal from his mines at Centreville, and hauled it to Philadelphia, where with great difficulty he sold two loads at the cost of transportation and gave the other seven loads away. He was by many regarded as an impostor for attempting to sell stone to the public as coal. Of the two loads sold, one was purchased by White & Hazard, for use at their wire works at the Falls of Schuylkill, and the other was purchased by Malin & Bishop, for use at the Delaware County rolling mill. By the merest accident of closing the furnace doors Mr. White obtained a hot fire from the coal, and from this occurrence, happening in 1812, we may date the first successful use of anthracite coal in the manufacture of iron in this country and in other American manufactures. At both the establishments mentioned it was used in their heating furnaces. Previous to this time bituminous coal from Virginia and Great Britain had been relied upon for manufacturing purposes in the Atlantic States in all cases where wood was not used.

In the latter part of 1823 the Boston Iron Company, owning the Boston iron works, obtained a full cargo of Lehigh anthracite coal, for use in heating iron to be rolled in its mill, and for smith-work. A short time previous to this transaction, and in the same year, Cyrus Alger, of South Boston, obtained a lot of about thirty tons of Lehigh coal, which he used in a cupola for melting iron for castings.

Anthracite coal for the generation of steam was first used in this country in January, 1825, under the boilers of the rolling mill at Phœnixville, of which Jonah and George Thompson, of Philadelphia, were the proprietors. It is also claimed that, two years later, in 1827, the first use of anthracite coal in the puddling furnace in this country was at the same rolling mill, Jonah and George Thompson still being the proprietors. The use of anthracite for puddling did not become general until about 1840. In 1839 anthracite coal was used in puddling at the Boston iron-works by Ralph Crooker, the superintendent. About 1836 Thomas and Peter Cooper, brothers, used anthracite in a heating furnace at their rolling mill in Thirty-third street, near Third avenue, New York, and about 1840 they began to puddle with anthracite. In April, 1846, there were twenty-seven rolling mills in Pennsylvania and New Jersey which used anthracite coal.

The following notice of the success of the Messrs. Thompson in the use of anthracite coal for the production of steam appeared at the time in a newspaper published at West Chester, Pennsylvania. "We understand that the Messrs. Thompson, at the Phœnix nail-works, on French creek, have fully succeeded in constructing a furnace for a steam engine calculated for the use of anthracite coal, and in discovering a mode by which this fuel may be most advantageously applied to that important purpose. We would heartily congratulate the eastern section of our state upon this valuable discovery. Nothing within our knowledge has occurred of recent date which can have a more auspicious influence upon our manufacturing interests."

THE MANUFACTURE OF IRON IN THE UNITED STATES WITH BITUMINOUS COAL.

It is remarkable that the introduction of bituminous coal in the blast furnaces of this country should have taken place at so late a day in our history, and within the memory of men who are not yet old. Bituminous coal had been discovered in the United States long before any attempt was made to use it in our blast furnaces, and Great Britain had taught us while we were still her colonies that it could be so used. In 1735 Abraham Darby, at his furnace at Coalbrookdale, in Shropshire, had successfully made pig iron with coke as fuel; in 1740 a coke furnace was built at Pontypool, in Monmouthshire; and in 1796 charcoal furnaces had been almost entirely abandoned in Great Britain. Our delay in following the example of the mother country may be variously explained. There was a lack of transportation facilities for bringing iron ore and coke together; not all of the bituminous coal that had been discovered was suitable for making good coke; the manufacture of coke was not well understood; the country had an abundance of timber for the supply of charcoal; and, finally, a prejudice existed in favor of charcoal pig iron and of bar iron hammered in charcoal forges.

The introduction about 1840 of bituminous coal as a fuel in American blast furnaces was naturally preceded by many experiments in its use, which were attended with varying success, but none of them with complete success. It appears to be mathematically certain that down to 1835 all of these experiments had been unsuccessful, as in that year the Franklin Institute, of Philadelphia, offered a premium of a gold medal "to the person who shall manufacture in the United States the greatest quantity of iron from the ore during the year, using no other fuel than bituminous coal or coke, the quantity to be not less than twenty tons." The Institute would not have been likely to make this offer if even so small a quantity as twenty tons of pig iron had been made in one furnace with bituminous coal, either coked or uncoked.

In a report by a committee of the Senate of Pennsylvania, of which Hon. S. J. Packer was chairman, read in the Senate on March 4, 1834, it was stated that "the coking process is now understood, and our bituminous coal is quite as susceptible of this operation, and produces as good coke, as that of Great Britain. It is now used to a considerable extent by our iron manufacturers in Centre county and elsewhere." It is certain that, at the time this report was written, coke could not have been used in blast furnaces in any other way than as a mixture with charcoal, and then only experimentally.

The offer of the gold medal by the Franklin Institute doubtless assisted in stimulating action upon a subject which had already attracted much attention. In the year in which this premium was offered, that accomplished furnace manager, William Firmstone, was successful in making good gray forge iron for about one month at the end of a blast at Mary Ann furnace, in Huntingdon county, Pennsylvania, with coke made from Broad Top coal. This iron was taken to a forge three miles distant and made into blooms. Mr. Firmstone did not claim the medal. He may not have known that a premium had been offered for the achievement which he undoubtedly accomplished.

In a pamphlet published in April, 1836, Isaac Fisher, of Lewistown, Pennsylvania, stated that "successful experiments have lately been tried in Pennsylvania in making pig iron with coke." It is probable that Mr. Fisher had in mind Mr. Firmstone's experiment.

William Firmstone was born at Wellington, in Shropshire, England, on October 19, 1810. When quite a young man he was manager at the Lays Works, near Dudley, which were then owned by his uncles, W. & G. Firmstone. He emigrated to the United States in the spring of 1835. After filling many responsible positions in connection with the manufacture of pig iron he died at his residence near Easton on September 11, 1877, and is buried in the cemetery at Easton. He was one of the first to introduce the hot-blast in the United States, having successfully added this improvement to Vesuvius furnace, in Lawrence county, Ohio, in 1836. In 1839 he added a hot-blast to Karthaus furnace, in Pennsylvania.

In 1836 or 1837 F. H. Oliphant, a skillful ironmaster, made at his furnace called Fairchance, near Uniontown, Fayette county, Pennsylvania, a quantity of coke pig iron in excess of 20 tons, and probably in excess of 100 tons.

He did not, however, long continue to make coke iron, and resumed the manufacture of iron with charcoal. Mr. Oliphant had heard of the offer of the gold medal, and in a letter to the Institute, dated October 3, 1837, he modestly referred to his success in making pig iron with coke, and suggested that possibly he was entitled to the premium. Accompanying his letter was a box of pig iron and the raw materials of its manufacture. We do not learn that he ever received the medal, or that anybody received it.

Between 1836 and 1839 other attempts were made at several furnaces in Pennsylvania to use coke, but the experiments were unsuccessful or unfortunate. The legislature of Pennsylvania passed an act on June 16, 1836, "to encourage the manufacture of iron with coke or mineral coal," which authorized the organization of companies for the manufacture, transportation, and sale of iron made with coke or coal. At Farrandsville, six miles north of Lock Haven, in Clinton county, half a million dollars was sunk by a Boston company in a disastrous attempt to smelt the neighboring ores with coke, and to establish other iron and mining enterprises. This company had commenced operations in the mining of coal as early as 1833. The furnace was blown in in the summer of 1837, and ran probably until 1839. About 3,500 tons of iron were made, but at such great cost, owing to the impurity of the coal and the distance of the ore, that further efforts to make iron with coke were abandoned. At Karthaus, in Clearfield county, the Clearfield Coal and Iron Company, composed of Henry C. Carey, Burd Patterson, John White, and others, succeeded in 1839, under the management of William Firmstone, in making pig iron with coke in a furnace which was built in 1836 by Peter Ritner (brother of Governor Ritner) and John Say, but at the close of the year the whole enterprise was abandoned, owing to the lack of proper transportation facilities. A furnace at Frozen run, in Lycoming county, made some pig iron with coke in 1838, but in 1839 it was using charcoal. The furnaces at Farrandsville and Karthaus were both supplied with hot-blasts—the former in 1837 and the latter in 1839. The apparatus for that at Farrandsville was made at Glasgow, and was the best then known.

The first notable success in the use of bituminous coal in the blast furnace in this country was achieved at three furnaces in western Maryland. Lonaconing furnace, in the Frostburg coal basin, on George's creek, eight miles northwest of Frostburg, in Alleghany county, was built in 1837 by the George's Creek Company, to use coke, and in June, 1839, it was making about 70 tons per week of good foundry iron. Alexander says that "the air was heated by stoves placed near the tuyere arches, and attained a temperature of 700 degrees Fahrenheit." The furnace was blown by an engine of 60-horse power. In the same coal basin, on the south branch of Jenning's run, nine miles northwest of Cumberland, two large blast furnaces were built in 1840 by the Mount Savage Company to use the same fuel. These furnaces were for several years successfully operated with coke.

But the use of coke did not come rapidly into favor, and many experiments with it were attended with loss. It was not until after 1850 that its use began to exert an appreciable influence upon the manufacture of pig iron. In 1849 there was not one coke furnace in Pennsylvania in blast. Thus far coke had not noticeably contributed to the revolution to which we have referred in the preceding chapter. But in 1856 there were twenty-one furnaces in Pennsylvania and three in Maryland which were using coke. After 1856 the use of this fuel rapidly increased in Pennsylvania, and was extended to other states.

While the effort was being made in a few localities in Pennsylvania and Maryland to introduce the use of coke in the blast furnace, attention was also directed to the possibility of using uncoked coal for the same purpose. Alexander says that the proprietors of Lonaconing furnace, in western Maryland, used raw coal before 1840. He leaves the reader to infer that it was successfully used, but he probably wrote from imperfect information. Some unsuccessful experiments were made with raw coal in Clarion county, Pennsylvania, about 1840. In the sketch of Mercer county, Pennsylvania, in Day's *Historical Collections*, printed in 1843, it is stated that, "in the vicinity of Sharon, on the Pittsburgh and Erie canal, exists a most valuable bed of coal of peculiar quality, between anthracite and bituminous, without the least sulphur. It has been tried successfully for smelting iron in a common charcoal furnace." It is not certain that the furnace referred to was in Mercer county. The coal mentioned is now classed among bituminous varieties. At Arcole furnace, in Lake county, Ohio, operated by Wilkeson & Co., raw coal from Greenville, Mercer county, Pennsylvania, was experimented with about 1840. John Wilkeson, one of the owners of the furnace at that time, writes us that the experiment "met with a small measure of success." Doubtless the several experiments mentioned were not the only ones that were made with raw coal before success in its use was fully achieved; and doubtless, too, none of the experiments mentioned produced any more satisfactory results than the qualified success attained at Arcole furnace.

The first truly successful use of raw bituminous coal in the blast furnace occurred in the autumn of 1845. It is circumstantially described in the following extract from a pamphlet entitled *Youngstown, Past and Present*, published in 1875: "In July, 1845, Himrod & Vincent, of Mercer county, Pennsylvania, blew in the Clay furnace, not many miles from the Ohio line, on the waters of the Shenango. About three months afterwards, in consequence of a short supply of charcoal, as stated by Mr. Davis, their founder, a portion of coke was used to charge the furnace. Their coal belongs to seam No. 1, the seam which is now used at Sharon and Youngstown, in its raw state, variously known as 'free-burning splint,' or 'block coal,' and which never makes solid coke. A difficulty soon occurred with the cokers, and, as Mr. Himrod states, he conceived the plan of trying his coal without coking. The furnace continued to work well, and to produce a fair quality of metal. It is admitted that Mr. David Himrod, late of Youngstown, produced the first metal with raw coal, about the close of the year 1845." The furnace here alluded to was situated on Anderson's run, in Mercer county, Pennsylvania, about two and one-half miles southeast of Clarksville, and was built in 1845. It has been abandoned for many years. In the chapter relating to Michigan we have mentioned the part taken by this furnace at an early day in smelting Lake Superior ores with the block coal of the Shenango valley.

While Himrod and Vincent were using the raw coal of the Shenango valley at Clay furnace, Messrs. Wilkeson, Wilkes & Co., of Lowell, in Poland township, Mahoning county, Ohio, were building Mahoning furnace, as related in the chapter devoted to Ohio, expressly to use in its raw state coal of the same quality from their mine near Lowell. This furnace was successfully blown in with this fuel by John Crowther on the 8th of August, 1846. The *Trumbull Democrat*, of Warren, Ohio, for August 15, 1846, in an account of the blowing in of Mahoning furnace, states that "to these gentlemen (Wilkeson, Wilkes & Co.) belongs the honor of being the first persons in the United States who have succeeded in putting a furnace in blast with raw bituminous coal."

John Crowther was an Englishman, born at Broseley, in Shropshire, on May 7, 1797. He emigrated to the United States in 1844, immediately prior to which time he had been the manager of seven blast furnaces in Staffordshire—five at Stowheath and two at Osier Bed. Prior to his connection with the Lowell furnace he had been employed as manager of the furnaces at Brady's Bend. He adapted many furnaces in the Mahoning and Shenango valleys to the use of block coal, and instructed three of his sons in their management, namely, Joshua, Joseph J., and Benjamin. He died on April 15, 1861, at Longton, in Staffordshire, England, where he is buried.

After it had been demonstrated at Clay and Mahoning furnaces that the block coal of the Shenango and Mahoning valleys could be used in the manufacture of pig iron, other furnaces in these two valleys were built to use this fuel, and some charcoal furnaces were altered to use it. In 1850 there were, however, only four furnaces in the Mahoning valley and only seven in the Shenango valley which used raw coal. After 1850, and especially after the introduction into these valleys of Lake Superior ores, about 1856, the use of raw coal greatly increased. In 1856 six furnaces in Pennsylvania and thirteen in Ohio were using this fuel. Some progress was afterwards made in its use in other states, particularly in Indiana, but down to 1880 its use had been mainly confined to the two valleys mentioned.

The American Iron and Steel Association has published a table which exhibits the production of pig iron in this country in each year from 1854 to 1880, classified according to the fuel used. So much of this table is here reproduced as will show the growth of the manufacture of pig iron with anthracite and bituminous coal since 1854, and also the period at which the use of bituminous coal in the blast furnace overtook that of anthracite coal.

Years.	Anthracite.	Charcoal.	Bituminous coal and coke.	Total.
	Net tons.	*Net tons.*	*Net tons.*	*Net tons.*
1854	339, 435	342, 298	54, 485	736, 218
1855	381, 866	339, 922	62, 390	784, 178
1856	443, 113	370, 470	69, 554	883, 137
1872	1, 369, 812	500, 587	984, 159	2, 854, 558
1873	1, 312, 754	577, 620	977, 904	2, 868, 278
1874	1, 202, 144	576, 557	910, 712	2, 689, 413
1875	908. 046	410, 990	947, 545	2, 266, 581
1876	794, 578	308, 649	990, 009	2, 093, 236
1877	934, 797	317, 843	1, 061, 945	2, 314, 585
1878	1, 092, 870	293, 399	1, 191, 092	2, 577, 361
1879	1, 273, 024	358, 873	1, 438, 978	3, 070, 875
1880	1, 807, 651	537, 558	1, 950, 205	4, 295, 414

Some of the pig iron classed above as having been produced with anthracite and bituminous coal, respectively, was produced with a mixture of these fuels, the quantity of pig iron so produced being mainly represented in the anthracite column. The mixed fuel referred to was not used to any considerable extent until within the past few years.

Before the close of the charcoal era steam had been applied to the blowing of American furnaces, but water-power was still in general use. The necessity of increasing the blast, and other considerations, soon led to the more general use of steam blowing engines in connection with anthracite and bituminous furnaces. Another improvement in blast-furnace management also had its beginning about the close of the charcoal era, namely, the utilization of the combustible gases emitted from blast furnaces. These gases were first used to heat the boilers for the blowing engines, and afterwards to heat the hot-blast stoves.

Bituminous coal was used at an early day in the heating furnaces attached to American rolling and slitting mills, and in 1817, when the rolling mill was established at Plumsock, in Fayette county, Pennsylvania, it was used in puddling furnaces. It was not, however, until about 1830, when rolling mills became numerous at Pittsburgh, that the use of bituminous coal in these establishments assumed noteworthy importance.

THE MANUFACTURE OF BLISTER AND CRUCIBLE STEEL IN THE UNITED STATES.

Steel was manufactured in a small way in several of the American colonies, either "in the German manner" or by the more clearly defined cementation process. We have in preceding chapters incidentally recorded some of the earliest attempts that were made to establish the manufacture of steel by these primitive methods. In this and the next chapter we will endeavor to present in sufficient detail the leading facts in the development of the present magnificent steel industry of our country. To do this we must first briefly notice the very insignificance of our small steel industry as it existed in colonial times and long after the close of the Revolutionary struggle.

Bishop states that the first suggestion of the manufacture of steel in the colonies was made in 1655, when John Tucker, of Southold, on Long Island, informed the general court of Connecticut "of his abilitie and intendment to make steele there or in some other plantation in the jurisdiction, if he may have some things granted he therein propounds." In October, 1655, and in May, 1656, special privileges were granted to the petitioner, but we are not told whether he ever made any steel. In 1736 Joseph Higby, of Simsbury, Connecticut, represented that he had, "with great pains and cost, found out and obtained a curious art by which to convert, change, or transmit common iron into good steel, sufficient for any use, and was the very first that ever performed such an operation in America." Several smiths testified to the excellent quality of his steel. Certain privileges were granted to him and his partner, Joseph Dewey, of Hebron, but we do not learn that they afterwards made any steel. In 1750 steel of good quality was made "from the crude metal" by D. J. Styles, at New Milford, in Litchfield county, Connecticut. Some time previous to 1750 a Mr. Eliot owned a steel furnace at Killingworth, and it was in this furnace that Rev. Jared Eliot, father of the owner, succeeded in 1761 in converting into good steel a bar of iron made in a common bloomary from magnetic sand, for which achievement he received a gold medal from the London Society of Arts.

In 1750 Massachusetts had one steel furnace. Bishop tells us that in 1787 the manufacture of steel was introduced in the town of Easton, in Massachusetts, by Eliphalet Leonard. "The article was made in considerable amount, and cheaper than imported steel," but it was inferior to foreign steel for edge tools and cutlery. This was doubtless cemented steel. About the same time some steel was made at Canton, in the same state, "from crude iron by the German process."

Peter Townsend, who became the proprietor of the Sterling iron works in New York before the Revolution, produced in 1776 the first steel made in that province. It was made "at first from pig and afterwards from bar iron, in the German manner." Blister steel was made in 1810 by Peter Townsend, Jr., which is said to have been equal to steel made from Dannemora iron in the manufacture of edge tools. At Amenia, in Dutchess county, New York, steel was made for the use of the Continental army.

New Jersey had one steel furnace in 1750. Steel was made at Trenton during the Revolution, "but the business afterwards declined."

Pennsylvania had a steel furnace in Chester county, called Vincent's, before 1750, and in that year it had two steel furnaces—both at Philadelphia. Concerning one of these, William Branson's, Richard Hockley writes to Thomas Penn on June 3, 1750: "As to steel, Mr. Branson says the sort he made, which was blistered steel, 10 tons would be ten years in selling." The other furnace, Stephen Paschal's, which was built in 1747, was owned in 1787 by Nancarrow & Matlock, when it was visited by General Washington, and is said to have been "the largest and best in America." In 1770 Whitehead Humphreys was the proprietor of a steel furnace on Seventh street, in Philadelphia. During the Revolution he made steel for the Continental army from Andover iron. In 1786 the legislature of Pennsylvania loaned £300 to Mr. Humphreys for five years to aid him in making steel from bar iron "as good as in England."

During the Revolution Henry Hollingsworth, at Elkton, in Cecil county, Maryland, manufactured muskets for the Continental army. Some of his bayonets were complained of as being too soft, "which he ascribed to the bad quality of the American steel with which they were pointed." Bishop does not mention any steel furnace in Maryland, and we are therefore unable to conjecture where Mr. Hollingsworth obtained his poor steel. We are also without positive information concerning the colonial or Revolutionary steel industry of Virginia and other southern colonies. In most of these colonies bounties were offered at the beginning of the Revolution for the establishment of steel furnaces as well as other manufacturing enterprises.

In the celebrated report of Alexander Hamilton, dated December 5, 1791, it is stated that "steel is a branch which has already made a considerable progress, and it is ascertained that some new enterprises on a more extensive scale have been lately set on foot." In the same year, 1791, in a reply to Lord Sheffield's *Observations on the Commerce of the United States*, Tench Coxe stated that "about one-half of the steel consumed in the United States is home-made, and new furnaces are building at this moment. The works being few, and the importations ascertained, this fact is known to be accurate." The works here referred to were all cementation furnaces, which produced blister steel.

In 1805 there were two steel furnaces in Pennsylvania, which produced annually 150 tons of steel. One of these was in Philadelphia county. In 1810 there were produced in the whole country 917 tons of steel, of which

Pennsylvania produced 531 tons in five furnaces—one at Philadelphia and one each in Philadelphia, Lancaster Dauphin, and Fayette counties. The remainder was produced in Massachusetts, Rhode Island, New Jersey, Virginia, and South Carolina, each state having one furnace. In 1813 there was a steel furnace at Pittsburgh, owned by Tuper & McKowan, which was the first in that city. Tench Coxe declared in this year that the manufacture of "common steel, iron wire, and edge tools" had been greatly advanced since 1810.

In 1831 a convention of the friends of American industry assembled at New York, at which were submitted many able reports upon the iron and steel industries of the country as they existed at that time. From one of these reports, prepared, we believe, by John R. Coates, of Philadelphia, we learn that there were then in the United States fourteen steel furnaces, distributed as follows: Two at Pittsburgh, one at Baltimore, three at Philadelphia, three in New York, one in York county, Pennsylvania, one at Troy, New York, two in New Jersey, and one at Boston. The report stated that "these furnaces are known to be now in operation, and of a capacity sufficient to supply more than 1,600 tons of steel annually, an amount equal to the whole importation of steel of every kind." The report continued: "But it should be observed that steel for common agricultural purposes is not the best, although it is most used; and that American is quite equal to English steel used for such purposes in England. American competition has excluded the British common blister steel altogether. The only steel now imported from Great Britain is of a different and better quality than that just mentioned." The common blister steel of American manufacture which is above referred to was used for plow-shares, shovels, scythes, and cross-cut and mill saws.

The better qualities of steel which were not made in this country in 1831, but were imported from Europe, almost entirely from England, were known as (1) best blister steel, made from iron from the Dannemora mines in Sweden; (2) shear steel, of the same origin; and (3) cast steel, made in crucibles. Concerning blister steel of the best quality the report from which we have quoted says that "steel is now made at Pittsburgh, and may be made in New York and Connecticut, bearing a fair comparison with the best hoop L, or Dannemora steel. No difference is observed where trials have been made without disclosing to the judges the origin of either." The report adds that iron equal to Swedish for the manufacture of steel had been recently manufactured "by improved processes from the ore of Juniata, and both sides of the line between New York and Connecticut." Shear steel was the best blister steel of the cementation furnace reworked under a hammer into bars convenient for the manufacture of coarse cutlery and edge tools. The manufacture of this steel was then about being introduced into this country. The report says: "England has hitherto monopolized this branch also, from being in possession of the only European steel that would bear the expense of preparation, and from the perfection of her machinery. She has now the honor of transferring a portion of her experience and skill to the United States." Cast steel, which was then made only from the best blister steel, was not made in the United States. Several attempts to make it with profit had been unfortunate in their results. "The causes of failure," says the report, "were, first, the want of the best quality of blister steel at a reasonable price, and, second, the want, or expense, of crucibles of proper quality, wherein the blister steel is to be melted and smelted. Black lead and a variety of clays have been tried, but the weakness of these materials has heretofore caused a loss to the manufacturer." The English Stourbridge clay was the only clay which in 1831 was known to possess the qualities required for crucibles. The report says that "the explorations of the present year have disclosed the existence of clay analogous to that of Stourbridge," the discoveries being made in Centre, Clearfield, and Lycoming counties in Pennsylvania, and in the vicinity of Baltimore. The expectations created by these discoveries were destined to disappointment.

From 1831, the date of the report from which we have just quoted, to 1860 but little progress was made in developing the manufacture of the finer qualities of steel in this country.

The following is a list of all the works in Pennsylvania that were engaged in the conversion of steel in 1850, with their product: James Rowland & Co., Kensington, (Philadelphia,) 600 tons; J. Robbins, Kensington, 500 tons; Earp & Brink, Kensington, 100 tons; Robert S. Johnson, Kensington, 400 tons; W. & H. Rowland, Oxford, (Philadelphia,) 700 tons; R. & G. D. Coleman, Martic, Lancaster county, 400 tons; R. H. & W. Coleman, Castle Fin, York county, 100 tons; Singer, Hartman & Co., Pittsburgh, 700 tons; Coleman, Hailman & Co., Pittsburgh, 800 tons; Jones & Quigg, Pittsburgh, 1,200 tons; Spang & Co., Pittsburgh, 200 tons; G. & J. H. Shoenberger, Pittsburgh, 200 tons; S. McKelvy, Pittsburgh, 178 tons; total, thirteen works, with a product of 6,078 tons. Of this quantity only 44 tons was cast steel. The foregoing information is not found in the census of 1850, but was obtained by an association of Pennsylvania ironmasters. The census of that year greatly understated the extent of our steel industry, and erroneously makes no mention of the manufacture of steel in any other state than Pennsylvania.

From about 1830 to 1860 many attempts were made at Pittsburgh to produce the various grades of steel. Between 1828 and 1830 an Englishman, named Broadmeadow, and his son, who had established a manufactory of files and rasps, made blister steel, and about 1831 they made some cast steel in pots of their own manufacture. Their attempt to manufacture cast steel was a failure. Josiah Ankrim & Son, file-makers, are said to have succeeded in making their own steel about 1830, but by what process is not stated. In 1831 Messrs. Wetmore & Havens successfully produced blister steel. In 1833 the firm of G. & J. H. Shoenberger commenced to manufacture blister steel, and in 1841 Patrick and James Dunn attempted the manufacture of crucible cast steel for this firm.

This last enterprise was abandoned in a year or two. "The crucibles employed were made of American clay, and, as may be supposed, were ill-suited to the purpose required." The firm continued to make blister steel until 1862, when its further manufacture was abandoned. It used Juniata blooms exclusively. About 1840 the firm of Isaac Jones & William Coleman was formed to manufacture blister steel, which business was successfully prosecuted until 1845, when the firm was dissolved, Mr. Jones retiring. In the same year Jones & Quigg built the Pittsburgh steel works, also to manufacture blister steel. Mr. Coleman continued alone the manufacture of blister steel until 1846, when a partnership was formed under the name of Coleman, Hailman & Co. Both of these new firms were successful in making blister steel of good quality. They were also successful in manufacturing some cast steel of a low grade. The first slab of cast plow steel ever rolled in the United States was rolled by William Woods, at the steel works of Jones & Quigg, in 1846, and shipped to John Deere, of Moline, Illinois. About 1846 the firm of Tingle & Sugden, file-makers, made its own steel. This was cast steel. The firm is also reported to have made some cast steel for sale. Juniata iron was used by all of these manufacturers.

In 1852 McKelvy & Blair, of Pittsburgh, who had commenced the manufacture of files in 1850, made cast steel of good quality, but not always of the best quality. It was, however, of a quality so creditable, and so uniformly superior to any that had previously been made at Pittsburgh, that the firm may be regarded as the pioneer in the production of cast steel in large quantities in that city. In 1853 the firm of Singer, Nimick & Co., of Pittsburgh, which had been organized in 1848 for the manufacture of blister steel, and in 1855 Isaac Jones, then doing business in his own name, were successful in producing the usual grades of cast steel for saw, machinery, and agricultural purposes, but they did not make tool steel of the best quality as a regular product. That honor was reserved for the firm of Hussey, Wells & Co., which began business in 1859, and in the following year was successful in making crucible cast steel of the best quality as a regular product. This was done with American iron. In 1862 the firm of Park, Brother & Co., also of Pittsburgh, accomplished the same achievement, also with American iron. These were the first firms in the country to meet with complete success in this difficult department of American manufacturing enterprise.

For many of the foregoing details concerning the manufacture of steel at Pittsburgh we are indebted to an anonymous publication, entitled *Pittsburgh, its Industry and Commerce*, published in 1870, and to George H. Thurston's *Pittsburgh and Allegheny in the Centennial Year.*

While these experiments in the manufacture of the best qualities of steel were being made at Pittsburgh, other localities were engaged in making similar experiments. The most important of these was conducted by the Adirondack Iron and Steel Company, whose works were at Jersey City, New Jersey. They were built in 1848 to make blister steel from charcoal pig iron made at Adirondack, Essex county, New York, and also to make cast steel. The pig iron was puddled with wood at Adirondack, and then drawn into bars under a hammer, which were sent to Jersey City, where they were converted into blister steel. An attempt to make cast steel by melting the blister steel in clay crucibles was a failure, but subsequently cast steel of good quality was made in black lead crucibles. This result was reached as early as February, 1849, and possibly a few months earlier. Of the excellent quality of the cast steel manufactured at this time at these works there is abundant evidence in the testimony of Government experts and of many consumers, all of which is now before us. It was used for chisels, turning and engravers' tools, drills, hammers, shears, razors, carpenters' tools, etc. Its manufacture was continued with encouraging results until 1853, when the business was abandoned by the company. It had not proved to be profitable, partly because of the prejudice existing against American cast steel. The works were then leased for ten years, during which they were managed with varying success. James R. Thompson was the manager from 1848 to 1857. In 1863 they passed into the hands of Dudley S. Gregory, one of the original stockholders, and were from that time managed with uniform success for the owner by H. J. Hopper. In 1874 Mr. Gregory died, and the works descended to his sons. They are the oldest cast-steel works in the United States, having been continuously employed in the production of this quality of steel since 1849. Mr. Hopper is still their manager.

It is proper to add that, while good cast steel was made from 1849 at the works of the Adirondack Iron and Steel Company, the product was not for many years of uniform excellence. Much of it was good tool steel, but much of it was also irregular in temper. The exact truth appears to be that the cast steel produced during the early years of trial, or from 1849 to 1853, was more uniformly excellent than that which had been produced by earlier or by cotemporary American steel works. This excellence was mainly due to the superiority of Adirondack iron. Since 1852 the Adirondack works have had many rivals in the production of crucible cast steel, the earliest of which have already been described in our reference to Pittsburgh enterprises.

Mr. Thomas S. Blair, of Pittsburgh, has furnished us with the following reminiscences of the American steel industry as it existed about 1850.

> The blister steel made at Pittsburgh was sent all over the west, and was used by the country blacksmiths for the pointing of picks, mattocks, etc., and for plating out into rough hoes, etc. It was usually made from Juniata blooms, especially in the period anterior to 1850. After that date Champlain ore blooms were used to a considerable extent. German steel was simply blister steel rolled down. The two leading applications of German steel were springs and plow shares. The business was very large at one time. G. & J. H. Shoenberger pushed this brand vigorously from about 1840 to 1860. Meanwhile quite a number of other concerns entered into the competition at various times.

The Shoenberger experiment in the manufacture of crucible steel failed on account of the inferior quality of the product. The firm were so confident that no iron could be found in this country that could in any respect excel the Juniata iron that, when that article failed to produce steel equal to that of Sheffield, they gave up the manufacture of crucible steel. In the light of the experience gained under the scientific methods which the Bessemer process has made a necessity we now understand that the Shoenbergers could not make good crucible steel out of iron containing two-tenths of one per cent. of phosphorus.

McKelvy & Blair at first made their pots out of Darby and Stannington clay, imported from England. The brilliant success of Joseph Dixon, of Jersey City, New Jersey, in perfecting the manufacture of plumbago crucibles, for which the crucible steel interest in the United States owes him a monument, gave to that firm and to the Jersey City steel works a very valuable lift. With these crucibles and with Adirondack blooms Mr. Thompson made some excellent steel. Along in 1853 and 1854 McKelvy & Blair made steel from the Adirondack blooms which was used in the nail factory of G. & J. H. Shoenberger. The American steel made from American iron was fully up to the English steel in every particular. It may be added, also, that the knives and dies of nail-cutting machines afford an admirable test of endurance in tool steel.

It was not possible for McKelvy & Blair to obtain the Adirondack blooms in any quantity, and they had no other resource than the Champlain and Missouri blooms, all of which produced red-short steel. This, notwithstanding that drawback, found a market so extensive that the firm sent to Sheffield and brought out several skilled workmen, and the business of manufacturing handsomely finished bars, plates, and sheets was fairly inaugurated. The drawbacks, however, of pioneer operations, chief among which was the abominable English system, imported along with the skilled labor, of "working to fool the master," were too much for the financial strength of the firm, and in 1854 they were forced to drop the enterprise.

The manufacture in this country of crucible cast steel of the best grades may be said to have been established on a firm basis after Hussey, Wells & Co., Park, Brother & Co., and Gregory & Co., in the years 1860, 1862, and 1863, respectively, succeeded in making it of uniform quality as a regular product. The event was one of great importance, as it marked the establishment in this country of a new industry which was destined to assume large proportions and to be of immense value. It met a want that had long been felt, and dissipated the long-standing belief that this country possessed neither the iron nor the skill required to make good cast steel. The establishment of this new industry, following closely in the wake of our successful application of anthracite and bituminous coal in the manufacture of pig iron, assisted greatly to advance our metallurgical reputation and to create confidence in our future metallurgical possibilities.

Fifty years ago, when the convention of the friends of home industry met at New York, we were struggling with the difficulties which then prevented the manufacture of blister steel of best quality; now we have not only solved that problem, but twenty years ago we solved the greater problem of the manufacture of crucible steel, and a few years later we achieved the still greater triumph of firmly planting upon American soil the Bessemer steel industry, the establishment of which industry in many countries in late years is justly regarded as constituting a much more important revolution in the production and use of iron and steel than had been created by any preceding influence or combination of influences in any age of the world's history. To this industry we have added the manufacture of steel by the open-hearth, or Siemens-Martin, process—a method of producing steel second only in cheapness and productiveness to the Bessemer process.

THE MANUFACTURE OF BESSEMER STEEL IN THE UNITED STATES.

The Bessemer process for the manufacture of steel consists in forcing streams of cold air, under a very high pressure, into a large pear-shaped vessel called a converter, which has been filled with melted cast iron, by which operation the oxygen of the air combines with and eliminates the carbon and silicon in the iron, the product being decarbonized and desiliconized iron. But, as some carbon is always required to produce steel, a definite quantity of manganiferous pig iron (*spiegeleisen*) or ferro-manganese is added to the contents of the converter while they are still in a state of fusion, by which addition the requisite amount of carbon is obtained, while the manganese liberates whatever oxygen may have remained after the termination of the blast. The final product is Bessemer steel, of a quality or temper corresponding to the character and proportions of the materials used. A distinguishing feature of the Bessemer process consists in the entire absence of any fuel whatever in converting the already melted cast iron into steel—the carbon and silicon in the iron combining with the oxygen of the atmospheric blast to produce an intensely high temperature. The Bessemer converter holds from five to fifteen tons. The charge of cast iron which it receives preliminary to a conversion, or "blow," may be supplied directly from a blast furnace or from a cupola in which pig metal has been melted. The latter method is generally employed in Europe and exclusively employed in the United States.

Sir Henry Bessemer, of London, the inventor of the process which bears his name, commenced in 1854 to experiment in the manufacture of iron for an improved gun. "In the course of his experiments," says Mr. Jeans, in his comprehensive work on *Steel*, "it dawned upon him that cast iron might be rendered malleable by the introduction of atmospheric air into the fluid metal." In 1855 and 1856 patents were granted to Mr. Bessemer for this discovery, but it was not until 1858 that entire success was achieved by him in the conversion of cast iron into cast steel. Nor was this success achieved without the assistance of others—Robert F. Mushet, of Cheltenham, England, and Goran Fredrick Goransson, of Sandviken, Sweden, contributing greatly to this result. It may also be added that many and valuable improvements have been made in the application of the Bessemer process since its successful introduction in Europe and America. These facts, however, detract nothing from the honor that is due to Sir Henry Bessemer, since it is true of all valuable inventions that their value is increased by the ingenuity and skill of those who use them. In addition to discovering that melted cast iron could be decarbonized and rendered malleable by blowing cold air through it at a high pressure, Mr. Bessemer is entitled to the whole credit of suggesting and perfecting the wonderful machinery by which this discovery has been applied to the rapid production of large quantities of Bessemer steel. The purely engineering feats accomplished by him in the development of his invention were essential to its success, and they amaze us by their novelty and magnitude. Those who have never seen this machinery in operation can form but a faint idea of its exquisite adaptation to the purposes to be accomplished. A Bessemer converter, weighing with its contents from 20 to 30 tons, is moved at will on its axis by the touch of a schoolboy, and receives, in response to the same touch, a blast so powerful that every particle of its many tons of metallic contents is heated to the highest temperature ever known in the mechanic arts. The honor of inventing this machinery is all Mr. Bessemer's own.

In 1856 Mr. Bessemer obtained two patents in this country for his invention, but was immediately confronted by a claim of priority of invention preferred by William Kelly, an ironmaster of Eddyville, Kentucky, but a native of Pittsburgh, Pennsylvania. This claim was heard by the commissioner of patents and its justice was conceded, the commissioner granting to Mr. Kelly a patent which took precedence over the patents granted to Mr. Bessemer. The effect of this action by the commissioner was to prevent for several years any serious effort from being made to introduce Mr. Bessemer's process into this country. As a matter of interest and of history we here give a complete account of Mr. Kelly's invention, prepared for these pages by Mr. Kelly himself.

In 1846 I purchased, in connection with my brother, John F. Kelly, a large iron property in Lyon county, Kentucky, known as the Eddyville iron works; and the beginning of 1847 found the firm of Kelly & Co. fairly under way, making pig metal and charcoal blooms. Our forge contained ten forge fires and two large finery, or run-out, fires.

To the processes of manufacture I gave my first and most serious attention; and, after close observation and study, I conceived the idea that, after the metal was melted, the use of fuel would be unnecessary—that the heat generated by the union of the oxygen of the air with the carbon of the metal would be sufficient to accomplish the refining and decarbonizing of the iron. I devised several plans for testing this idea of forcing into the fluid metal powerful blasts of air; and, after making drawings of the same, showed them to my forgemen, not one of whom could agree with me, all believing that I would chill the metal, and that my experiment would end in failure. I finally fixed on a plan of furnace which I thought would answer my purpose. This consisted of a small blast furnace, about 12 feet high, having a hearth and bosh like a common blast furnace. In this I expected to produce decarbonized metal from the iron ore; but, if I failed in this, I could resort to pig metal and thereby have good fluid metal to blow into. The novelty of this furnace was that it had two tuyeres, one above the other. The upper tuyere was to melt the stock; the lower one was fixed in the hearth near the bottom, and intended to conduct the air-blast into the metal. That portion of the hearth in which the lower tuyere was placed was so arranged as to part from the upper portion, and consisted of a heavy cast-iron draw, lined inside with fire-brick, so that, when the iron was blown to nature by the lower tuyere, the draw could be run from under the hearth, and the iron taken out, carried to the hammer, and forged.

I began my experiments with this furnace in October, 1847, but found it impossible to give it sufficient attention, as I had then commenced to build a new blast furnace, the Suwannee, on our property. This occupied so much of my time that I had but little left in which to attend to my new process. In the year 1851, having finished our new blast furnace, I found myself more at leisure, and again directed my attention to my experiments; and, on looking for the cause of failure in my experimental furnace, found that my chief trouble lay in the melting department, not in the more important matter of blowing into the iron, so that the question presented itself to my mind, Why complicate my experiments by trying to make pig metal in a furnace not at all suited to the business? Why not abandon altogether the melting department and try my experiments at our new blast furnace, where I could have the metal already melted and in good condition for blowing into? I fully believed that I could make malleable iron by this process. In my first efforts with this object in view I built a furnace consisting of a square brick abutment, having a circular chamber inside, the bottom of which was concave like a molder's ladle. In the bottom was fixed a circular tile of fire-clay, perforated for tuyeres. Under this tile was an air-chamber, connected by pipes with the blowing engine. This is substantially the plan now used in the Bessemer converter.

The first trial of this furnace was very satisfactory. The iron was well refined and decarbonized—at least as well as by the finery fire. This fact was admitted by all the forgemen who examined it. The blowing was usually continued from five to ten minutes, whereas the finery fire required over an hour. Here was a great saving of time and fuel, as well as great encouragement to work the process out to perfection. I was not satisfied with making refined or run-out metal; my object was to make malleable iron. In attempting this I made, in the course of the following eighteen months, a variety of experiments. I built a suitable hot-blast oven; but, after a few trials, abandoned it, finding the cold-blast preferable, for many reasons. After numerous trials of this furnace I found that I could make refined metal, suitable for the charcoal forge fire, without any difficulty, and, when the blast was continued for a longer period, the iron would occasionally be somewhat malleable. At one time, on trying the iron, to my great surprise, I found the iron would forge well, and it was pronounced as good as any charcoal forge iron. I had a piece of this iron forged into a bar four feet long and three-eighths of an inch square. I kept this bar for exhibition, and was frequently asked for a small piece, which I readily gave until it was reduced to a length of a few inches. This piece I have still in my possession. It is the first piece of malleable iron or steel ever made by the pneumatic process. The variability of results in the working of my experimental furnace was then a mystery which is now explained. An analysis having since been made of all the ore deposits of Suwannee furnace, they were found to embrace cold-short, red-short, and neutral ores. Some of the deposits showed a large percentage of manganese.

I now decided that, if I could not succeed in making malleable iron, I could turn my invention to practical account by putting up a furnace of sufficient capacity to supply our forge with refined or run-out metal, and at the same time continue my experiments as before. The difficulty here was in my blast. The furnace engine, though large and powerful, would not give over 5 pounds' pressure to the square inch. To overcome this difficulty I built a converting vessel and placed it in the pig-bed convenient to the tapping-hole of the hearth. This furnace was circular, built of boiler-plate iron, was about 5 feet high and 18 inches inside diameter; and, instead of blowing up through the bottom, the blast was applied to the sides, above the bottom, through four three-quarter-inch tuyeres. Experience soon proved that a single tuyere, an inch in diameter, answered my purpose best. In this vessel I could refine fifteen hundredweight of metal in from five to ten minutes. Should the blast prove weak, as was often the case, the tuyeres could be snuffed in the same way as in a finery fire. In this way a heavy charge could be worked with a weak blast. This furnace had an opening in the side, about nine inches square, three feet from the bottom, to run in the metal; also a tap-hole to let out the metal into a set of iron molds such as are used about finery fires. This furnace was found to answer a valuable purpose, supplying a cheap method of making run-out metal, and, after trying it a few days, we entirely dispensed with the old and troublesome run-out fires.

Our blooms were in high repute, and were almost entirely used for making boiler plates, so that many steamboats on the Ohio and Mississippi rivers were using boilers made of iron treated by this process some years before it was brought out in England. My process was known to every ironmaker in the Cumberland river iron district as "Kelly's air-boiling process." The reason why I did not apply for a patent for it sooner than I did was that I flattered myself I would soon make it the successful process I at first endeavored to achieve, namely, a process for making malleable iron and steel. In 1857 I applied for a patent, as soon as I heard that other men were following the same line of experiments in England; and, although Mr. Bessemer was a few days before me in obtaining a patent, I was granted an interference, and the case was heard by the commissioner of patents, who decided that I was the first inventor of this process, now known as the Bessemer process, and a patent was granted me over Mr. Bessemer.

It will be seen that Mr. Kelly claims for himself the discovery of the pneumatic principle of the Bessemer process several years before it dawned upon the mind of Mr. Bessemer. The validity of this claim cannot be impeached. But it must also be said that Mr. Bessemer successfully employed this principle in the production of steel, and that Mr. Kelly did not. The Kelly process produced only refined iron of good quality. Furthermore, the machinery with which Mr. Kelly operated his process was not calculated to produce rapidly or at all large masses of even refined iron; whereas Mr. Bessemer's machinery was successful almost from the first experiments that were made with it in producing steel in large quantities and with great rapidity.

Mr. Kelly claimed that his process, if successful in connection with the limited operations of the refinery forge attached to his blast furnace at Eddyville, would be applicable also to the refining of iron for rolling mills, and would take the place of puddling. Some experiments with this end in view were made at the Cambria iron works, at Johnstown, Pennsylvania, in 1857 and 1858, in a converting vessel similar to that now used in the Bessemer process. They were so far successful that Mr. Kelly wrote from Johnstown on the 29th of June, 1858, that he had not "the slightest difficulty in converting crude pig iron into refined plate metal by blowing into it for about fifteen to twenty-five minutes." These experiments were not, however, continued. Mr. Robert W. Hunt says that at Johnstown Mr. Kelly "met with the usual number of encouraging failures."

In May, 1863, Captain E. B. Ward, of Detroit, Daniel J. Morrell, of Johnstown, William M. Lyon and James Park, Jr., of Pittsburgh, and Z. S. Durfee, of New Bedford, Massachusetts, having obtained control of the original patent and other patents of Mr. Kelly, organized the Kelly Process Company, Mr. Kelly retaining an interest in any profits which might accrue to the company. The company resolved to establish experimental works, and also to acquire the patent in this country of Mr. Mushet for the use of *spiegeleisen* as a recarbonizing agent, through which the Bessemer process had been made a success in England. This patent was granted to Mr. Mushet in 1856 in England and in 1857 in this country. Experimental works were accordingly established at Wyandotte, Michigan, and Mr. Durfee was sent to England to procure an assignment of Mr. Mushet's patent. The latter purpose was effected on the 24th of October, 1864, upon terms which admitted Mr. Mushet, Thomas D. Clare, and John N. Brown, of England, to membership in the Kelly Process Company. On the 5th of September, 1865, the company was further enlarged by the admission to membership of Charles P. Chouteau, James Harrison, and Felix Vallé, all of Saint Louis. The works at Wyandotte were erected and operated under the superintendence of William F. Durfee, a cousin of Z. S. Durfee. In the fall of 1864 William F. Durfee succeeded in making Bessemer steel at the experimental works at Wyandotte, and this was the first Bessemer steel made in America. The machinery used at the Wyandotte works was certainly an infringement upon so much of Mr. Bessemer's patents as covered the machinery of his process.

The control in this country of Mr. Bessemer's patents was obtained in 1864 by John F. Winslow, John A. Griswold, and Alexander L. Holley, all of Troy, New York, Mr. Holley visiting England in 1863 in the interest of himself and his associates. In February, 1865, Mr. Holley was successful at Troy in producing Bessemer steel at experimental works which he had constructed at that place in 1864 for his company. Mr. Mushet's method of recarbonizing the iron in the converter was used at Troy, and this was an infringement of his patent.

As the Kelly Process Company could not achieve success without Mr. Bessemer's machinery, and as the owners of the right to use this machinery could not make steel without Mr. Mushet's improvement, an arrangement was effected by which all of the American patents were consolidated early in 1866. Under this arrangement the titles to the Kelly, Bessemer, and Mushet patents were vested in Messrs. Winslow, Griswold, and Morrell, the first two being owners of two-thirds of the property, and Mr. Morrell holding the other third in trust for the members of the Kelly Process Company. This arrangement continued until the formation of the Pneumatic Steel Association, a joint-stock company organized under the laws of New York, in which the ownership of the consolidated patents was continued. Z. S. Durfee acted as the secretary and treasurer of the company. The ownership of the patents is now vested in the Bessemer Steel Company Limited, an association organized under the laws of Pennsylvania. This company also owns all other patents in this country which relate in any way to the manufacture of Bessemer steel.

The consolidation, in 1866, of the various interests above mentioned was followed by a large reduction in fees and royalties, and thenceforward the business of making Bessemer steel was rapidly extended in this country. The order in which the various Bessemer steel works of the United States have been established is presented below.

1. Kelly Pneumatic Process Company, Wyandotte, Wayne county, Michigan. One 2½-ton experimental converter. Made its first blow in the fall of 1864. Bought by Captain E. B. Ward in 1865, and abandoned in 1869. These experimental works were connected with an iron rolling mill.

2. Albany and Rensselaer Iron and Steel Company, Troy, New York. Experimental Bessemer plant established by Winslow, Griswold & Holley. One 2½-ton converter. Made its first blow February 16, 1865. Now, two 6¼-ton converters. Added to an iron rail mill.

3. Pennsylvania Steel Works, Pennsylvania Steel Company, Steelton post-office, Dauphin county, Pennsylvania. Two 6½-ton converters. Made their first blow in June, 1867. An entirely new works. Added three more converters in 1881.

4. Freedom Iron and Steel Works, Lewistown, Mifflin county, Pennsylvania. Two 5-ton converters. Made their first blow May 1, 1868. Added to the forge and blast furnaces of the Freedom Iron Company. Failed in 1869 and Bessemer works dismantled; most of the machinery went to Joliet, Illinois.

5. Cleveland Rolling Mill Company, Cleveland, Ohio. Two 6¼-ton converters. Made their first blow October 15, 1868. Added to an iron rail mill.

6. Cambria Iron and Steel Works, Cambria Iron Company, Johnstown, Pennsylvania. Two 6-ton converters. Made their first blow July 10, 1871. Added to an iron rail mill.

7. Union Iron and Steel Company, Chicago, Illinois. Two 5⅛-ton converters. Made their first blow July 26, 1871. Added to an iron rail mill.

8. North Chicago Rolling Mill Company, Chicago, Illinois. Two 6¾-ton converters. Made their first blow April 10, 1872. Added to an iron rail mill. Building two 10-ton converters and a complete rolling plant at South Chicago in 1881.

9. Joliet Steel Works, Joliet Steel Company, Joliet, Illinois. Two 5⅛-ton converters. Made their first blow January 26, 1873, and their first steel rail March 13, 1873. An entirely new works.

10. Bethlehem Iron Company, Bethlehem, Pennsylvania. Now four 7-ton converters; originally two 7-ton converters. Made their first blow October 4, 1873, and their first steel rail October 18, 1873. Added to an iron rail mill.

11. Edgar Thomson Steel Works, Carnegie Brothers & Company Limited, Bessemer station, Allegheny county, Pennsylvania. Two 7-ton converters. Made their first blow August 26, 1875, and their first steel rail September 1, 1875. An entirely new works. Adding one more converter in 1881.

12. Lackawanna Iron and Steel Works, Lackawanna Iron and Coal Company, Scranton, Lackawanna county, Pennsylvania. Two 7½-ton converters. Made their first blow October 23, 1875, and their first steel rail December 29, 1875. Added to an iron rail mill.

13. Vulcan Steel Company, St. Louis, Missouri. Two 6¼-ton converters. Made their first blow September 1, 1876. Added to an iron rail mill.

14. Pittsburgh Bessemer Steel Company Limited, Homestead, Allegheny county, Pennsylvania. Two 4-ton converters. Made their first blow March 19, 1881. An entirely new works.

15. Pittsburgh Steel Casting Company, Pittsburgh, Pennsylvania. One 7-ton converter. Made its first blow August 26, 1881. Added to a crucible steel works. Product, ingots for special purposes; works not intended for the production of rails.

16. Colorado Coal and Iron Company, South Pueblo, Pueblo county, Colorado. Building two 5-ton converters in 1881. An entirely new works.

17. Scranton Steel Company, Scranton, Lackawanna county, Pennsylvania. Bessemer steel works projected and commenced in 1881. An entirely new works. To contain two 4-ton converters.

A summary of the above details shows that fifteen Bessemer works have been built in this country, of which two have been abandoned and thirteen are yet active, and that two additional Bessemer establishments are being built in 1881. The thirteen works that are now in operation employ thirty converters and will soon use three more. The works that are being constructed at South Pueblo and Scranton will add four more converters.

Mr. Robert W. Hunt informs us, in his *History of the Bessemer Manufacture in America*, read before the American Institute of Mining Engineers in 1876, that the first conversion made at Troy was from Crown Point charcoal pig iron, and that the first at Wyandotte was from Lake Superior charcoal pig iron.

Although Bessemer steel is adapted to all purposes for which other steel is used, except perhaps the manufacture of fine cutlery, its use in Europe has been mainly confined to the production of railway bars, and its use in this country has been even more narrowly limited to the same product. For many years after the introduction of the Bessemer process into the United States it was used to produce nothing but rails. The first Bessemer steel rails ever made in this country were rolled at the North Chicago rolling mill on the 24th of May, 1865, from hammered blooms made at the Wyandotte rolling mill from steel ingots made at the experimental steel works at Wyandotte. The rolls upon which the blooms were rolled at the North Chicago rolling mill had been in use for rolling iron rails. The steel rails came out sound and well-shaped. Several of these rails were laid in the track of one of the railroads running out of Chicago, and were still in use in 1875. The first steel rails rolled in the United States upon order, in the way of regular business, were rolled by the Cambria Iron Company, at Johnstown, Pennsylvania, in August, 1867, from ingots made at the works of the Pennsylvania Steel Company, near Harrisburg, Pennsylvania; and by the Spuyten Duyvil Rolling Mill Company, at Spuyten Duyvil, New York, early in September of that year, from ingots made at the Bessemer steel works at Troy, New York, then owned by Winslow & Griswold.

Important improvements upon Mr. Bessemer's machinery have been invented and patented by A. L. Holley, George Fritz, Robert W. Hunt, William R. Jones, and other American engineers. The inventive genius and rare mechanical skill of John Fritz have also produced many valuable improvements which were clearly patentable but have not been patented. In the early stages of the industry in this country great difficulty was experienced in obtaining suitable pig metal, and also materials for the lining of the converters. The lack of experienced workmen was also severely felt. All difficulties, however, have long been overcome. It is now universally admitted that in the United States the Bessemer steel industry has been brought to a higher state of perfection than it has attained in any other country. The American Bessemer works have been constructed after plans which are greatly superior to those of most European works.

The most recent improvement upon the Bessemer process is the work of two English chemists—Sidney Gilchrist Thomas and Percy C. Gilchrist, both of London. It renders possible the use in the converter of cast iron which contains a large percentage of phosphorus, no method of eliminating from it this hostile element having previously been in use. The first patent of Mr. Thomas, the principal inventor of this successful method of dephosphorizing iron, is dated November 22, 1877, and relates to the application of a basic lining to Bessemer converters. The Thomas-Gilchrist process is now practiced with success in Great Britain, France, Germany, Austria, Belgium, and Russia. It has not yet been introduced in this country. The entire control in the United States of the Thomas-Gilchrist patents has been purchased by the Bessemer Steel Company Limited. Jacob Reese, of Pittsburgh, claims priority of invention over Messrs. Thomas and Gilchrist.

Mr. Mushet's English patent for the use of *spiegeleisen* as a recarbonizer was permitted to lapse through causes over which he had no control, and before he had received any pecuniary benefit from his invention. Mr. Bessemer has, however, since partly recognized his indebtedness to Mr. Mushet's invention by allowing him an annuity of £300. Mr. Bessemer's own profits from his invention have been enormous. Mr. Jeans says that "from first to last Bessemer's patents have brought him royalties to the value of over £1,057,000." This statement was made in 1879. Mr. Jeans also gives some interesting particulars concerning the profits of the first company that was organized in England to work the Bessemer process. Mr. Bessemer was the projector of this company and a member of it, his associates being Messrs. Longsdon, Allen, and the Galloways of Manchester. The works were located at Sheffield. Mr. Jeans' statement is as follows:

> On the expiration of the fourteen years' term of partnership of this firm, the works, which had been greatly increased from time to time, entirely out of revenues, were sold by private contract for exactly twenty-four times the amount of the whole subscribed capital, notwithstanding that the firm had divided in profits during the partnership a sum equal to fifty-seven times the gross capital, so that by the mere commercial working of the process, apart from the patent, each of the five partners retired, after fourteen years, from the Sheffield works with eighty-one times the amount of his subscribed capital, or an average of nearly cent. per cent. every two months—a result probably unprecedented in the annals of commerce.

The American Iron and Steel Association has ascertained as follows the production of Bessemer steel rails in the United States since the commencement, in 1867, of their manufacture in this country as a commercial product.

Years.	Net tons.	Years.	Net tons.	Years.	Net tons.
1867	2, 550	1872	94, 070	1877	432, 169
1868	7, 225	1873	129, 015	1878	550, 398
1869	9, 650	1874	144, 944	1879	683, 964
1870	34, 000	1875	290, 868	1880	954, 460
1871	38, 250	1876	412, 461		

The total production of rails in these fourteen years was 3,784,019 net tons. Since 1872 the Association has annually ascertained the production of Bessemer steel ingots in the United States. It has been as follows:

Years.	Net tons.	Years.	Net tons.	Years.	Net tons.
1872	120, 108	1875	375, 517	1878	732, 226
1873	170, 652	1876	525, 996	1879	928, 972
1874	191, 933	1877	560, 587	1880	1, 203, 173

A comparison of the production of ingots and rails since 1872 will show approximately the quantity of Bessemer steel that has annually been used in miscellaneous forms. Virtually all of the Bessemer steel that has ever been produced in this country has been used at home; only an infinitesimal quantity has been exported.

John A. Griswold was born at Nassau, Rensselaer county, New York, on November 14, 1818, and died at Troy, New York, on October 31, 1872, aged almost 54 years. Z. S. Durfee was born at Fall River, Massachusetts, on April 22, 1831, and died at Providence, Rhode Island, on June 8, 1880, aged over 49 years.

THE MANUFACTURE OF OPEN-HEARTH STEEL IN THE UNITED STATES.

The open-hearth process for the manufacture of steel, of which the Siemens-Martin furnace is the most popular type, consists in melting pig iron in a large dish-shaped vessel, or reverberatory furnace, and afterwards decarbonizing it by adding wrought iron, steel scrap, or iron ore—a deficiency of carbon being supplied, as in the Bessemer process, by the application of *spiegeleisen* or ferro-manganese; the product is steel, containing any percentage of carbon that may be desired. The materials are melted by the union in the furnace of atmospheric air and combustible gases, affording an intense heat. All of the heat employed is obtained by the use of a regenerative gas furnace. The melted pig metal, previous to receiving the decarbonizing ingredients, is termed a "bath." The quantity of steel that may be made at one operation, or "heat," ranges from five to fifteen tons, according to the size of the furnace.

The open-hearth process, although capable of producing as large masses of steel as the Bessemer process, is much slower in its operation, but it possesses the advantage over its rival that the melted mixture may be indefinitely kept in a state of fusion until experiments with small portions determine the exact conditions necessary to produce a required quality of steel. Another point of difference may be mentioned. While the distinctive features of both the Bessemer and the open-hearth processes embrace strictly chemical operations on a large scale—no direct manipulation of the contents of the Bessemer converter or open-hearth furnace being necessary, the success of the former mainly rests upon the wonderful power and perfection of the machinery by which it is operated, and the success of the latter mainly rests upon the appliances for producing and storing up the gases used in producing combustion.

Both processes may be combined with already-existing iron rolling mills or crucible steel works, but the open-hearth process can be most economically added to such establishments, and this is one cause of its increasing popularity, although, as already intimated, its productive capabilities are much less than those of the Bessemer process. The open-hearth process is also especially adapted to the utilization of the scrap steel and rail ends which accumulate at Bessemer steel works, and very naturally, therefore, many open-hearth furnaces have been built in connection with these works, both in Europe and in the United States. Another use to which the open-hearth process is adapted is the remelting of worn-out steel rails for the production of either new steel rails or steel in other forms. A popular use of the open-hearth process in Europe and America is the production of steel plates for boilers. In Europe open-hearth steel is also coming largely into use as a substitute for iron in shipbuilding. Preparations are being made to use open-hearth steel for the latter purpose in this country.

The importance of the two processes which have been mentioned, and the extent of the revolution they have effected, may be inferred from the fact that they have unitedly increased the world's production of steel fifty-fold in the last twenty-five years

Previous to 1856, the same year in which Mr. Bessemer obtained his most important patent, (February 12, 1856,) Dr. Charles William Siemens gave his attention, in conjunction with his brother, Frederick Siemens, both of whom were natives of Hanover, in Germany, but at the time were citizens of England and residents of London, to the construction of a gas furnace for the manufacture of iron, steel, glass, and other products which require a high and uniform heat. These gentlemen were in that year successful in perfecting the Siemens regenerative gas furnace, which has since been widely introduced in Europe and in this country, and without which no open-hearth steel is now made. The first patent in connection with this invention was granted in 1856 to Frederick Siemens alone.

As early as 1861 Dr. Siemens experimented with the regenerative furnace in the production of cast steel in a reverberatory furnace, or open-hearth, for which application of the regenerative furnace he obtained a patent. He subsequently encountered great practical difficulties in establishing his process of making steel, efforts to accomplish this result being made in 1862 at Tow Law, and in 1863 and 1864 at Barrow and Fourchambault—the last-named place being in France and the others in England.

In 1864 Messrs. Emile and Pierre Martin, of the Sireuil works, in France, with the assistance of Dr. Siemens, erected one of the Siemens regenerative gas furnaces to melt steel in an open-hearth, or reverberatory furnace, of their own construction. In this furnace they produced cast steel of good quality and various tempers, and at the Paris Exposition of 1867 their product secured for them a gold medal. The Messrs. Martin subsequently obtained patents for various inventions of their own which were applicable to the manufacture of steel by the Siemens regenerative furnace.

Dr. Siemens claims, in a letter which is now before us, that, both at Tow Law and Fourchambault, cast steel had been produced upon an open-hearth, which had been specially constructed by himself for that purpose, from pig metal, *spiegeleisen*, and scrap iron, previous to Messrs. Martin's connection with the process. The furnace at Tow Law was a small one, and several such furnaces were recently at work there in the manner originally designed by Dr. Siemens. In 1865 Dr. Siemens commenced the erection at Birmingham, in England, of steel works of his own, in which the regenerative furnace should be used in producing steel. These works, which were completed in 1867, have produced satisfactory results.

The Messrs. Martin devoted their efforts to the production of steel by the dissolution of wrought iron and steel scrap in a bath of pig metal, while the efforts of Dr. Siemens were more especially directed to the production of steel by the use of pig metal and iron ores—the latter either in the raw state or in a more or less reduced condition. The Siemens, or "pig and ore," process is the one that is now generally employed in Great Britain. The Siemens-Martin, or "pig and scrap," process is the one that is chiefly used on the Continent and in this country. The credit of introducing it into this country is due to Hon. Abram S. Hewitt, of New York, who was favorably impressed with it when visiting the Paris Exposition in 1867 as a commissioner of the United States. At his request Frederick J. Slade, his business associate, went to Sireuil to study the process in order to put it into practice in this country.

Dr. Siemens and the Messrs. Martin obtained patents in this country for the use of their respective processes for manufacturing steel, and Dr. Siemens also obtained American patents for the Siemens gas furnace.

On the 1st of December, 1862, Park, McCurdy & Co., of Pittsburgh, sent Lewis Powe, the manager of their copper mill, to England to study the manufacture of tin plates. While there he visited Birmingham, and saw a Siemens gas furnace and procured one of the Siemens pamphlets containing a full description of it. On his return home he called the attention of James Park, Jr., to the advantages of the furnace. Immediately after July 4, 1863, the erection of a Siemens gas furnace was commenced at the copper works. This furnace was erected for the purpose of melting and refining copper, and was completed on the 14th of August, 1863. It was constructed after the drawings contained in the Siemens pamphlet, and worked well. In the fall of 1863 Mr. Powe revisited England, and while there had an interview with Dr. Siemens. Soon afterwards the firm of Park, Brother & Co. built a Siemens furnace to heat steel, but it was not a success. In 1864 James B. Lyon & Co., of Pittsburgh, built a Siemens gas furnace for making glass. The enterprise, however, although mechanically successful, met with an accident which suddenly brought it to an end. This furnace was also constructed after published designs. The introduction into this country of the Siemens furnace by each of the above-named firms was accomplished in an irregular manner, without first obtaining licenses from Dr. Siemens.

The first Siemens gas furnace that was regularly introduced into this country for any purpose was built by John A. Griswold & Co., at Troy, New York, and was used as a heating furnace in their rolling mill, the license having been granted on the 18th of September, 1867. The next gas furnace that was regularly introduced was used as a heating furnace by the Nashua Iron and Steel Company, of New Hampshire, the license for which was granted on the 26th of September, 1867. The next furnace that was regularly introduced was built by Anderson & Woods, of Pittsburgh, for melting steel in pots, the license for which was dated in November, 1867. About 1869 the owners of the Lenox plate-glass works in Massachusetts also built a Siemens gas furnace. All of these furnaces gave satisfaction.

The first open-hearth furnace introduced into this country for the manufacture of steel by the Siemens-Martin process was built in 1868 by Cooper, Hewitt & Co., proprietors of the works of the New Jersey Steel and Iron Company, at Trenton, New Jersey. The building of this furnace was commenced in the spring of 1868, and in December of the same year it was put in operation.

The first successful application in this country of the Siemens regenerative gas furnace to the puddling of iron was under the direction of William F. Durfee, at the rolling mill of the American Silver Steel Company, at Bridgeport, Connecticut, in 1869. Prior to this event an unsuccessful attempt was made to accomplish the same result at the Eagle rolling mill of James Wood & Co., at Saw Mill run, near Pittsburgh.

The production of open-hearth steel ingots in the United States in the census year 1880 was 84,302 net tons, only 9,105 tons of which were converted into rails, the remainder being used for miscellaneous purposes. At the close of the census year 1880 there were thirty-seven open-hearth furnaces in the United States, of which two were in Illinois, one was in Kentucky, four were in Massachusetts, one was in New Hampshire, one was in New Jersey, ten were in Ohio, fourteen were in Pennsylvania, one was in Rhode Island, two were in Tennessee, and one was in Vermont.

During the calendar year 1880 the production of open-hearth steel ingots in this country was much larger than during the census year, being 112,953 net tons, which was a little more than double the production of 1879. Our open-hearth steel industry has suddenly assumed large proportions, and is already an important factor in supplying the domestic demand for steel for all purposes for which Bessemer steel and the ordinary qualities of crucible steel may be used. It is destined to be still further developed in the immediate future. In 1872 the production of open-hearth steel ingots in this country was only 3,000 net tons, and in 1873 it was only 3,500 tons. The following statistics, compiled by the American Iron and Steel Association, will show the production of ingots since 1873 in the districts of the country containing open-hearth steel works.

Districts.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
	Net tons.	*Net tons.*	*Net tons.*	*Net tons.*	*Net tons.*	*Net tons.*	*Net tons.*
New England	5,300	3,010	6,085	6,652	8,228	14,660	20,560
New Jersey and Pennsylvania	1,700	4,240	7,547	7,771	12,231	19,575	50,736
Western and Southern states	....	1,800	7,858	10,608	15,667	22,055	41,657
Total	7,000	9,050	21,490	25,031	36,126	56,290	112,953

The Pernot furnace is a modification of the open-hearth process which has been introduced into the United States from France, but, while producing good steel, it is not likely to grow in favor because of the great trouble and expense which are necessary to keep it in working order. The Ponsard furnace is another modification, but it has not been experimented with in this country, and is not likely to be.

Experimental works were erected at Pittsburgh in 1877 by Park, Brother & Co., in conjunction with Miller, Metcalf & Parkin, for the manufacture of refined iron directly from the ore by a process invented by Dr. Siemens, and successfully tested by him at his experimental works at Towcester, England. The process embodies the application of the Siemens gas furnace. The experiment was abandoned in 1879, the results being unsatisfactory. The same process was subsequently successfully established at Tyrone Forges, in Pennsylvania, by Anderson &

Co., of Pittsburgh. In 1881 Robert J. Anderson and his associates, under the name of the Siemens-Anderson Steel Company, erected extensive works of the same character at Pittsburgh. This process, like many other processes for the manufacture of iron or steel directly from the ore, has its reputation yet to make.

MISCELLANEOUS FACTS OF INTEREST RELATING TO THE DEVELOPMENT OF THE AMERICAN IRON INDUSTRY.

It would far transcend the limits assigned to this report if all of the modern inventions connected with the manufacture of iron and steel in this country were to be made the subject of historical and statistical inquiry. The most important of these inventions, and the history of their introduction into our country, have been referred to in preceding chapters. Several subjects of less importance relating to the mechanical development of our iron and steel industries will now be noticed, with which notice this branch of our subject will be dismissed.

Since the introduction into this country of the hot-blast in connection with the manufacture of pig iron, which occurred in the decade between 1830 and 1840, many methods of heating the air have been in use. Probably the first practical application of the hot-blast in this country was by William Henry, the manager of Oxford furnace, in New Jersey, in 1834. The waste heat at the tymp passed over the surface of a nest of small cast-iron pipes, through which the blast was conveyed to the furnace. The temperature was raised to 250° Fahrenheit, and the product of the furnace was increased about 10 per cent. In 1835 a hot-blast oven, containing cast-iron arched pipes, was placed on the top of the stack by Mr. Henry, and heated by the flame from the tunnel-head. By this arrangement the temperature of the blast was raised to 500°. This innovation in American blast-furnace practice increased the product of Oxford furnace about 40 per cent., with a saving of about the same percentage of fuel. No better device for heating the blast was in use in this country until about 1840. Hot-blast ovens, supplied with cast-iron arched pipes, of various patterns, were in general use in subsequent years down to about 1861, when an improvement in the construction of the oven, but embodying no essential modification of the system, was introduced by Samuel Thomas and adopted at many furnaces. In 1867 or 1868 John Player, of England, introduced his iron hot-blast stove into the United States, which soon became popular, owing to the facilities which it afforded for increasing the heat of the blast. Mr. Player personally superintended the erection of the first of his stoves in this country. It was erected at the anthracite furnace of J. B. Moorhead & Co., at West Conshohocken, Montgomery county, Pennsylvania, and is still in use. Down to the introduction of the Player hot-blast, the ovens, or stoves, were generally placed at the tunnel-head; Mr. Player placed his stove on the ground.

It is due to the memory of John Player that the fact should here be plainly stated that the introduction of his stove was the means of greatly increasing the yield of American furnaces and decreasing the quantity of fuel used to the ton of pig iron. After its introduction the temperature of the blast was generally raised, even where the Thomas and other ovens were used, and ere long powerful blowing engines were more generally used and higher furnaces were built. Connellsville coke was found to work admirably as a fuel for blast furnaces in connection with a powerful blast and high temperature. Since 1868 cast-iron stoves of various patterns have been increased in size, and in this and other improvements their efficiency in raising the temperature of the blast has been greatly promoted.

The Whitwell fire-brick hot-blast stove, also an English invention, was first used in this country at Rising Fawn furnace, in Dade county, Georgia, on June 18, 1875. Its next application was at Cedar Point furnace, at Port Henry, in Essex county, New York, on August 12, 1875. The stoves at Cedar Point furnace were, however, built before those at Rising Fawn furnace. The first application of this stove in Pennsylvania was made as late as February, 1877, at Dunbar furnace, in Fayette county. The Rising Fawn and Dunbar furnaces used coke as fuel, while Cedar Point furnace used anthracite. The first set of Siemens-Cowper-Cochrane fire-brick hot-blast stoves erected in this country was erected at one of the Crown Point furnaces, in Essex county, New York, in 1877; but the first set of these stoves erected in America was erected at Londonderry, in Nova Scotia, by the Steel Company of Canada Limited, in 1876. The Siemens-Cowper-Cochrane stove is also an English invention. Both it and the Whitwell stove embody the regenerative principle in storing heat. The introduction of these stoves has greatly promoted the economic management of American blast furnaces and increased their yield, supplementing and in all respects rivaling the good work inaugurated when the Player stove was introduced.

In the twenty years between 1840 and 1860 the plan of conveying the escaping gases from the top of the blast furnace to the boilers and hot-blast ovens, or stoves, gradually came into general use as a substitute for independent fires or for the use of the flame at the tunnel-head. Its introduction was greatly promoted between 1842 and 1850 by the efforts of Mr. C. E. Detmold, a German engineer, then residing at New York, but recently residing at Paris, who had taken out a patent in this country as assignee of Achilles Christian Wilhelm von Faber du Faur, superintendent of the government iron works at Wasseralfingen, in Wurtemberg, Germany, who had invented a method of utilizing furnace gases in heating the blast. The first practical experiments made by this invention in utilizing furnace gases in the production of heat were made in 1836 and 1837 at Wasseralfingen.

Achilles Christian Wilhelm von Faber du Faur was born on December 2, 1786. He studied at Freiberg in 1808; was first assistant superintendent of the government iron works at Kœnigsbronn in 1810, and afterwards was superintendent for thirty-two years of the government iron works at Wasseralfingen. In 1843 he became a member of the Mining Council (*Bergrath*) at Stuttgart, but owing to ill health he was compelled to retire from active service in 1845. He died on March 22, 1855.

David Thomas, of Catasauqua, Pennsylvania, was the first person in the United States to fully realize the value of powerful blowing engines in the working of blast furnaces. About 1852 he introduced engines at his furnaces at Catasauqua which increased the pressure to double that which was then customary in England. The results were surprising. But many years elapsed before Mr. Thomas's example was generally followed in this country. Within the past few years, however, our superior blast-furnace practice has been mainly due to the use of blowing engines of great power. English ironmasters have only within the past year commenced to imitate the best American practice in this respect.

At the Siberian rolling mill of Rogers & Burchfield, at Leechburg, in Armstrong county, Pennsylvania, natural gas, taken from a well 1,200 feet deep, was first used as a fuel in the manufacture of iron. In the fall of 1874 it was announced that during the preceding six months the gas had furnished all the fuel required for puddling, heating, and making steam, not one bushel of coal having been used. Since 1874 natural gas for puddling has been successfully used at the same rolling mill at Leechburg; at the works of Spang, Chalfant & Co., and Graff, Bennett & Co., in Allegheny county, Pennsylvania; and at the rolling mill of the Kittanning Iron Company, at Kittanning, Pennsylvania. In each instance the gas used has been obtained from wells that were sunk for oil but were found to produce only gas. The method employed in using the gas at Kittanning in the summer of 1881 has been described as follows:

> The gas is brought from a well some three miles distant, in four-inch casing, and at the mill is distributed amongst eighteen boiling furnaces. The furnaces are the same as those in which coal is used. The gas enters the rear of the furnace in three small pipes, shaped at the end like a nozzle. There being quite a pressure, the gas enters with considerable force, and by means of dampers to regulate the draft an intense and uniform heat is obtained. After a heat the furnace is cooled and prepared for the next heat in the same manner as with coal. When the metal is in place the gas is turned on, and the operation of puddling is the same, with the exception that it is somewhat slower. Only one-half of the well's production of gas is in fact consumed by the eighteen furnaces here described. The puddlers like the gas very much, as it reduces their labor to some extent, and they say they can make better weight than with coal. The furnaces being free from sulphur, a better quality of iron is produced, and it brings a slightly advanced price in the market. These furnaces have been running all the time for some months past, and have used nothing but gas for fuel, which has proved satisfactory in every respect, and is found to be much cheaper than coal.

We have previously recorded the erection in 1817, at Plumsock, in Fayette county, Pennsylvania, of the first rolling mill in the United States for the production of bar iron. The first puddling in this country was also done at this rolling mill in the same year. It may seem strange to many of the present generation, who witness the number and magnitude of our iron and steel establishments, that such important processes as the puddling of pig iron and the rolling of bar iron should not have been introduced into the United States until sixty-five years ago, but we have been unable to locate their introduction at an earlier period. Careful inquiry fails to discover the existence in the United States of any rolling mill to roll bar iron and puddle pig iron prior to the enterprise at Plumsock in 1817. We have, however, obtained the curious information that a patent was granted to Clemens Rentgen, of Kimberton, in Chester county, Pennsylvania, as late as June 27, 1810, for a machine to roll iron in round shapes, proving that Cort's rolls had not then been introduced into the United States. The original patent of Mr. Rentgen has been shown to us by his descendant, Professor William H. Wahl, of Philadelphia. We learn from this gentleman that Mr. Rentgen, before obtaining the patent in 1810 for his method of rolling round iron, built an experimental set of rolls, which were replaced by a permanent set after the patent was granted, with which he rolled round iron as early as 1812 or 1813, some of which was for the Navy Department of the United States Government. It is not claimed that he used puddling furnaces or rolled bar iron.

Ralph Crooker, recently of the Bay State iron works, at Boston, the oldest rolling-mill superintendent in the United States, writes us that the first bar iron rolled in New England was rolled at the Boston iron works, on the mill-dam in Boston, in 1825, and that the first puddling done in New England was at Boston, on the mill-dam, by Lyman, Ralston & Co., in 1835.

Before the use of bituminous and anthracite coal became general in this country wood was sometimes used to puddle pig iron, as it is now used at some places in Sweden, and it was also used in the heating furnaces of rolling mills. From 1821 to 1825 the Fall River rolling mill, in Massachusetts, used wood in heating iron for nail plates. In 1848 pig iron was puddled with wood at Adirondack, in Essex county, New York. Prior to 1850 puddling with wood was done at Horatio Ames's works at Falls Village, in Connecticut. In 1858 the Hurricane rolling mill and nail works, on Pacolet river, 43 miles west of Yorkville, in South Carolina, used dry pine wood in its puddling and heating furnaces; and in the preceding year the Cherokee Ford rolling mill, on Broad river, in Union county, in the same state, used "splint" wood for the same purposes.

It has already been stated that the Catalan forge, for the manufacture of iron directly from the ore, is still in use in the United States, and it may here be added that in some of the southern states it is used in the simple and inexpensive form in which it appears to have been introduced into this country, and which is known among metallurgists as the German bloomary. But in the Champlain district of New York the Catalan forge, or German bloomary, has been greatly improved. The blast is heated, which was never done with the old Catalan forge, but most of the power is still supplied by a water-wheel. Charcoal is the only fuel used, and great care is taken in its manufacture, as well as in calcining the ore, which is of a pure quality. The bloom produced in this forge usually weighs from 300 to 400 pounds. From the bloom is obtained a billet of refined iron, which goes into consumption in the manufacture of crucible and open-hearth steel, iron wire, plate and sheet iron, etc. About one ton of billets is produced at each forge in twenty-four hours. The blooms and billets are hammered into shape by a trip-hammer. In the census year 1880 there were in the Champlain district 22 establishments for the manufacture of blooms, embracing 141 forge fires. They produced 31,580 net tons of blooms in the year named. Statistics obtained by the American Iron and Steel Association show that the production of Champlain blooms has increased from 23,666 net tons in 1875 to 34,351 tons in the calendar year 1880.

The beginning of the regular manufacture of Connellsville coke, which is especially celebrated for its excellence as a fuel for blast furnaces, is said by Dr. Frank Cowan to date from the summer of 1841, when William Turner, Sr., P. McCormick, and James Campbell employed John Taylor to erect two ovens for making coke on his farm lying on the Youghiogheny river, a few miles below Connellsville, in Pennsylvania. The ovens were built of the bee-hive pattern. After repeated failures a fair quality of coke was produced in the winter of 1841–'42. By the spring of 1842 enough coke had been made to load a coal boat 90 feet long. This boat was taken down the Youghiogheny, the Monongahela, and the Ohio to Cincinnati, where a purchaser was obtained for the coke after some difficulty. This purchaser was Mr. Greenwood, a wealthy foundryman, and the price paid was 6¼ cents a bushel, half cash and half old mill irons. Others embarked in the business of manufacturing coke in 1842, Mordecai Cochran and Richard Brookins among the number, both of whom were successful. In 1844 improved ovens were introduced by Colonel A. M. Hill, whose energy and success gave a great impetus to the coke business. In 1855 there were only 26 coke ovens at work on the Monongahela river, and in all western Pennsylvania there were probably not over a hundred; now their number may be counted by thousands, most of which are built upon improved models. To-day Connellsville coke is extensively used in the blast furnaces of many states, its use for this purpose extending to the Mississippi valley. Fully one-third of the annual production of pig iron in this country is made with this fuel. Its use as a furnace fuel properly dates from 1860, when it was first used in a furnace at Pittsburgh owned by Graff, Bennett & Co., and known as Clinton furnace. This was the first continuous and successful use of Connellsville coke in a blast furnace. This coke is free from sulphur, but contains more ash than the celebrated Durham coke of England. One hundred pounds of Connellsville coal will make 62½ pounds of coke.

The Phœnix wrought-iron column, which is now in general use in this country and in Europe in the construction of wrought-iron bridges, viaducts, depots, warehouses, and other structures, is the invention of the late Samuel J. Reeves, of Philadelphia, a member of the Phœnix Iron Company, of Phœnixville, Pennsylvania. The invention was patented on June 17, 1862.

Mr. Reeves died at Phœnixville on December 15, 1878, aged 60 years. For many years previous to his death he had been president of the American Iron and Steel Association and of the Phœnix Iron Company. He was a native of Bridgeton, New Jersey. We mention his name with the reverence due to a good man's memory.

Down to 1846, when John Griffen built a rolling mill at Norristown, Pennsylvania, for Moore & Hooven, steam boilers had never been put over puddling and heating furnaces in any country. In this mill all the steam that was needed for driving the mill was generated in boilers over the puddling and heating furnaces, no auxiliary boilers being used or needed, thus greatly economizing fuel. Mr. Griffen met with much opposition from observers while constructing the mill upon this plan, and many predictions were made by them that the new arrangement would be a failure. It was a great innovation on the practice then prevailing, but it was a complete success, and its general adoption has effected a saving in fuel to the iron manufacturers in this country of many millions of dollars. Mr. Griffen has been for many years the general superintendent of the Phœnix iron works, at Phœnixville.

THE EARLY HISTORY OF IRON RAILS IN THE UNITED STATES.

The influence of railroads upon the development of the iron and steel industries of the United States has been so great that we will be justified in presenting in this chapter some of the leading facts connected with the laying of the first rails upon American railroads and with the manufacture of the first American rails.

The first railroads in the United States were built to haul gravel, stone, anthracite coal, and other heavy materials, and were all short, the longest probably not exceeding a mile in length. Strictly speaking, they were tramroads and not railroads. One of these was built on Beacon Hill, in Boston, by Silas Whitney, in 1807; another by Thomas Leiper, in Delaware county, Pennsylvania, in 1809; and another at Bear Creek furnace, in Armstrong county, Pennsylvania, in 1818. The tracks of these roads were composed of wooden rails. Other short tramroads were built in various places early in this century, and were similarly constructed. In George W. Smith's notes on Wood's *Treatise on Railroads* (1832) it is stated that "in 1816 the first railroad on which self-acting inclined planes were erected was executed by Mr. Boggs, on the Kiskiminetas river," in western Pennsylvania. This road was used to convey bituminous coal to Mr. Boggs's salt works.

Prior to 1809 Oliver Evans, of Philadelphia, to whom more than to any other person the honor of inventing the locomotive is due, urged in repeated addresses to the public the construction of a passenger railroad from Philadelphia to New York, and in that year he unsuccessfully attempted to form a company for this purpose. In 1812 Colonel John Stevens, of Hoboken, New Jersey, published a pamphlet, recommending the building of a passenger railroad from Albany to Lake Erie, but his suggestions were not heeded.

On the 7th of April, 1823, the state of New York chartered the Delaware and Hudson Canal Company to construct a canal and railroad from the coal fields of Pennsylvania to the Hudson river at Rondout in New York. The canal was completed in 1828, but the railroad was not completed until 1829. It was 16 miles long, and extended from Honesdale to Carbondale. It was built to carry coal.

In 1826 the Quincy railroad, in Massachusetts, 4 miles long, including branches, was built by Gridley Bryant and Colonel T. H. Perkins, to haul granite blocks from the Quincy quarries to the port of Neponset. The rails of this road were made of wood, but strapped with iron plates 3 inches wide and ¼ of an inch thick. In 1827 the Mauch Chunk railroad, in Carbon county, Pennsylvania, 9 miles long, with 4 miles of sidings, was built to connect the coal mines of the Lehigh Coal and Navigation Company with the Lehigh river. Its rails were also made of wood and strapped with iron. Gordon, in his *Gazetteer of the State of Pennsylvania*, (1832,) says of this road: "The railway is of timber, about 20 feet long, 4 inches by 5, and set in cross-pieces made of cloven trees placed 3½ feet from each other and secured by wedges. The rail is shod on the upper and inner edge with a flat bar of iron 2¼ inches wide and ⅝ of an inch thick." Solomon W. Roberts says of the Mauch Chunk road: "It was laid mostly on the turnpike, and was a wooden track, with a gauge of 3 feet 7 inches, and the wooden rails were strapped with common merchant bar iron, the flat bars being about 1½ inches wide and ⅜ of an inch thick. The holes for the spikes were drilled by hand. Although a great deal of bar iron, of somewhat varying sizes, was bought for the purpose, the supply fell short, and, to prevent delay in opening the road, strips of hard wood were spiked down in place of iron on about a mile and a half or two miles of the road, as a temporary expedient."

Mr. Roberts relates that the Lehigh Coal and Navigation Company made a short section of experimental railroad at its foundry in Mauch Chunk in the summer of 1826. "The idea then was to make a road with rails and chairs of cast iron, like those in use at the coal mines in the North of England. After casting a good many rails, each about 4 feet long, the plan was given up on account of its being too expensive."

In 1826 the state of New York granted a charter for the construction of the Mohawk and Hudson railroad, for the carriage of freight and passengers, from Albany to Schenectady, a distance of 17 miles. Work on this road, however, was not commenced until August, 1830; it was opened for travel on September 12, 1831.

On February 28, 1827, the state of Maryland granted a charter for the construction of the Baltimore and Ohio railroad, which was the first railroad in the United States that was opened for the conveyance of passengers. Its construction was commenced on July 4, 1828,—the venerable Charles Carroll, of Carrollton, laying the corner-stone. In 1829 the track was finished to Vinegar Hill, a distance of about 7 miles, and "cars were put upon it for the accommodation of the officers and to gratify the curious by a ride." Mr. Poor, in his *Manual of the Railroads of the United States*, says that the road was opened for travel from Baltimore to Ellicott's Mills, a distance of 13 miles, on May 24, 1830. The Washington branch was opened from Relay to Bladensburg on July 20, and to Washington City on August 25, 1834.

The next passenger railroad which was undertaken in the United States was the Charleston and Hamburg railroad, in South Carolina, which was chartered on December 19, 1827. Six miles of the road were completed in 1829, but they were not opened to the public until December 6, 1830, when a locomotive was placed on the track. The road was completed in September, 1833, a distance of 135 miles. At that time it was the longest continuous line of railroad in the world. The Columbia branch was opened on November 1, 1840, and the Camden branch on June 26, 1848. We need not further note the beginning of early American railroads.

The rails used on the Charleston and Hamburg and the Mohawk and Hudson railroads were made of wood, with flat bar iron nailed upon their upper surface. A writer in Brown's *History of the First Locomotives in America* says that the track of the Baltimore and Ohio railroad consisted of cedar cross-pieces, and of string-pieces of yellow-pine "from 12 to 24 feet long and 6 inches square, and slightly beveled on the top of the upper side, for the flange of the wheels, which at that time was on the outside. On these string-pieces iron rails were placed and securely nailed down with wrought-iron nails, 4 inches long. After several miles of this description of road had been made long granite slabs were substituted for the cedar cross-pieces and the yellow-pine stringers. Beyond Vinegar Hill these huge blocks of this solid material could be seen deposited along the track, and gangs of workmen engaged in the various operations of dressing, drilling, laying, and affixing the iron." Brown says that "iron strips were laid, for miles and miles, on stone curbs on the Baltimore and Ohio railroad." Appleton's *American Cyclopædia* says that the iron used was ½ and ⅝ of an inch thick and from 2½ to 4½ inches wide, and that the heads of the spikes which fastened it were countersunk in the iron.

Before the Baltimore and Ohio railroad had been finished to Point of Rocks in 1832 "wrought-iron rails of the English mode," says Brown, had been laid down on a part of the line. The company had found in practice that the strap rail would become loosened from the wooden stringer, and that the ends of it, called "snakes' heads," were frequently forced by the wheels through the bottom of the cars, to the jeopardy of the passengers. The English rail obviated this inconvenience and risk.

About the time when the Baltimore and Ohio railroad was finished to Point of Rocks various patterns of heavy rolled iron rails were in use in England. The first of these to be used was the fish-bellied rail, which was invented by John Birkinshaw, of the Bedlington iron works, and patented in October, 1820, and which fitted into a cast-iron chair. A thin wedge, or key, of wrought iron was driven between the inside of the chair and the rail, to keep the latter firmly in its place, and the operation of "driving keys" had to be repeated almost every day.

The Birkinshaw rail was used on the Stockton and Darlington railroad, in England, which was opened in September, 1825, and was the first railroad in the world that was opened for general freight traffic and passenger travel. The larger part of the Stockton and Darlington road, which was 37 miles long, was laid with rolled rails of this pattern, weighing 28 pounds to the yard; a small part of the line was laid with fish-bellied cast-iron rails. The Liverpool and Manchester railroad, which was opened in September, 1830, and which was the second railroad built in England for general business, used rails which were also of the Birkinshaw pattern. "The rails used were made of forged iron, in lengths of 15 feet each, and weighed 175 pounds each. At the distance of every 3 feet the rail rests on blocks of stone. Into each block two holes, 6 inches deep and 1 inch in diameter, are drilled; into these are driven oak plugs, and the cast-iron chairs into which the rails are fitted are spiked down to the plugs, forming a structure of great solidity."

The Clarence rail was an English improvement on the Birkinshaw rail; it also rested in a chair, but it did not have the fish-belly, its upper and lower surfaces being parallel to each other. Rails of the Clarence pattern were used upon the Allegheny Portage railroad in Pennsylvania, which was finished in 1833, and many of the stone blocks on which they were laid can yet be seen in its abandoned bed. The Columbia and Philadelphia railroad was opened on the 16th of April, 1834. On a small part of this road flat rails were laid, either directly on granite blocks or on wooden string-pieces, but on the larger part of it Clarence rails were laid on stone blocks. On the Boston and Lowell railroad, which was chartered in June, 1830, and completed in 1835, stone cross-ties were at first laid, some of which were in use as late as 1852. On one track of this road the fish-bellied Birkinshaw rail was used, and on the other track the H rail was laid. This rail, which rested in a chair, had a web, or flange, similar to that of the modern T rail. The H rail was laid upon the Washington branch of the Baltimore and Ohio railroad. It was 15 feet in length, weighed 40 pounds to the yard, and was laid on string-pieces of wood. Wooden cross-ties have been substituted for stone blocks on all American railroads.

The following extract from a New York newspaper, dated May 30, 1844, shows the risk to which travelers were subjected who journeyed on railroads the tracks of which were laid with flat rails.

> RAILROAD CASUALTY.—The cars on the railroad a short distance east of Rome, New York, came in contact with a "snake head" on Saturday morning which threw several of the passenger cars and the mail car off the track. The crush was tremendous, and the cars were torn to splinters, though happily no lives were lost. Mr. Peter Van Wie was badly bruised, and some others slightly injured.

The flat rail which was first used on American railroads continued in use for many years, notwithstanding the difficulty experienced in keeping it in its place. At first the holes for the spikes were drilled by hand. The flat rails which were afterwards made were indented, or countersunk, at regular distances in their passage through the rolls. The center of the countersunk surface was then punched through for the admission of the spike. As late as 1837, when the Erie and Kalamazoo railroad was in course of construction from Toledo to Adrian, it was proposed to put down wooden rails, of oak studding 4 inches square, and to draw the cars by horses. But wiser counsels prevailed, and by great exertions sufficient funds were obtained to enable the management to iron the road with flat rails ⅝ of an inch thick. Mr. Poor says: "It was not until 1850 that the longitudinal sill and the flat rail were entirely removed from the Utica and Schenectady railroad, the most important link in the New York Central line." Flat rails were in use on many other railroads in this country after 1860, and may yet be seen on some southern railroads.

Cast-iron rails were made in this country in small quantities during the early years of our railroad history, notwithstanding the unfavorable experiment in their use at Mauch Chunk which is noted by Mr. Roberts. Johnson, in his *Notes on the Use of Anthracite*, written in 1841, records a series of tests made in that year with rails for mine roads, cast in a foundry from pig iron made at the Pottsville furnace of William Lyman. These rails were 6 feet long and were of various weights. It is particularly stated of one rail which was tested that it was "intended to sustain locomotives." The rails were bulbous at both the top and bottom, like the double-headed, or H, rail now used in England, but they had at each end, for about 3 inches along the base, flanges for securing them to the cross-ties, which caused an end view of them to resemble that of a modern T rail.

Many years elapsed after the first railroad was built in this country before any other than flat iron rails were made in American rolling mills. Among the proposals to furnish heavy rails for the Columbia and Philadelphia railroad, received in May, 1831, there were none for American rails, and the whole quantity was purchased in England. It is necessary to explain here that previous to the passage of the tariff act of 1842 rails were admitted into this country virtually free of duty. On the passage of that act American capitalists began to think about making heavy rails.

Early in 1844 there were still no facilities in this country for the manufacture of heavy iron rails to supply the wants of the 4,185 miles of American railroad which existed at the beginning of that year, and of a few hundred additional miles which were then projected. In a memorial which was laid before Congress in that year Hon. John Tucker, the president of the Philadelphia and Reading Railroad Company, under date of May 4, 1844, made the following declaration.

> Immediately on the line of the road are rich mines of iron ore. Last fall and winter it was generally known in that section of the state through which the road passes, as well as on other portions of it, that this company intended to lay a second track, and that about 8,300 tons of railroad iron was wanted. Public proposals were issued for all the materials required, except the iron. The iron was not included in these proposals for the simple reason that I knew that it could not be furnished in this country, but I had interviews with several of the largest ironmasters, and freely expressed my desire to contract for American railroad iron, provided it could be furnished at the time it was wanted. I received no proposition to deliver the rolled bars. I inclose a copy of a letter from one of the largest ironmongers in the state, offering cast-iron rails, which, I presume you are aware, have not answered any good purpose. I also inclose a copy of my answer, to which I have not received a reply. I unhesitatingly express my conviction that the railroad iron needed by this company could not have been obtained in this country, at the time they required it, at any price; and I am equally confident that there are no parties ready to contract to deliver such iron for a long time to come. This company was therefore compelled to import their iron.

The following is the correspondence referred to above concerning the proposition to make cast-iron rails for the Philadelphia and Reading Railroad Company.

PHILADELPHIA, *November* 7, 1843.

MR. TUCKER: DEAR SIR: Since my conversation with you, in relation to substituting cast-iron rails for your new track of rails which you contemplate laying soon, I have concluded to propose to you that I should cast eighteen bar-rails 15 feet long from the model in the Franklin Institute, as a sample of the strength and durability of rails made from cast iron. The price to be $30 per ton cash upon delivering at Broad street. With respect, yours,

CLEMENT B. GRUBB.

Direct Lancaster, Pennsylvania.

OFFICE OF THE PHILADELPHIA AND READING RAILROAD COMPANY, PHILADELPHIA, *November* —, 1843.

CLEMENT B. GRUBB, Esq., *Lancaster:* DEAR SIR: I duly received your communication of the 7th instant. This company is not disposed to make any experiment with the cast-iron rails on their own account. But if you choose to send the eighteen bars they shall be laid on the road; and if, after a trial of six months, they are found to answer a good purpose the company will pay you $30 per ton for the rails. If they are not suitable for the road they will then be delivered to you, the company merely incurring the expense of laying down and taking up the rails. Your obedient servant,

JOHN TUCKER, *President.*

No reply was received to this.

The 8,300 tons of rails which were wanted by Mr. Tucker, and which he was compelled to buy in England, were of the H pattern, then very popular. The rails weighed 60 pounds to the yard, and cost £5 10*s*. per ton.

In a letter dated May 22, 1844, which formed a part of the above-mentioned memorial to Congress, Joseph E. Bloomfield made the following statement.

> There is no doubt of the fact that there are no establishments for the manufacture of railroad iron in Pennsylvania prepared to produce a moiety of the iron required for the railways actually commenced. Mr. Oakley, of Brooklyn, made a statement, that at the time was combated and denied, that he could furnish from one set of works 10,000 tons of railroad iron per annum. This is so palpably incorrect that it needs no refutation. There is no iron establishment of this kind in this country.

On the 24th of April, 1844, the Hon. Edward Joy Morris, of Pennsylvania, declared that "not a ton of T rail had yet been made in this country." He might have included all other heavy patterns.

In 1844 the manufacture of heavy iron rails in this country was commenced at the Mount Savage rolling mill, in Alleghany county, Maryland, erected in 1843 especially to roll these rails. The first rail rolled at the Mount Savage rolling mill, and in honor of which the Franklin Institute of Philadelphia struck a silver medal, was a U rail, known in Wales as the Evans patent, of the Dowlais iron works, at Merthyr Tydvil. It was intended to be laid on a wooden longitudinal sill, and was fastened to it by an iron wedge, keying under the sill, thus dispensing with outside fastenings. This rail weighed 42 pounds to the yard. About 500 tons of rails of this pattern were laid in 1844 on a part of the road then being built between Mount Savage and Cumberland, a distance of nine miles. Soon afterwards rails weighing 52 pounds to the yard were rolled at the Mount Savage rolling mill for the road leading from Fall River to Boston. The foregoing information was obtained by us from Henry Thomas Weld, of Mount Savage.

The Montour rolling mill, at Danville, Pennsylvania, was built in 1845 expressly to roll rails, and here were rolled in October of that year the first T rails made in the United States. The first T-rail rolls made in this country were made for the Montour Iron Company by Haywood & Snyder, proprietors of the Colliery iron works at Pottsville, the work being done at their branch establishment at Danville. The Boston iron works were started in January, 1824, to manufacture cut nails, hoops, and tack plates, but they subsequently rolled rails, and on the 6th of May, 1846, they rolled the first T rails in Massachusetts, Ralph Crooker being superintendent. In 1845 the rolling mill of Cooper & Hewitt was built at Trenton, New Jersey, to roll heavy rails, and on the 19th of June, 1846, their first T rail was rolled. About the 1st of September, 1846, the New England Iron Company, at Providence, Rhode Island, commenced to roll T rails. The first lot of these rails rolled by the company was delivered to the Providence and Worcester railroad on September 11, 1846. T rails were rolled in November, 1846, at Phœnixville, Pennsylvania; in the fall of the same year at the Great Western iron works at Brady's Bend, Pennsylvania, and at the Lackawanna iron works at Scranton, Pennsylvania; early in 1847 at the Bay State rolling mill, in Massachusetts, then owned by the Massachusetts Iron Company; in January, 1848, at the Rough-and-Ready rolling mill at Danville, Pennsylvania; and in the same year at Safe Harbor, Pennsylvania. All of the T rails made at the mills above mentioned were rolled with a base or flange similar to that of the present T rail. Some of them did not differ greatly from the H rail, and when laid rested, like it, in a chair. Indeed the H rail was sometimes called the T rail. A few other mills rolled heavy rails before 1850, but at the beginning of that year, owing to foreign competition, only two out of fifteen rail mills in the country were in operation.

From *A History of the Growth of the Steam Engine*, by Robert H. Thurston, we learn that the present T rail is an American invention. Professor Thurston says: "Robert L. Stevens, the president and engineer of the Camden and Amboy railroad, and a distinguished son of Colonel John Stevens, of Hoboken, was engaged, at the time of the opening of the Liverpool and Manchester railroad, in the construction of the Camden and Amboy railroad. It was here that the first of the now standard form of T rail was laid down. It was of malleable iron. It was designed by Mr. Stevens, and is known in the United States as the 'Stevens' rail. In Europe, where it was introduced some years afterwards, it is sometimes called the 'Vignoles' rail." Professor Thurston adds that a part of the track of the Camden and Amboy railroad at Bordentown was laid down and opened for business in 1831. We presume that T rails were laid on the whole line, which crossed the state of New Jersey.

Through the courtesy of Professor Thurston we have been furnished with the accompanying *fac-simile* of the call issued by Mr. Stevens in 1830 for proposals for supplying the Camden and Amboy railroad with T rails.

The sides of the rails rolled for Mr. Stevens were made straight, and without "the projections on the lower flange at every two feet" which were specified in his call. These projections were intended to serve the purposes of cast-iron chairs then in use, by giving a broad base to the rail at its connection with the cross-ties.

Mr. Francis B. Stevens, of Hoboken, New Jersey, a nephew of Robert L. Stevens, has supplied us in the following letter with additional information concerning the history of the T rail. His letter is valuable, and, in connection with the *fac-simile* of the original call for proposals which we have given, conclusively establishes the fact that the present T rail was the invention of his uncle, Robert L. Stevens.

HOBOKEN, NEW JERSEY, *May* 31, 1881.

DEAR SIR: In answer to your letter of the 27th instant I will say that I have always believed that Robert L. Stevens was the inventor of what is called the T rail, and also of the method of fastening it by spikes, and I have never known his right to the invention questioned.

The rail of the Liverpool and Manchester railroad, on its opening, in September, 1830, was of wrought iron, divided into fish-bellied sections, each section being supported by a cast-iron chair, to which it was secured by a wooden wedge. This form was derived from the old cast-iron fish-bellied tram rail, cast in single sections, each about 36 inches long. This wrought-iron rail was afterwards improved by making its bottom straight uniformly throughout its length.

Mr. Stevens's invention consisted in adding the broad flange on the bottom, with a base sufficient to carry the load, and shaped so that it could be secured to the wood below it by spikes with hooked heads; thus dispensing with the cast-iron chair, and making the rail and its fastening such as it now is in common use. In the year 1836 and frequently afterwards he spoke to me about his invention of this rail, and told me that in London, after unsuccessful applications elsewhere in England, shortly after the opening of the Liverpool and Manchester railroad, he had applied to Mr. Guest, a member of Parliament, who had large rolling mills in Wales, to take a contract to make his rail for the Camden and Amboy railroad, of which he was the chief engineer; that Mr. Guest wished to take the contract, but considered that it would be impracticable to roll the rail straight; that, finally, Mr. Guest agreed to go to Wales with him and make a trial; that great difficulty was at first experienced, as the rails coming from the rolls curled like snakes, and distorted in every imaginable way; that, by perseverance, the rail was finally successfully rolled; and that Mr. Guest took the contract. The Camden and Amboy railroad, laid with this rail, was opened October 9, 1832, two years after the opening of the Liverpool and Manchester railroad. Of this I was a witness.

This rail, long known as the old Camden and Amboy rail, differed but little, either in shape or proportions, from the T rail now in common use, but weighed only 36 pounds to the yard. For the next six or eight years after the opening of the Camden and Amboy railroad this rail was but little used here or abroad, nearly all the roads built in the United States using the flat iron bar, about 2½ inches by ⅝ inch, nailed to wooden rails, and the English continuing to use the chair and wedge.

My uncle always regretted that he had not patented his invention. He mentioned to me, upwards of forty years ago, that when advised by his friend, Mr. F. B. Ogden, the American consul at Liverpool, who was familiar with the circumstances of his invention, to patent it, he found that it was too late, and that his invention had become public property. Yours, truly,

FRANCIS B. STEVENS.

Smith, in his notes on Wood's *Treatise on Railroads*, thus describes the T rail which was laid on the Camden and Amboy railroad: "The rails are of rolled iron, 16 feet long, 2⅛ inches wide on the top, 3¼ inches at the bottom, and 3½ deep; the neck half inch thick; the weight is 209 pounds = $39\frac{3}{16}$ pounds per yard; they are secured by clamps of iron, riveted at the extremity of each bar. The rails are attached to the stone blocks and sleepers by means of nails or pins, at the sides, driven into wooden plugs; chairs are dispensed with." It seems strange that the T rail should not have become generally popular in this country until after 1845.

The first 30-foot rail rolled in this country is claimed to have been rolled at the Cambria iron works at Johnstown, Pennsylvania, in 1855. These rails were perfectly made, but there being no demand for them they were used in the tracks of the Cambria Iron Company. It is claimed that the first 30-foot rails rolled in the country on order were rolled at the Montour rolling mill, in January, 1859, for the Sunbury and Erie Railroad Company. The first 60-foot, or double-length, rails rolled in this country were rolled by the Edgar Thomson Steel Company, at Braddock's Station, near Pittsburgh, Pennsylvania, in the fall of 1875. In 1877 the Lackawanna Iron and Coal Company, at Scranton, Pennsylvania, commenced to roll 60-foot rails. At the Centennial Exhibition at Philadelphia, in 1876, the Edgar Thomson Steel Company exhibited a steel rail which at that time was the longest steel rail that had ever been rolled. It was 120 feet long, and weighed 62 pounds to the yard.